

## NATIONAL INSTITUTE OF TECHNOLOGY MEGHALAYA

**Department of Computer Science & Engineering** 

Under Graduate Curriculum & Syllabus Regulation - 2018

**B.Tech in Computer Science & Engineering** 

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## **Vision and Mission**

### Vision

Attaining global recognition in Computer Science & amp; Engineering education, research and training to meet the growing needs of the industry and society.

### Mission

- Imparting quality education through well-designed curriculum in tune with the challenging software needs of the industry.
- Providing state-of-art research facilities to generate knowledge and develop technologies in the thrust areas of Computer Science and Engineering.
- Developing linkages with world class organizations to strengthen industry-academia relationships for mutual benefit.

### **Program Educational Objectives (PEOs)**

PEO1: Apply computer science theory blended with mathematics and engineering to model computing systems.

PEO2: Design, implement, test and maintain software systems based on requirement specifications.

PEO3: Communicate effectively with team members, engage in applying technologies and lead teams in industry.

PEO4: Assess the computing systems from the view point of quality, security, privacy, cost, utility, etiquette and ethics.

PEO5: Engage in lifelong learning, career enhancement and adapt to changing professional and societal needs.

## **Program Outcomes (POs)**

- **PSO 1:** The ability to understand, analyse and develop solution strategy towards problems in the areas related to algorithms, system software, machine learning, and Artificial Intelligence, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.
- **PSO 2:** The ability to understand the evolutionary changes in computing, apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success, real world problems and meet the challenges of the future.
- PSO 3: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, lifelong learning and a zest for higher studies and also to act as a good citizen by inculcating in them moral values & ethics.

## **Structure of Curriculum**

	SEMESTER - 1										
Course	Course Title	Course	Con	tact H	lours	Credit	Pre-				
Code	Course Inte	Туре	L	т	Р	С	requisites				
MA 101	Differential Calculus and Linear Algebra	Sc/HS	3	1	0	4	None				
ME 101	Engineering Mechanics	BE	3	0	0	3	None				
CY101/ PH101	Chemistry/Physics	Sc/HS	2/3	1	0	3/4	None				
CE 101	Engineering Drawing	BE	1	0	4	3	None				
EE101/ EC101	Basic Electrical Engineering /Basic Electronics Engineering	BE	2	0	0	2	None				
HS 101	English Language Skills	Sc/HS	2	0	0	2	None				
HS 151	English Language Skills Lab	L	0	0	2	1	None				
CY151/ PH151	Chemistry Lab /Physics Lab	L	0	0	2	1	None				
EE151/ EC151	Basic Electrical Lab /Basic Electronics Lab	L	0	0	2	1	None				
Total Contact Hours – Component wise			13/ 14	2	10						
Total Contact Hours				25/26		20/21					

	SEMESTER – 2										
Course	Course Title	Course	Con	itact H	lours	Credit	Pre-				
Code	Course Intie	Туре	L	т	Р	С	requisites				
MA 102	Integral Calculus and Complex Variables	Sc/HS	3	1	0	4	None				
EE101/ EC101	Basic Electrical Engineering /Basic Electronics Engineering	BE	2	0	0	2	None				
PH101/ CY101	Chemistry/Physics	Sc/HS	2/3	1	0	3/4	None				
CY 102	Environmental Science	Sc/HS	2	0	0	2	None				
CS 102	Introduction to Computing	BE	2	1	0	3	None				
ME 152	Workshop Practice	L	0	0	4	2	None				
EE151/ EC151	Basic Electrical Lab/ Basic Electronics Lab	L	0	0	2	1	None				
CY151/ PH151	Chemistry Lab /Physics Lab	L	0	0	2	1	None				
CS 152	Computing Lab	L	0	0	2	1	None				
Total Contact Hours – Component wise			11/ 12	3	10						
	Total Contact Hours			24/25		19/20					

SEMESTER - 3										
Course	Course Title	Course	Contact Hours			Credit	Pre-			
Code	Course fille	Туре	L	Т	Р	С	requisites			
MA 201	Integral Transforms and PDEs	М	3	1	0	4	None			
Professio	Professional Core Courses - 1, 2, 3									
CS 201	Data Structures	PC	3	0	0	3	None			
CS 203	Digital Logic Design	PC	3	1	0	4	None			
CS 205	Discrete Mathematical Structures	PC	3	1	0	4	None			
Special C	ourse – 1									
ME 291	Safety Engineering	S	2	0	0	2	None			
Lab Cour	ses - 1, 2, 3									
CS 251	Data Structures Lab	L	0	1	2	2	None			
CS 253	Digital Logic Design Lab	L	0	1	2	2	None			
CS 255	Internet Web Technology Lab	L	0	0	2	1	None			
Total Contact Hours – Component wise			14	5	6					
	Total Contact Hours			25						

	SEMESTER – 4										
Course	Course Title	Course	Contact Hours			Credit	Pre-				
Code	Course Inte	Туре	L	Т	Р	С	requisites				
Professio	Professional Core Courses - 4, 5, 6										
CS 202	Computer Organization	PC	3	1	0	4	CS 203				
CS 204	Object Oriented Programming and Design	PC	3	1	0	4	CS 101				
CS 206	Data Communication	PC	3	0	0	3	None				
Professional Elective – 1											
CS 212	Analysis and Design of Algorithms	PE	3	0	0	3	None				
CS 214	Computational Models for Real Time Systems	PE	3	0	0	3	None				
CS 216	Cyber Physical Systems	PE	3	0	0	3	None				
CS 218	Computer Arithmetic	PE	3	0	0	3	None				
Professio	nal Elective – 2										
CS 220	Principles of Programming Languages	PE	3	0	0	3	CS 101				
CS 222	Programming in Java	PE	3	0	0	3	CS 101				
CS 224	GUI Design and Programming	PE	3	0	0	3	CS 101				
CS 226	Python Programming	PE	3	0	0	3	CS 101				

Open Ele	Open Elective – 1									
CS 272	Object Oriented Programming	OE	2	0	0	2	CS 101			
Lab Courses - 4, 5,6										
CS 252	Computer Organization Lab	L	0	0	2	1	CS 203			
CS 254	Object Oriented Programming and Design Lab	L	0	1	2	2	CS 101			
CS 256	Data Communication Lab	L	0	1	2	2	None			
Total Contact Hours – Component wise			17	4	6					
Total Contact Hours				27		24				

	SEMESTER –	5							
Course	Course Title	Course	Con	tact H	ours	Credit	Pre-		
Code	Course rue	Туре	L	Т	Р	С	requisites		
Professio	onal Core Courses - 7, 8, 9								
CS 301	Operating Systems	PC	3	1	0	4	CS 204		
CS 303	Database Management Systems	PC	3	1	0	4	CS 201		
CS 305	Computer Networks	PC	3	0	0	3	None		
Professio	Professional Elective – 3								
CS 311	Microprocessors and Interfacing	PE	3	1	0	4	None		
CS 313	Embedded Systems	PE	3	1	0	4	None		
CS 315	E-commerce and Cyber Laws	PE	3	1	0	4	None		
CS 317	Machine Vision	PE	3	1	0	4	None		
Professional Elective – 4									
CS 319	Automata and Formal Language	PE	3	0	0	3	None		
CS 321	Formal Verification	PE	3	0	0	3	None		
CS 323	Computational Geometry	PE	3	0	0	3	None		
CS 325	Modern Digital Arithmetic	PE	3	0	0	3	None		
Open Ele	ective – 2								
CS 371	Database System Concepts	OE	2	0	0	2	None		
Lab Cou	rses - 7, 8, 9								
CS 351	Operating Systems Lab	L	0	1	2	2	CS 204		
CS 353	Database Management Systems Lab	L	0	1	2	2	CS 201		
CS 355	Computer Networks Lab	L	0	0	2	1	None		
Total Contact Hours – Component wise			17	5	6				
Total Contact Hours				28		25			

	SEMESTER – 6									
Course	Correct Title	Course	Con	tact H	ours	Credit	Pre-			
Code	Course The	Туре	L	Т	Р	С	requisites			
Professio	onal Core Courses – 10, 11									
CS 302	Software Engineering	PC	3	1	0	4	None			
CS 304	Compiler Design	PC	3	1	0	4	None			
Professio	onal Elective – 5									
CS 312	Computer Graphics	PE	3	0	0	3	None			
CS 314	Shell Programming	PE	3	0	0	3	None			
CS 316	Augmented and Virtual Reality	PE	3	0	0	3	None			
CS 318	Information Theory and Coding	PE	3	0	0	3	None			
Professio	nal Elective – 6									
CS 320	Machine Learning	PE	3	0	0	3	None			
CS 322	Cryptography And Network Security	PE	3	0	0	3	None			
CS 324	Data Analysis and Visualization	PE	3	0	0	3	None			
CS 326	Multimedia	PE	3	0	0	3	None			
CS 328	System Software	PE	3	0	0	3	None			
Open Ele	ective – 3									
CS 372	Introduction to Machine Learning	OE	2	0	0	2	None			
Special H	IS Course – 2									
HS 392	Corporate Communication	S	2	0	0	2	None			
Lab Cou	rses – 10, 11	1								
CS 352	Software Engineering Lab	L	0	1	2	2	None			
CS 354	Compiler Design Lab	L	0	1	2	2	None			
CS 382	Term Paper	Т	0	0	2	1	None			
Total Contact Hours – Component wise			16	4	6					
Total Contact Hours				26		23				

SEMESTER – 7									
Course Code	Course Title	Course Type	Contact Hours			Credit	Pre-		
	Course Inte		L	т	Ρ	С	requisites		
CS 401	Project – I	Ρ	0	0	10	5	None		
Professional Elective –7									
CS 411	Soft Computing	PE	3	0	0	3	None		

CS 413	Pattern Recognition	PE	3	0	0	3	None		
CS 415	Complex Networks	PE	3	0	0	3	None		
CS 417	Blockchain Technologies	PE	3	0	0	3	None		
CS 419	High Performance Architecture	PE	3	0	0	3	None		
Professional Elective –8									
CS 421	Image Processing	PE	3	0	0	3	None		
CS 423	Artificial Intelligence	PE	3	0	0	3	None		
CS 425	Advanced Web Technology	PE	3	0	0	3	None		
CS 427	Software Defined Network	PE	3	0	0	3	None		
CS 429	Robotics and Automation	PE	3	0	0	3	None		
Open Ele	ctive –4								
CS 471	Data Analytics using Python	OE	2	0	0	2	None		
Special C	ourse – 3								
CE 491	Disaster Management	S	2	0	0	2	None		
Lab Cour	ses- 12								
CS 461	Computational Intelligence Lab	L	0	1	2	2	None		
CS 481	Summer Internship	1	0	0	0	1	None		
	Total Contact Hours – Component wise			1	12				
Total Contact Hours			23		18				

	SEMESTER –8									
Course	Course Title	Course	Contact Hours			Credit	Pre-			
Code	Course little	Туре	L	т	Р	С	requisites			
CS 402	Project – II	Р	0	0	18	9	None			
Professional Elective –9										
CS 412	Mobile Computing	PE	3	0	0	3	None			
CS 414	Cloud Computing	PE	3	0	0	3	None			
CS 416	Wireless Sensor Network	PE	3	0	0	3	None			
CS 418	Natural Language Processing	PE	3	0	0	3	None			
CS 420	Cyber Forensics and Analysis	PE	3	0	0	3	None			
Professio	onal Elective –10									
CS 422	Data Mining	PE	3	0	0	3	None			
CS 424	Distributed Computing	PE	3	0	0	3	None			
CS 426	Bioinformatics	PE	3	0	0	3	None			
CS 428	Internet of Things	PE	3	0	0	3	None			

CS 430	Human Computer Interaction	PE	3	0	0	3	None
Special C	Special Course –4						
HS 492	Entrepreneurship	S	2	0	0	2	
Total Contact Hours – Component wise			8	0	18		
Total Contact Hours				26		17	

## **Credit Distribution (Course Components)**

Category	Sem - 1	Sem - 2	Sem - 3	Sem - 4	Sem - 5	Sem - 6	Sem - 7	Sem - 8	Total
Science/HS Course	9/10	9/10	-	-	-	-	-	-	19
Basic Engg. Course	8	5	-	-	-	-	-	-	13
2 <sup>nd</sup> year Math Course	-	-	4	-	-	-	-	-	4
Professional Core (PC)	-	-	11	11	11	8	-	-	41
Professional Elective (PE)	-	-	-	6	7	6	6	6	31
Open Elective (OE)	-	-	-	2	2	2	2	-	8
Special Course	-	-	2	-	-	2	2	2	8
Lab Course	3	5	5	5	5	4	2	-	29
Project Work (PW)	-	-	-	-	-	-	5	9	14
Term Paper	-	-	-	-	-	1	-	-	1
Internship	-	-	-	-	-	-	1	-	1
Total	20/21	19/20	22	24	25	23	18	17	169



## **Credit Distribution (Research Components)**

Research Group	Sem – 1	Sem - 2	Sem - 3	Sem - 4	Sem - 5	Sem - 6	Sem - 7	Sem - 8	Total
Computer Network & Security	-	-	-	11	25	15	6	12	69
Computational Intelligence & Computer Vision	-	-	4	3	4	20	12	3	46
Data Science & Machine Learning	-	4	1	17	3	3	10	9	47
High Performance Computing	-	-	11	11	14	3	6	6	51
Total		4	16	42	46	41	34	30	213



## List of Professional Core Courses

SI.NO	Course Code	Course Name	Credits
1	CS 201	Data Structures	3
2	CS 203	Digital Logic Design	4
3	CS 205	Discrete Mathematical Structures	4
4	CS 202	Computer Organization	4
5	CS 204	Object Oriented Programming and	л
5	C3 204	Design	4
6	CS 206	Data Communication	3
7	CS 301	Operating Systems	4
8	CS 303	Database Management Systems	4
9	CS 305	Computer Networks	3
10	CS 302	Software Engineering	4
11	CS 304	Compiler Design	4

## **List of Professional Electives**

SI.NO	Course Code	Course Name	Credits
1	CS 212	Analysis and Design of Algorithms	3
2	CS 214	Computational Models for Real Time	2
		Systems	5
3	CS 216	Cyber Physical Systems	3
4	CS 218	Computer Arithmetic	3
5	CS 220	Principles of Programming	2
		Languages	5
6	CS 222	Programming in Java	3
7	CS 224	GUI Design and Programming	3
8	CS 226	Python Programming	3
9	CS 311	Microprocessors and Interfacing	4
10	CS 313	Embedded Systems	4
11	CS 315	E-commerce and Cyber Laws	4
12	CS 317	Machine Vision	4
13	CS 319	Automata and Formal Language	3
14	CS 321	Formal Verification	3
15	CS 323	Computational Geometry	3
16	CS 325	Modern Digital Arithmetic	3
17	CS 312	Computer Graphics	3
18	CS 314	Shell Programming	3
19	CS 316	Augmented and Virtual Reality	3
20	CS 318	Information Theory and Coding	3
21	CS 320	Machine Learning	3
22	CS 322	Cryptography and Network Security	3
23	CS 324	Data Analysis and Visualization	3
24	CS 326	Multimedia	3
25	CS 328	System Software	3
26	CS 411	Soft Computing	3
27	CS 413	Pattern Recognition	3
28	CS 415	Complex Networks	3
29	CS 417	Blockchain Technologies	3
30	CS 419	High Performance Architecture	3

31	CS 421	Image Processing	3
32	CS 423	Artificial Intelligence	3
33	CS 425	Advanced Web Technology	3
34	CS 427	Software Defined Network	3
35	CS 429	Robotics and Automation	3
36	CS 412	Mobile Computing	3
37	CS 414	Cloud Computing	3
38	CS 416	Wireless Sensor Network	3
39	CS 418	Natural Language Processing	3
40	CS 420	Cyber Forensics and Analysis	3
41	CS 422	Data Mining	3
42	CS 424	Distributed Computing	3
43	CS 426	Bioinformatics	3
44	CS 428	Internet of Things	3
45	CS 430	Human Computer Interaction	3

## List of Open Electives

SI.NO	Course Code	Course Name	Credits	Offered by
1	CS 272	Object Oriented Programming	2	
2	CS 371	Database System Concepts	2	
3	CS 372	Introduction to Machine Learning	2	
4	CS 471	Data Analytics using Python	2	

## **List of Special Courses**

SI.NO	Course Code	Course Name	Credits	Offered by
1	ME 291	Safety Engineering	2	
2	HS 392	Corporate Communication	2	
3	CE 491	Disaster Management	2	
4	HS 492	Entrepreneurship	2	

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Programme     Bachelor of Technology     Year of Regulation     2018													)18					
Programme     Bachelor of Technology     Year of Regulation     2018       Department     Mathematics     Semester     I       Course     Credit Structure     Marks Distribution												I						
Course Code     Course Name     Pre-requisite     Credit Structure     Marks Distribution       L     T     P     C     INT     MID     END     T												n						
Co	ode			Course	e maine			Fle-lequ	lisite	L	Т	Р	С	INT	MID	END	Total	
MA	101	Di	iffere	ntial Cal Alg	culus and ebra	d Linear		NIL	4	3	1	0	4	50	50	100	200	
											CO1	O1 Able to understand the concept of limit, of and differentiation for functions of sim multivariables, and the consequences of mean value theorems for differential function					continuity ngle and different ons	
Ca		To in calcu	ntrodu ulus, c	ice the fu ordinary c	ndamenta lifferentia	al concept al equation	s of diffens and li	erential inear alge	ebra.	CO2 Able to apply Taylor set differentiable functions of sing and estimate the error.						es to approximate and multivariables		
Obje	urse ctives									Outcomes	CO3	Able to able to s problem	understa olve extr s with rea	nd the i eme valu il world	dea of op ie problem problems	otimizations, and read	on and be elate such	
Able to solve ordinary differential equation         CO4       analytically and apply the ODEs to model real work         To apply these concepts of in modeling and analyzing       problems         several engineering problems       analytically and the basic concepts of vector													equations real world					
	several engineering problems CO5 Able to understand the basic concepts of vector spaces and matrix algebra CO6 Able to solve systems of linear equations																	
	CO6     Able to solve systems of linear equations       Mapping with Program Outcomes (POs)     Mapping with PSOs																	
No.	COs     Mapping with Program Outcomes (POs)     Mapping with PSC       PO1     PO2     PO3     PO4     PO5     PO6     PO7     PO8     PO9     PO10     PO11     PO12     PSO1     PSO2     PSO3													PSO3				
1	PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS02           CO1         2         0											1505						
2	CO1         2         0																	
3	CO3		2	0	0	0	0	0	0	0	0	0	0	0				
4	CO4		3	0	0	0	0	0	0	0	0	0	0	0				
5	CO5		2	0	0	0	0	0	0	0	0	0	0	0				
6	CO6		3	0	0	0	0	0	0	0	0	0	0	0				
									SYLLA	BUS								
No.								Content							Hour	s	COs	
Ι	<b>Differ</b> Limit; Macla	entia conti urin's	<b>l Cal</b> e inuity s serie	culus of S ; differen es, indeter	Single Va tiation, R rminat fo	ariable: colle's theo rms, L' He	orem, me ospital's	ean value rule	theorem	s of Lagrar	ige and (	Cauchy; T	aylor's a	nd	11		CO1 CO2	
II	<b>Differ</b> Real theore of fun	entia valueo m for ctions	d fun d fun r hom s of tv	culus of I ctions of ogeneous vo variab	Multi-va two/thre function les; Lagra	riable: ee variabl s; Taylor' ange's me	es, limit s and M thod of u	t, continu aclaurin's undeterm	uity, diff s series f ined mul	erentiabilit or function tipliers.	y, partia of two	al differer variables;	ntiation; 1 Extreme	Euler's values	16		CO1 CO2 CO3	
III	Ordin Linear	a <b>ry I</b> diffe	Differ erentia	ential Eq al equatio	<b>juations:</b> ns with c	onstant co	o-efficier	nts, Euler	- Cauchy	forms; Me	ethod of	variation	of parame	eters	10		CO4	
IV	Linea Vector eigen matric	<b>r Alg</b> r spac value æs.	gebra: ce ove es and	er R, subs d eigen	paces, ba vectors;	ases and d Symmetri	imensio c, skew	n; Echelo -symmetr	on form, 1 ric, Herr	rank of a n nitian, ske	natrix, sy w-Herm	ystem of l nitian, oth	inear equ ogonal, 1	ations; unitary	11		CO5 CO6	
							Tota	l Hours							48			
Esse	ntial R	eadin	ngs															
1	<b>.</b> J. Ste	ewart,	, "Cal	culus", C	engage I	earning I	ndia Pvt.	Limited,	,7th edit	tion, $20\overline{17}$ .								
2	• E. K	reyszi	ig, "A	dvanced	Engineer	ring Mathe	ematics"	, John Wi	iley & So	ons, 10th e	dition 20	)15						
Supp	olemen	tary l	Read	ings					-									
1	. R. K	. Jain	and S	5. R. K. Iy	yengar, "	Advanced	Enginee	ering Mat	hematics	s", Narosa I	Publishi	ng House,	5th edition	on, 2016				



Programme

Department

Course Code **ME 101** 

Course

Objectives

No.

1 2

3

4

5

No.

Ι

Π

III

IV

V

VI

VII

VIII

Rope/belt friction

**B.Tech in Mechanical Engineering** 

#### National Institute of Technology Meghalaya

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epartme	rtment Mechanical Engineering Semester I e Course Name I Course Name I																			
rse	ment     Mechanical Engineering     Semester       Course Name       L     T     P     C     INT												Marks Di	stribution						
de	Course Name     L     T     P     C     INT       Engineering Mechanics     3     0     0     3     50       This course describes the different laws of forces associated with     CO1     Able to classify the different different laws of forces associated with     CO1     Able to classify the different different laws of forces associated with													END	Total					
101			Enginee	ring Mecl	nanics			3	0	0	3	50	50	100	200					
-	This cours different e	e describe ngineering	s the diffe	erent laws S.	of forces a	ssociated	with		CO1 Able to classify the different la with engineering systems. (Ur					laws of forces associated nderstanding)						
	This cours working co	e introduc onditions.	es the use	of force a	nd momer	nts in vario	ous		CO2	Able to i) Illustrate the use of force and moments in various working conditions (Understanding). ii) sol related problems. (Applying)										
rse	This cours engineerin	e illustrate g.	es the use	of subject	knowledg	e in the fie	elds of	Course	CO3	Able to engineer various	identify th ring struct loads. (At	ne equilibritures (trus	rium condi s, beams, f	um conditions of , beams, frames) under						
	This cours structures	e introduc under vari	es the stat ous loadii	tes of an er	ngineering ons.	elements	and	outcomes	CO4	Able to consider	solve the ring static	practical 1 friction. (	mechanics (Applying)	problems						
-	This course explains how to solve the practical problems of mechanics to determine the static forces with their magnitudes and directions.       Able to understand the prosleme of solve related problems. (Able to understand the problems.												ciple of virtual work and pplying)							
			Map	ping with	PSOs															
COs	sPO1PO2PO3PO4PO5PO6PO7PO8PO9PO10PO11PO12													PSO2	PSO3					
CO1	PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12           3         0											3	0	0						
CO2	3	0	0	0	0	0	0	0	0	0	0	0	3	0	0					
CO3	3	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$										2	2	0						
CO4	3	0         2         1							0	0										
CO5	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$											2	2	0						
		1		-	1	I	SYLLA	BUS				_		-1	<u></u>					
	Content													rs	COs					
Introd Classi Assur	uction fication, Bangling nptions in r	asic termin nechanics	nologies, I	Laws of N	Iechanics,	Units, Ch	naracteris	stics of force	s, Vecto	rs, Dimen	sional ho	mogeneity	y, <b>0</b> 3		CO1					
Comp Free b	oositions of oody diagra	two force . Lami's tł	system, R neorem, E	Resolution quilibrium	of forces, a of conne	General n cted bodie	nethod or es	f compositio	n of forc	es, Equili	brium of l	oodies,	03	,	CO1					
Mome system	ent of force n, Equilibri	, Varignor um of non	n's theore, -concurre	Couple, F ent system	Resolution of forces	of a force	into a fo	orce and cou	ple, Resu	iltant of n	on-concui	rrent force	<sup>;</sup> 04		CO2					
Types	of support	s, Types o	f beam, T	ypes of loa	adin, Find	ing reaction	ons at suj	pport					04	,	CO3					
Cente	r of gravity	, Centroid	, Use of a	xis of sym	metry, Ce	ntroid of a	a compos	site section,	Center of	f gravity o	of a flat pl	ate,			CO1					
Differ	ence betwe	en center	of gravity	and centre	oid, Deter	mination o	of centro	id from first	principle	9	-		03	5	CO2					
		<b>D</b> "	<u> </u>	<b>D</b> 1					<u></u>			0			CO3					
Mome of ine	Aoment of inertia, Radius of gyration, Polar moment of inertia, Moment of inertia from first principles, Theorems of momen of inertia, Moment of inertia of composite sections, Moment of inertia of standard sections													,	CO3					
Frame	of inertia, Moment of inertia of composite sections, Moment of inertia of standard sections														CO3					
Laws system	er of gravity, Centroid, Use of axis of symmetry, Centroid of a composite section, Center of gravity of a flat plate, erence between center of gravity and centroid, Determination of centroid from first principle nent of inertia, Radius of gyration, Polar moment of inertia, Moment of inertia from first principles, Theorems of moment ertia, Moment of inertia of composite sections, Moment of inertia of standard sections nes, Assumptions in analysis of frame, Nature of forces, Methods of analysis, Method of joints, Method of sections s of friction, Angle of friction, angle of repose, cone of friction, Wedges, Problems involving non-concurrent force em														an analysis of frame, Nature of forces, Methods of analysis, Method of joints, Method of sections 04 cos e of friction, angle of repose, cone of friction, Wedges, Problems involving non-concurrent force 02 co2					

CURRICULUM

2019-20

Academic Year of Regulation

IX	Work, Work done by varying force, Energy, Power, Work energy equation for translation, Motion of connected bodies Work done by spring	03	CO2 CO5
X	Simple harmonic motion, Simple harmonic motion as a sine wave, Simple pendulum	03	CO2 CO5
	Total Hours	32	
Essen	tial Readings		
1. F.P	. Bear, E. R. Johnston, Vector Mechanics for Engineers, 9th ed.2009, Tata McGraw Hill.		
Supp	lementary Readings		
<b>1.</b> H.	J. Shah, S. B. Junarkar, Applied Mechanics, 19th Ed.2015, Charotar Publication, Anand.		
<b>2.</b> S.	S. Bhavikatti, K. G. Rajashekarappa, Engineering Mechanics, 1994, Wiley Eastern Ltd.		
3. R.	C. Hibbeler, Engineering Mechanics – Statics & Dynamics, 11 <sup>th</sup> Ed., Macmillan Publication Co.		

**CO4** 



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CURRICULUM

	C OF TECHNO																	
Programme     Bachelor of Technology     Year of Regulation     201       Department     Physics     Semester										9-20								
Department     Physics     Semester     I       Course     Credit Structure     Marks Distribution												<u> </u>						
Course CodeCredit StructureImage: StructureLTPCINT														Marks D	istributior	1		
Code         L         T         P         C           PH 101         Physics         3         1         0         4												INT	MID	END	Total			
PE	I 101					Physics				3	1	0	4	50	50 100 200			
		To ha	ndle	the concep	pts of mee	chanics wi	th help of	vector ca	alculus		CO1	Students able to articulate and describe fundamen of Physics				ental law		
Co	urse	To un	derst	and the fu	ndamenta	uls of elect	romagnet	ism		Course	CO2	Gain the Enginee	e concept ering conc	of electro epts	magnetisn	n applied t	0	
Obje	ectives	To introduce various concepts of optical phenomena in PhysicsOutcomesand EngineeringCC										Student and Phy	s able to g sical Opti	ain infor	mation abo	out Geom	etrical	
		To introduce students, the developments of Physics in the 20th century CO4											understan Physics a	d the cond nd its app	cepts and the lications.	theories of	f 20-th	
No     COs     Mapping with Program Outcomes (POs)     Mapping with PSOs												n PSOs						
No.     COs     PO1     PO2     PO3     PO4     PO5     PO6     PO7     PO8     PO9     PO10     PO11     PO12     PSO2     PSO2     PSO2													PSO3					
1         CO1         3         2         0												0						
1         CO1         3         2         0											0	0	0					
2     CO2     3     2     0     0     0     0       3     CO3     3     2     0     0     0     0     0										0	0	0	0	0	0	0	0	
4	CO4		3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	
									SYLLA	ABUS								
No.     Content												Hours	s COs					
Ι	Mech work a bodies	anics: and kin	Vect etic e	or Calcult energy, Po	us, Revisi tential en	ting Newt ergy and e	on's laws energy coi	of motion servation	n, Motion n, momen	along a stra atum, impuls	ight line, e, and co	Motion in llisions, R	n 2D and 3 otation of	3D, Trigid	13		CO1	
п	Elect Lorent and to	romag z force rque or	<b>netis</b> e, Bio n a ma	<b>m:</b> Gauss ot-Savart agnetic di	's law and and Ampo pole. Mot	d its appli ere's laws ional EM	cations, I and their F, Faraday	Divergenc applicati y's law, Le	e and cu ions, Div enz's law	rl of electro ergence and , Maxwell's	static fie curl of 1 equations	lds, Elect magnetost s.	rostatic po atic fields	otential. , Force	13		CO2	
Ш	<b>Optic</b> - Fres reflect	es: Internet and ion and	rferen d Fra l Bre	nce - Cohe aunhofer o wster's la	erence, Pr diffracting w.	inciple of g, Grating	Superpos and its	ition, You usages; F	ung's dou Polarizati	ible slit expe on- Introduc	eriment, N etion, Ma	Jewton's alus' law,	rings. Diff Polarizat	raction ion by	13		CO3	
IV	IVModern Physics: Old quantum theory, black body radiation, Planks law, photoelectric effect, Compton effect, de- Broglie's hypothesis, Heisenberg uncertainty principle, wave packet, group and phase velocities, postulates of quantum mechanics. Schrödinger's equation, application in 1-dimension: particle in a box.13CO4																	
							Tota	l Hours							52			
Esse	ntial Re	eading	s											<b>.</b>				
1	• R. A.	Serwa	y and	l J. W. Jev	wett, "Phy	vsics for S	cientists a	nd Engine	eers with	Modern Phy	ysics", Cl	ENGAGE	Learning	Custom I	Publishing	, 9th edition	on,	
2	2012. 2 Hafez A. Radi, John O. Rasmussen, Principles of Physics for Scientists and Engineers, Springer, 2013																	
Sup	Sunnlementary Readings																	
1	J.C.	Morris	on. N	· <del>∍</del> ~ Iodern Ph	vsics for s	Scientists	and Engir	neers. Else	evier: 1st	edition 201	1.							
2	. M. M	lansfiel	ld and	d C. O'Su	llivan, "U	nderstand	ing Physi	cs", Wiley	y-Blackw	vell; 2 <sup>nd</sup> Edit	ion, 2010	).						

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Pı	ogramr	ne	Bachelor	of Technolo	ogy						Ŋ	ear of R	egulation		201	9-20
D	epartme	ent	Civil Eng	neering					1			Seme	ester			Ι
Co	urse				Course N	Jame				Credit	Structure	~		Marks Di	stributio	n 
	101			En	incoring	Drowing			L 1		P 4		INT 50	MID 50	END 100	Total
	101	To dev	elop the st	udent's abil	ity to und	erstand th	s ne role and		1	U	4	3	50	50	100	
		import and ap	ance of tec plication o	hnical draw f BIS and IS	ings in en SO convei	gineering tions.	drawing proce	ess,		CO1	Underst process	tand the le	ettering, l eering dra	ining and o wing	limensio	oning
		To dev represe	elop the st entation and	udent's abil	ity to und Lines, L	erstand the ettering, a	ne proper and dimensioni	ng.		CO2	Underst associat	tand the interest ted with e	mportanc engineerir	e of varioung drawing	s types o	of scales
Co	urse	To dev scales.	elop stude	nt's ability f	o underst	and the in	nportance of ty	pes of	Course	CO3	Constru solids.		, lines, cu	rves, polyg	;ons, pla	ines and
Obje	ctives	To dev	elop the st	udent's abil	ity to con	struct plan	ne geometry.		Outcomes	CO4	and crea	ate sectio	nal views	of objects	view d	rawing,
		To dev project To dev Multi To dev of surf	elop the st ion and the elop the st view, picto relop the st aces of var	udent's abil eir applicati udent's abil rial view (Is udent's abil ious objects	ity to und on in tech ity to app sometric V ity to und	erstand th nical drav ly project /iew) dra erstand de	ne concepts of wing. ion technique t wings. evelopment pro	o draw		CO5	Illustrat various	e the dev objects.	elopment	process of	surface	s of
No.	COs	COsMapping with Program Outcomes (POs)PO1PO2PO3PO4PO5PO6PO7PO8PO9PO10PO11PC													oing wit	h PSOs
1	CO1	PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10           CO1         0         0         0         2         0         0         0         1         3												PSO1	PSO2	PSO3
2	C01	0	0	0	0	2	0	0	1 1	3	0	1	3	0		
3	CO3	0	0	0	0	3	0	1	3	0	0					
4	CO4	0	0	0	0	2	0	0	0	1	3	0	1	3	0	0
5	CO5	0	0	0	0	2	0	0	0	1	3	0	1	3	0	0
No							<u> </u>	YLLABU	JS					Hours	COs	
110.	Intro	luction	Enginoari	ng Drowing	drowing	Instrumo	onto and matoric		and ISO or	nuantia	na			01	L CO1	
Ι	Linas				, urawing	msuume		ais, D.1.5.						05	CO1	
	Plane	Geome	ig, and Di	nensioning										05	CO1	
II	Geom	etrical C	Constructio	n: line, arc,	and angle	, division	ns of straight lir	ne and cir	cumference	e, constru	uction of p	oolygon		05		CO3
III	Constr nomog	ruction gram	of scales	– plane sca	le, diago	nal scale	, Vernier scale	e, functio	onal scale;	concept	of conve	ersion sca	ale and	05		CO2
IV	<b>Conic</b> Constr	Section cuction	ns and oth of Ellipse,	e <b>r Curves</b> Parabola, H	yperbola,	Rectangu	ılar Hyperbola,	, Cycloida	al Curves: C	Cycloid,	Involute			05	_	CO3
V	<b>Proje</b> Princi	c <b>tion</b> ple of P	rojection a	nd Orthogra	phic Proj	ection								01		<b>CO4</b>
v	Projec	tion of ]	points and	lines										05		CO4
	Projec	tion of I	Planes											05		<b>CO4</b>
VI	Solid Types	Geome of Solid	t <b>ry</b> ls: polyhec	lral, prisms,	pyramids	, cylinder	r, cone, sphere,	auxiliary	projection	method				01	_	CO4
	Orthog	graphic	projection	of solids: or	ne view, t	wo view a	and three view	drawings	s, Missing v	iew, rule	es for sele	ction of v	views	05		<b>CO4</b>
VII	Sectio	nal viev	v, section p	lane perper	dicular to	the HP &	& VP and other	Various	positions, ti	rue shap	e of sectio	ons		05		CO4
VIII	Classi cylind	fication ers, inte	, line of intersection of	ersection, li	ne/genera ylinder	tor metho	od and section p	plane met	thod: interse	ection of $\frac{1}{1}$	two prisr	ns, two		05		CO4
IX	Metho pyram	id of devided	length of e	parallel lin	ue surfac	ment, rad	ial line develop	oment, de	velopments	of cylin	der, cone	, prism,		05		CO5
X	Termi	nology,	isometric	scale, isome	tric view	and isom	etric projection	i, isometr	ic axes, and	lines, m	issing vie	ew		<u>05</u> 58		<u>CO4</u>
Essei	ntial Re	adings				10								50	<u> </u>	
1	. N.D.	Bhatt, E	Engineering	g Drawing,	Chrotar P	ublishing	House.									
2	. Dhan	anjay A	Jolhe, Eng	gineering dr	awing, TN	AH, 2008	5									
<u>S</u>	M.B.	Shah ar	nd B.C. Ra	na, Enginee	ring Draw	ving, Pear	rson, 2009.									
Supp 1	TFF	rench (	T I Vierek	and R I For	ter Grant	ic Scienc	e and Design	4th editic	on McGraw	, Hill 10	084					
2	. WJI	uzadde	r and J M	Duff, Funda	mentals o	f Enginee	ering Drawing.	11th edit	tion, Prentic	e-Hall o	f India, 19	995.				
3	. K Ve	nugpoal	, Engineer	ing Drawing	g and Gra	phics, 3nd	d edition, New	Age Inter	rnational, 1	998.	/ -					

<ol><li>Gary J</li></ol>	R. Bertoline, Eric N. Wi	ebe, Nathan W. Hartman	, William A. Ross, Te	echnical graphics Co	ommunication, 4th Edition,	McGraw Hill Higher
Educ	ation, 2009					

- 5. Frederick E. Giesecke, Shawna Lockhart, Marla Goodman, Cindy M. Johnson Technical Drawing With Engineering Graphics, 15th Edition, Prentice Hall, 2016
- 6. SP 46: 2003, Engineering Drawing Practice for schools and colleges.

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An Institute of National Importance

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	OF TECHNOP																
P	rogramr	ne	Bac	helor of [	<u><b>Fechnolo</b></u>	gy							Year of R	egulation		201	9-20
D	epartme	ent	Elec	ctrical Er	ıgineerin	g				1			Seme	ester			I
Co	urse				Cor	urse Name	د				Credit St	tructure			Marks D	istributior	1
C	ode									L	Т	Р	С	INT	MID	END	Total
EE	101			Ba	asic Elect	rical Eng	ineering			2	0	0	2	50	50	100	200
											CO1	Acquire	knowled	ge of circi	uit theorer	ns, unders	tand and
		To und	ersta	and basic	circuit the	eorems an	d laws					Underst	and the la	ws of elec	ctricity and	d magnetis	m and
											CO2	apply th	nem in sim	ple circui	ts		
Co	urse									Course	CO3	Analyze	e single ph	hase AC c	ircuits for	voltage ar	nd circuit
Obje	ctives									Outcomes		and calc	culate com	plex pow	er ems and s	olve probl	ems of
		<b>T</b> 1	1	.1 1.11	. 1	.1 1 7					CO4	simple	polyphase	system	chis and s	orve proor	
		10 dev	elop	the skills	to analyz	ie the basi	c DC/AC	system			CO5	Acquire	knowled	ge of diffe	erent types	bes of electric	
										(7.0		machine	es and me	asuremen	t instrume	nts	220
No.	COs		1	DOD			Mapping	with Prog	gram Out	comes (POs	) DO0	<b>DO10</b>	DO11	DO12		pping with	PSOs
1	CO1	PO	1	PO2	PO3	PO4	PO5	PO6	PO/	P08	PO9	PO10		PO12	PSOI	PS02	PS03
1	CO1         J         J         I																
2	CO2         5         2         1         0																
3	CO3         3         2         1         1         0													0			
4	CO4         3         1         1         0													0			
5	CO5	0		0	1	0	0			0	0	0	0	0			
0	000	U		•		0	U			ABUS	U	U	Ū	v			
No								Content		шев					Hours COs		
	Analy	sis of D	Cai	rouita													
Ŧ	Mesh,	node, bi	rancl	h, Ohm's	law, serie	es and par	allel circu	iit, basic d	levices: r	esistors, car	acitors, in	nductors, o	dependent	and	0.6		001
1	indepe	ndent so	ource	es, Kirchł	10ff's Lav	vs, Mesh a	and Node	Analysis,	Star-Del	ta conversio	on, Superp	position th	eorem, So	ource	06		COI
	conver	sion, Tł	nevei	nin theore	em, Norto	n theorem	ı, Maximı	um power	transfer	theorem							
	Electr	omagne	etic I	nduction	ı & Magr	etic Circ	uit			1		1 . • •,	,				
П	Magne	etic field	l, Ri em	ight hand $f_s$ (ac &	rule, Le	ft hand ri raday's 1	ule, Elect aw of el	romechan	ncal laws	s, relation l	between e	induced	and mag	netism,	06		CO2
	dynam	ically a	nd st	tatically i	nduced er	nfs, self-i	nductance	es, and mu	utual indu	uctances, co	efficient	of couplir	ng, Inducta	ance in	00		001
	series	and para	allel,	energy st	tored in a	magnetic	field.										
	A.C F	undame	ental	ls and R.	L.C circu	lits											
III	Phasor	s, Com	plex	quantitie	s, Applic	ation of a	complex a	algebra to	A.C cir	cuit, series	and para	llel RL, F	RC, RLC	circuit,	05		CO3
	series-	parallel	circi	uit.	gie, comp	lex power	I. active,	leacuve a	nu appai	ent power,	power ur	aligie, au	initialice u	langie,			
		1															
	Polypl	hase Ne	twoi	rks													
IV	Balanc	ed two	phas	se and thr	ree phase	systems,	Balanced	Star-Delta	a connec	tions, phase	and line	currents a	and voltag	ges and	04		<b>CO4</b>
	uieir re	stations,	wiea	asuremen	t of three	phase pov	vel										
	Measu	ring In	stru	ments													
V	MC, N	II and D	OM ty	ype instru	iments, er	ergy mete	er.								03		CO5
v	Eleme	ntarv C	)ver	view of F	lectrical	Machine	s:								03		003
	Princip	ole, Čon	struc	ction and	Types of	different 1	otating el	ectrical m	achines,	transformer	·s.						
<u> </u>							Tota	ıl Hours							24		
Esse	ntial Re	adings															

1.A. Hussain, Fundamental of Electrical Engineering, Dhanpat Rai & Co. Ltd., 3rd edition, 2007.

2. V.N Mittle, Basic Electrical Engineering, Tata McGraw Hill, 2nd edition 2017.

3 A. Chakroborty, S. Nath and C.K. Chanda, "Basic Electrical Engineering", McGraw Hill Education Pvt. Ltd., 1<sup>st</sup> Edition, 2009.

4. M.S. Sukhija and T.K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford University Press, 1<sup>st</sup> Edition, 2014.

#### **Supplementary Readings**

1. H. Cotton, "Electrical Technology", Pitman Publication, 7th edition 2005.

2. Hughes, "Electrical Technology", Longman, 10th edition 2010.

3. John Bird, Electrical Circuit Theory and Technology, Routledge, Taylor & Francis Group, 4th edition 2010.

4. W.H. Hayt, J.E. Kemmerley, Engineering circuit analysis, Int. St. Ed. McGraw Hill, 8th edition 2013.



Programme     Bachelor of Technology     Year of Regulation     2018-2019       Department     Humanities and Social Sciences     Semester     I																	
D	epartme	ent	Hur	nanities	and Socia	l Science	S						Semes	ster			[
Co	urse				C	ourse Nar	ne				Credit	Structure			Marks D	istribution	l
C	ode									L	Т	Р	C	INT	MID	END	Total
HS	101				English	Langua	ge Skills			2	0	0	2	50	50	100	200
		This co	ourse	introduc	es the basi	c concept	ts of comm	nunication	L		CO1	Able to commun	define and	l explain	the basic c	concepts o	t
		This co	ourse	familiari	zes speaki	ing skill					CO2	Able to	demonstra	te fluenc	y in speak	ing Englis	sh
Co	urse	This co	ourse	familiari	zes writin	g skill				Course	CO3	Able to	demonstra	te good v	vriting ski	ll in Engli	sh
Obje	ctives	This co	ourse	familiari	zes listeni	ng and re	ading Skil	lls		Outcomes	CO4	Able to in Engli	understan sh	d and inte	erpret idea	s presente	d to them
		This co	ourse	familiari	zes preser	ntation ski	ills				CO5	Able to	explain th	eir ideas	clearly in	English	
		This co	ourse	familiari	zes body l	anguage					CO6	Able to commun	choose ap	propriate ith others	body lang	uage whil	e
							Mapping	with Progr	ram Outo	comes (POs)			0		Map	ping with	PSOs
No.	COs	PC	D1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	CO1         0         0         0         0         0         0         1         3         0           CO2         0         0         0         0         0         0         1         3         0												2			
2	CO2	CO2         0         0         0         0         0         0         1         3         0												2			
3	CO3	CO3         0         0         0         0         0         0         1         3         0												2			
4	CO4	CO4         0         0         0         0         0         0         0         1         3         0												2			
5	CO5	0	)	0	0	0	0	0	0	0	1	3	0	2			
6	CO6	0	)	0	0	0	0	0	0	0	1	3	0	2			
									SYLLA	BUS							
No.								Content							Hours	COs	
Ι	<b>Overv</b> Englisand bo	<b>iew</b> h: An e ooks; Ev	ssent valuat	ial langua tion plan	age; Objec	tive and i	mportance	e of the co	urse; A d	discussion or	n the cou	rse conten	t, course p	olan	01	A	All COs
II	<b>Vocab</b> Anton	<b>oulary</b> ym; Syr	nonyı	m; Homo	nym; Wor	d substitu	ition; Fore	ign Words	s & Phra	ses; Idioms &	& Prover	bs			02		CO2 CO3 CO4 CO5
III	<b>Gram</b> Funda	mar mentals	s of G	brammar;	Common	Sentence	Structures	s; Commo	n Errors	in English					04		CO2 CO3 CO4 CO5
IV	Oral Communication Speaking & Listening Skills – Some basic tips; Greetings, Introductions, Requests, Suggestions; Giving a description, Invitations, Telephonic Conversation; Extempore Speech, Declamation/Elocution, Group Discussion, Seminar;CO2 CO4 CO5 CO6																
V	Reading Unseed and wr	<b>ng</b> n Comp riting at	orehe oout t	nsion; Pr hem	ecis, Writi	ing summ	nary, Paraj	phrase, Ce	ntral ide	ea; Reading 1	materials	from inte	rnet and t	alking	03		CO4
	Writing CO3																
VI	VI Process of Writing, Writing an article/speech/essay/Notice writing, Report writing; Letter writing – Personal, Official, Business, Job application, e-correspondence																

Total Hours	24	
Essential Readings		
1. C. Muralikrishna & Sunita Mishra, "Communication Skills for Engineers," Pearson, 2 <sup>nd</sup> Edition, 2014.		
2. Nitin Bhatnagar & Mamta Bhatnagar, "Communicative English for Engineers and Professionals," Pearson, 2010.		
Supplementary Readings		
1. J. K. Gangal, "A Practical Course for Developing Writing Skills in English," PHI, 2011.		
2. John Seely, "Oxford Guide to Effective Writing and Speaking," Oxford University Press, Indian Edition, 2019.		
3. Sanjay Kumar & Pushp Lata, "Communication Skills," Oxford University Press, 2012.		

A CONTRACT OF THE DESCRIPTION OF
OF TECHNOLS

An Institute of National Importance

	TUTE OF TECHNOL	00															
P	rogram	me	Bac	helor of 7	Fechnolog	gy						Y	lear of Re	gulation		201	18-19
D	epartm	ent	Hun	nanities a	and Socia	l Sciences	5						Seme	ster			Ι
Co Co	urse ode	Course	e Nan	ne				Pre	e-Requisi	te	Credit	Structure			Marks E	vistributio	on
н	151	Englig	h I a	nguaga S	Skille I ob				NH	L	Т	Р	C	Continu	ous Asse	ssment	Total
IIC	5 1 5 1	Engils		nguage S	SKIIIS LAU					0	0	2	1	01 Expe	riment	10	100
		This co	urse i	ntroduces	s the basic	concepts	of commun	ication	1		CO1	Able to d communi	efine and cation	explain th	e basic co	oncepts o	f
Co	11700	This co	urse f	amiliariz	es speakir	ıg skill				Course	CO2	Able to d	emonstrat	e fluency	in speaki	ng Englis	sh
Obje	ctives	This co	urse f	amiliariz	es writing	; skill				Outcomes	CO3	Able to d	emonstrat	e good wi	riting skil	l in Engli	sh
5		This co	urse f	amiliariz	es listenin	ig and read	ding Skills				CO4	Able to u	nderstand	and inter	pret ideas	presente	d to them in
		This co	urse f	amiliariz	es present	ation skill					C05	Able to e	vnlain the	ir ideas cl	early in F	Inglish	
							.5				C05	Able to c	hoose app	ropriate b	$\frac{carry}{odv}$ lang	age whi	e
		This co	urse f	amiliariz	es body la	inguage						communi	cating wit	th others			
No	COs					- -	Mapping wi	ith Prog	gram Outo	comes (POs)			1		Ma	pping wit	h PSOs
1101		PC	<b>)</b> 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	C01	0	)	0	0	0	0	0	0	0	1	3	0	2			
2	CO2		)	0	0	0	0	0	0	0	1	3	0	2			
3			,	0	0	0	0	0	0	0	1	3	0	2			
4 5	C04		)	0	0	0	0	0	0	0	1	3	0	2			
6	CO5         0         0         0         0         0         0         0         1         3         0         2           CO6         0         0         0         0         0         0         0         1         3         0         2																
-	CO6         0         0         0         0         0         0         1         3         0         2           SYLLABU																
	1								S								
No.							C	ontent							Hours		COs
1	Short	Speeche	s or o	other audi	o files (Li	stening, D	Discussing w	ith the	teacher o	or other stude	ents)				02		
2	Short	Speeche	s or o	other audi	o files (Li	stening, V	Vriting a sur	nmary,	, Speaking	g and recordi	ing of in	portant po	ints)		02		
3	Short ]	Movies	or oth	ner video	files (Wat	ching, Di	scussing wit	h the te	eacher or	other studen	ts)				02		
4	Short ]	Movies	or oth	ner video	files (Wat	ching, Wı	riting a sum	mary, S	Speaking	and recordin	g of imp	ortant poir	nts)		02		All
5	Interne	et mater	ials (I	Reading n	naterials f	rom the ir	iternet, Disc	cussing	with the	teacher or ot	her stude	ents)			02		COs
6	Interne	et mater	ials (H	Reading n	naterials f	rom the ir	nternet, Writ	ting a S	Summary)						02		
7	Group	o Semina	ar Pre	sentation	s on pre-a	ssigned to	pics								04		
8	Pronu	nciation	Skill	ls Exercis	es										02		
9	Group	) Discus	sion												04		
10	Takin	g and G	iving	Interview	VS										02		
							Total H	Iours							24		
Essen	tial Re	adings															
1. ว	C. Mu	Iralikris	nna &	Sunita N	Aishra, "C	ommunic	ation Skills	for Eng	gineers,"	Pearson, 2 <sup>nd</sup>	Edition,	2014.	2010				
L.	INITIN .	Bry Dec	ar &	$\frac{1}{2}$	matnagar,	Commu	meative Eng	gusn fo	or Enginee	ers and Profe	ssionals	, Pearson,	2010.				
suppi 1		ary <b>Kea</b> Gangal (	umgs "∆ Þr	actical C	ourse for	Developir	o Writing S	kille in	1 English	"PHI 2011							
2.	John S	Seelv. "(	Dxfor	d Guide t	to Effectiv	ve Writing	and Speaki	ng." O	xford Uni	iversity Press	s, Indian	Edition. 2	019.				
3.	Sanja	y Kumai	: & Pi	ushp Lata	ı, "Comm	unication	Skills," Oxt	Ford Un	niversity F	Press, 2012.	,						
	5.						-		2								

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	- OF TECHN		_										_				
P1	ogram	me	Bac	helor of 7	l'echnolog	<u>3</u> y							r ear of Re	gulation		2013	<u>3-14</u>
D	epartm	ent	Phys	sics				<del></del>					Seme	ster		<b>I</b> /.	<u></u>
Cor Co	urse ode	Course	e Nan	ne				Pr	re-Requisi	te	Credit	Structure			Marks D	istributior	1
РН	151		F,	nginoorin	a Physic	. I abarat	orw		NII	L	Т	Р	C	Continue	ous Asses	sment	Total
	101			ignicerm						0	0	2	1	01 Expe	riment	10	100
		To unde	erstan	d the fund	damentals	s of electro	omagnetism	l			CO1	Able to g Engineer	ain the co	ncept of el	lectromag	netism ap	plied to
Co	urse	To unde Enginee	erstan ering	d various	concepts	of optical	l phenomen	a in Ph	iysics and	Course	CO2	Able to g Optics	ain inforn	nation abo	ut Geome	trical and	Physical
Obje	ctives	To unde	erstan	d the tran	sition from	m classica	1 to quantum	m mecl	hanics	Outcomes	CO3	Able to u application	nderstand	the conce	pts of ger	eral Phys	ics and its
		To unde	erstan	d the fund	damentals	of genera	al physics				CO4	Able to a	pply laser	s in engine	eering		
No	CO	•					Mapping w	ith Pro	ogram Out	comes (POs)	)				Map	ping with	PSOs
INO.	COs	PC	)1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0
2	CO2	3	6	2	0	0	0	0									
3	CO3	3	;	2	0	0	0	0									
4	CO4         3         2         0															0	0
ŊŢ	SYLLABUS Content Lours COa																
No.	Content     Hours     COs															COs	
1	To determine the wavelength of sodium light by measuring the diameters of Newton's rings.       02																
2	To fin	d the ret	fracti	ve index o	of prism b	y measuri	ing angle of	prism	and angle	e of minimur	n deviati	on.			02		
3	To ver	rify inve	erse so	quare law	(using a j	point sour	ce of light).								02		
4	Deterr	minatior	n of w	vavelengtl	n of mono	chromatic	: light (LAS	ER) us	sing Fresn	el Biprism.					02		CO1
5	To det	termine	the w	vavelength	ı of LASF	ER using I	Diffraction §	grating	,.						02		CO2
6	To ver	rify Cou	lomb	's Law of	force bet	ween two	magnetic p	oles.							02		CO3
7	To fin	d resona	ance f	frequency	in series	RLC circu	uit.								02		
8	To de	termine	frequ	ency of A	.C. Main	s using so	nometer.								02		
9	To de	termine	the Y	oung's m	odulus of	elasticity	of the mate	rial of	a sample	beam by ber	nding.				02		
10	To dra	aw the V	7-1/λ	characteri	istic for L	ight Emit	ting Diode (	(LED)	and deterr	nine the valu	ue of Plai	nck's const	ant.		02		
							Total F	Iours							20		
Essen	tial Re	adings															
<b>1.</b> R.	A. Serv	way and	J. W	. Jewett, '	'Physics f	or Scienti	sts and Eng	ineers	with Mod	ern Physics'	', CENG	AGE Lear	ning Cust	om Publisł	ning.		

2. D. J. Griffiths, "Introduction to Electrodynamics", Prentice-Hall of India.
3. A. Ghatak, "Optics", Tata McGraw-Hill.
Supplementary Readings
1. D. Kleppner, and R. J. Kolenkow, "An Introduction to Mechanics", Tata McGraw
2. R. Eisberg, and R. Resnick, "Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles", John
Essential Readings



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Pr	Programme     Bachelor of Technology     Year of Regulation     2019-20       Department     Electrical Engineering     Semester     I															
De	epartme	ent	Electrical	Engineeri	1g							Ser	nester		_	I
Col	irse			8	8				(	Credit S	tructure		Ν	/larks Dist	ibution	
Co	de			Co	urse Name	e			L	Т	Р	С	Continue	ous evaluat	tion	Total
EE	151			Basic Elect	rical Lab				0	0	2	1		100		100
										CO1	Verify t	he applica	tion of circuit	t theorems		
		Tound	anatond ha	io oirovit ti		ad laws				CO2	Measur	e voltage,	current, pow	er, power f	actor etc	of
Cou	irse	10 und	erstand bas	sie encuit u	leorenis a	iu iaws			Course		differen	<u>it circuits l</u>	ike fluroscen	t, RLC set	ries, RLC	c parallel
Obje	ctives								Outcomes	CO3	choke c	oil and tra	nsformer	om measur		s 101 a
		To dev	elop the sk	ills to analy	ze the bas	ic DC/AC	C system			CO4	Measur connect	e power in	three phase	circuits, ve	erify star	delta
Na	COa					Mappin	g with Pr	ogram O	utcomes (PC	Ds)				Map	ping witl	n PSOs
INO.	COs	PO	1 PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	2	0	0												
2	CO2	2	0	0												
3	CO3	2	0	0												
4	CO4	CO4         2         0         1         0         0         0         0         1         0         0           CO4         2         0         1         0         0         0         0         1         0         0														
5	CO5         0															
6	CO6	0	0	0	0	0	0	0	0	0	0	0	0			
NT								SYLI	LABUS							<u> </u>
NO.	Tastu	d		Zinalala a ff? a	Valtara	arri and V	Conten	it « Cumum	t I ann ammlia	d to D (				Hours		COs
I II	To stu To stu	$\frac{dy}{dy}$ and $\frac{dy}{dy}$	verify the I	Aavimum I	Voltage L	aw allu N		s Curren	t Law applie		. circuit.			02		$\frac{C01}{C01}$
	TOSIU					.,								02		
	To stu	dy and	measure th	e inductanc	e of choke	e coil.								02		CO3
IV	To stu	dy and	obtain the	<i>y-i</i> characte	ristics of a	Fluoresco	ent Lamp							02		CO2
V	To stu	dy and j	perform an	plitude, fro	equency a	nd phase	measuren	nents usi	ng calibrated	d cathoo	le ray osc	illoscope.		02		CO2
VI	To stu relatio	dy the H ns to be	R-L-C serie verified b	es circuit, it y drawing t	is connec he phasor	ted to an A diagram.	AC supply	y and the	e voltage, cui	rrent, po	ower are c	onsumed.	The	02		CO2
VII	To stu verifie	dy the F d by dra	R-L-C Para awing the j	llel circuit, bhasor diag	and the rel ram.	ations of o	currents a	nd volta	ges in differ	ent bran	ches .The	relations	to be	02		CO2
VIII	To det SC tes	ermine ts.	equivalent	circuit para	ameters, el	ficiency a	ind regula	ation of a	a single phas	e transfo	ormer by	conductin	g OC and	02		CO3
IX	Verify	the rela	ation of ph	ase and line	value of	voltage an	d current	in 3 Pha	se Star and	Delta ba	alanced co	onnection.		02		CO4
X	Measu	iremnt a	nd verifica	tion of 3- <b>¢</b>	power in	star and d	elta conne	ection.						02		CO4
	Total Hours 20															
Supp	lement	ary Rea	ndings													
1	W.H.	Hayt, J	E. Kemme	rley, "Engi	neering ci	rcuit anal	ysis", Int.	St. Ed. ]	McGraw Hil	ll.						
2	John	Bird, "E	lectrical C	ircuit Theo	ry and Teo	hnology"	, Routled	ge, Tayl	or & Francis	Group.						
3.	. V.N N	Aittle, "	Basic Elec	trical Engir	ieering", 7	ata McGı	aw Hill, 2	2nd editi	on 2017.							

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	OF TECHNOC																
Pr	ogramn	ne	Back	helor of	Technol	ogy						Y	ear of Re	gulation	l	20	18
D	epartme	ent	Mat	hematio	CS								Seme	ster		I	Ι
Co	urse				Cou	rse Name	2		_	(	Credit St	ructure	1		Marks D	vistributio	n
C	ode				Cou					L	Т	Р	C	INT	MID	END	Total
MA	A 102		In	tegral (	Calculus	and Com	plex Var	riables		3	1	0	4	50	50	100	200
		To in	trodu	ice the	fundame	ntal conc	cepts and	techniqu	ues of		CO1	Able to plane c of solid	apply de apply de apply de apply de apply de aurves; to ls of rotat	efinite in determi ion	tegrals to ne volum	evaluate le and sur	length of face area
		integra calcul	al ca us an	alculus	of sing y of com	le and plex varia	multi-var bles	riables,	vector		CO2	Able integral	to under ls and the	stand the stand the stand the stand the standard s	he conce rgence pro	epts of operties	improper
											CO3	Able to solve p	o apply the roblems r	e knowle elated to	edge of m areas, vo	ultiple in dumes, et	tegrals to c
Co Obje	urse ectives									Course Outcomes	CO4	Able to theorem triple in	o apply C n and Gre ntegrals	Gauss' d en's the	ivergence orem to e	theorem valuate do	, Stokes' ouble and
		To de	velop	o proble	m solving	g and criti	cal thinki	ng skills.			CO5	Able to and geo and ana	o underst ometry of alytic fund	and con f comple ctions	nplex nur ex numbe	nbers, the ers, comp	e algebra lex plane
	COs       Able to evaluate contour integrals by using Cauchy's Integral Theorem, Cauchy Integral Formulae, Residual Theorem         Mapping with Program Outcomes (POs)       Mapping with PSOs																
No	COs       Mapping with Program Outcomes (POs)         PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PSO2       PSO3																
•	COs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS02         PS03           CO1         3         0																
1	CO1	3		0	0	0	0	0	0	0	0	0	0	0			
2	CO2	3		0	0	0	0	0	0	0	0	0	0	0			
3	CO3	3		0	0	0	0	0	0	0	0	0	0	0			
4	CO4	3		0	0	0	0	0	0	0	0	0	0	0			
5	C05	3		0	0	0	0	0		0	0	0	0	0			
0	000	3		U	U	U	U	U			U	U	U	U			
No									SILL	ADUS							
								Content							Hours	3	COs
Ι	Integr Defini under Integra	te integ sign of als: dou	ral: le ral: le integ ble a	: ength o gral: Le nd triple	f a plane eibnitz ru e integral	curve, sur le; Impro s, volume	rface area per integ e and surf	of revol rals, con ace integ	ution, v vergenc rals.	volume of so te tests, beta	olids of re a and ga	evolution mma fun	; Differen ctions; M	tiation ultiple	21		CO1 CO2
II	<b>Vecto</b> Gradie	<b>r Calcu</b> ent, dive	ı <b>lus:</b> ergen	ice, curl	; line and	surface i	ntegrals;	Green's t	heorem	; Gauss' the	eorem; St	tokes theo	orem.		11		CO3 CO4
III	Comp Analyt Cauch	<b>lex Va</b> tic func y's inte	riable ctions gral f	<b>es:</b> s, Cauch formula	hy-Riema ; Power s	nn equat eries, Tay	ions, harr ylor and L	monic fu Laurent se	nctions; eries; Po	; Line integoles and resi	grals, Ca dues, Ca	uchy's in uchy's re	tegral the sidual the	eorem, orem.	16		CO5 CO6
							Total	Hours							48		
Esse	ntial Re	eadings	5													I	
1	J. Ste	ewart, "	Calcı	ulus", C	lengage L	earning I	ndia Pvt.	Limited,	7th edi	tion, 2017.							
2	• E. Kı	eyszig,	"Ad	vanced	Engineer	ing Math	ematics",	John Wi	ley & S	ons, 10th ed	dition 20	15.					
Supp	olement	tary Re	eadin	igs													
1	• R. K.	Jain ar	nd S.	R. K. Iy	yengar, "A	Advanced	l Engineer	ring Matl	hematic	s", Narosa I	Publishin	g House,	5th editio	on, 2016			



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Pi	ogramn	ne E	Engine	eering	rechnoic	ogy in ⊑i€	ctronics	and Con	nmunic	ation		Y	ear of Re	gulation			2018-19	)		
D	epartme	ent I	Electro	onics a	nd Com	municati	on Engine	eering					Seme	ster			I/II			
Co	urse				Cc	ourse Nar	ne				Credit	Structure			Mark	s Distribu	ution			
Co	ode									L	Т	Р	С	INT	MID	END	То	tal		
EC	101		Ba	asic El	ectronics	3				2	0	0	2	50	50	100	20	)0		
	_	To deve ofelectr	elop th onics i	he stud in circu	lent's abi uit analys	lity to ap is.	ply the ba	asic princ	ciples		CO1	Verify schottky study of	the V-I diode, z rectifier	charact ener diod and filter	racteristics of p-n junction didiode (Voltage Regulation), LED litering Circuits.					
	-	To deve diode,tr	lop th	e stude or and	ent's abili digital lo	ty to desi gic ICs.	gn basic c	circuits ba	ased on		CO2	Study th CB and	e charac CC mode	teristics a	es and switching action of BJT in CE					
Co Obje	urse ctives	To prov associat the digi	ide the ed wi talsyst	e stude th the tems.	ents with a principle	some kno s of ope	wledge an ration and	nd analys lapplicati	isskills ons of	Course Outcomes	СОЗ	3 Interpret the truth tables of logic gates and De- morgan'stheoremsfor digital electronics circuits.								
		To deve	lop th	e stude	ent's abili	ity to con	nmunicate	effective	ely the		CO4	Underst andits ap	and abou	t Radio F in transn	requency nitter and	Spectrum receiver	m, modul s.	ation		
		knowle	lge of	electro	onics and	communi	cation sys	stems.		(50)	CO5	Explain RayOsc Function	the worl illoscope nGenerat	king of el & & amp; or, Power	ectronic Digital Supply,	instrume Storag Digital N	nts like ( e Oscill <u>/ultimete</u>	Cathode oscope, r.		
No.	COs	COs PO1 PO2 PO2 PO4 PO5 PO6 PO7 PO2 PO2 PO4 PO5 PO7 PO2 PO2 PO4 PO5 PO5 PO7 PO2 PO2 PO4											DO12		/lapping v		S			
1	CO1	3		2	PU3 0	P04 0	PU5	0	0	P06	PU9 0	P010	0	P012	3	P302	PSO2 PSO3 0 3			
2	CO2	3		2	0	0	0	0	0	0	0	0	0	0	2	0	0 2			
3	CO3	3		2	0	0	0	0	0	0	0	0	0	0	2	3	$\begin{array}{c c} 0 & 2 \\ \hline 3 & 2 \\ \hline 2 & 2 \end{array}$			
4	CO4	3		2	0	0	0	0	0	0	0	0	0	0	2	3	2	3		
5	CO5	3		2	0	0	0	0	0	0	0	0	0	0	0	0	0	3		
	SYLLABUS																			
No.	Introduction       Content         Fundamentals concept of semiconductor (Energy Bandgap, Mobility, Conductivity & Resistivity) and Junction(Metal-Semiconductor and Semiconductor –Semiconductor (homo and hetero-junction).														Hours		COs			
I	Diode and it's circuits07CO1Basic p-n junction Diode Theory, Zener Diode, Photodiode, Light Emitting Diode, Varactor Diode, and Schottky Diode.07CO1																			
	Half W & $\pi$ filt	Vave Rec ters), Vo	ctifier ltage N	Circuit Multipl	t, Full Wa liers.	ave Rectif	ïer Circui	t and Brid	dge Rec	tifier Circuit	, Filterir	g Circuits	s (C, L, I	2-C						
11	<b>Diode</b> Transi Config	and it's stor The gurations	<b>circu</b> ory, Ti , Diffe	<b>its</b> ransiste erent B	or Action liasing Te	, Transist chniques	or Symbo , Concept	ls, Comn of Transi	non Coll istor Am	ector, Comr plifier.	non Emi	tter and C	Common	Base	04		CO2			
111	<b>Digita</b> Boolea	<b>l Electr</b> e an Algeb	o <b>nics</b> ora, Lo	ogic Ga	tes, Com	binational	Circuits.								03		CO3			
IV	<b>Comm</b> Introdu Basic <b>C</b>	nunicati uction to Circuits o	on Radic of Moc	o Frequ dulation	iency Spe n and Dei	ectrum, M modulatic	odulation on, Transn	, Need of nitters and	Modula d Receiv	ntion, Differ ers, Applica	ent Type ation of I	s of Modu Modulatio	ulation, n.		06		CO4			
V	<b>Instru</b> Cathoo Power	<b>mentati</b> de Ray C Supply,	on )scillo: Digita	scope a al Mult	& Ditimeter.	igital Stor	age Oscil	loscope: '	Theory a	and Applicat	tions, Fu	nction Ge	enerator,		04		CO5			
							Total	Hours							24					
Esse	ntial R	eadings	mier.	<u> </u>					liohan	0000										
1 Sum	. Basic		onics,		opadhya	y&Raksh	IIT, INEW A	Age Publ	lisner, 2	:009										
Sup	Flact	ronice P	rincinle		ert P Ma	llvino Pul	olisher: Te	ita McGra	aw-Hill <i>'</i>	2010										
2	. Elect	ronics D	evices	s, Thom	nas L. Flc	yd, Publi	sher: Pea	rson Edu	cation, 2	2008										

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P	rogrami	ne	Bacl	helor of '	Technolo	gy (All b	ranches)						Year of Re	egulation		20	19-20	
D	epartme	ent	Che	mistry			,						Seme	ester		Ι	or II	
Co	urse				Co	maa Nam	2				Credit S	tructure			Marks I	Distributio	on	
Co	ode				Col		5			L	Т	Р	С	INT	MID	END	Total	
CY	101				C	hemistry				2	1	0	3	50	50	100	200	
		To pro chemis compo	ovide stry ounds	the stud and pro	dents wit perties a	h some k Ind appli	cations c	e of coord of co-ord	dination		CO1	Able to properti	acquirekr ies and ide	nowledge	about coo on of its ap	chemistry,		
		To pro corrosi green c	ovide ion, r chemi	fundame eaction c istry	ental unde dynamics,	rstanding polymer	on electro science a	ochemistry nd import	y, tance of		CO2	Able t analysis problem	to acquire s and iden ns (energy	e knowl tification storage of	ledge ab of applic devices an	out elect	rochemical engineering on)	
Co Obje	urse ctives	To dev instrum	velop nenta	the stud l method	lent's abil ls for cher	lity to app nical anal	ply knowl ysis	edge of d	lifferent	Course Outcomes	CO3	Able to acquire knowledge about the basics ch kinetics, theories of reaction rates and their appli in catalysis						
5	·										CO4	Able to techniq Able to	b acquires ues and th acquire k	knowledg eir applic knowledg	dge about various instrument plications in chemical analysis edge about different types (soli			
		To intr	oduc	e the stud	dents with	the conc	ept, classi	fications a	and		CO5	liquid a their ap	ind gases) plications	of fuels	and its ex	straction p	process and	
		industi	rial ap	oplication	ns of diffe	erent poly	mers				CO6	Able to polyme applicat	o acquire rs, polyme tions	e knowle erization	edge abor processes	ut the cost and thei	oncepts of r industrial	
No.	COs	Mapping with Program Outcomes (POs)COsPO1PO2PO3PO4PO5PO6PO7PO8PO9PO10PO11PO														pping wit	with PSOs	
-	<b>CO</b> 1	PC	PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         D		PO10	PO11	PO12	PSO1	PSO2	PSO3								
1	CO1	2		0	0	0	0	0	0	0	0	0	0	0				
2	C02	2		0	0	0	0	0	0	0	0	0	0	0				
4	CO3	3		0	0	0	0	0	0	0	0	0	0	0				
5	CO5	3		0	0	0	0	0	0	0	0	0	0	0				
6	CO6	2		0	0	0	0	0	0	0	0	0	0	0				
									SYLLA	ABUS								
No.								Content							Hour	s	COs	
Ι	Doubl crystal	e salts, field th	coord neory	lination c of co-ore	compound dination c	ls, differen ompound	nt types W s, optical a	erner's thand magne	neory of c etic prop	coordinatior erties, isom	n compou erism in c	nds, valan co-ordinati	ice bond an	nd ounds	05		CO1	
II	Condu Redox half-ce Introdu	ctance reactio ell, calo uction to	of ele ons, el mel h o fuel	ectrolytic lectrode nalf-cell, l cell.	solutions potential, quinhydro	, effect of Nernst e one half-c	temperatuquation, fa	are and co actors affe	oncentrati ecting the	on, conduct e emf of ha	tometric t lf cells, I	itrations Latimer di	agram, hy	drogen	07		CO2	
III	Galva	nic serie	es, ele	ectrochen	nical theo	ry, galvar	nic corrosi	on, crevic	ce corrosi	on and pitti	ng corros	ion, contro	ol of corro	osion.	04		CO2	
IV	Theore	etical ar	nd exp	periment	al pH-met	ry, potent	tiometry a	nd colorin	netry.						04		CO4	
V	Princip	pals and	l appl	ications	of green c	hemistry									01		CO3	
VI	Variou period Activa	is facto s tion ene	rs aff ergy,	fecting theories	he rate of of reactio	reactions	s, integrat atalysis, ki	ed rate la	aws for z homogen	zero, first a eous, hetero	nd second ogeneous	d order re and enzyr	eactions, h	half-life is	06		CO3	
VII	Solid, numbe	liquid er, aviat	and g ion fu	gaseous and base	fuels, coa iodiesel.	ıl analysis	s, classific	cation of	coal, ant	ti-knocking	agents, o	octane nu	mber and	cetane	04		CO5	
VIII	Conce polym indust	pts, cla erizatio rial poly	assifio n pro ymers	cation, s ocess, nat	structures tural rubb	, and m per and its	olecular 5 propertie	weights es, vulcan	of polyn ization o	mers, mec f rubber, sy	hanism a ynthesis a	and kinet and applic	ics of ations of	various various	05		CO6	
-							Tota	l Hours							36			
Essei	ntial Re	adings	1 1 / 1	Ioin "T	ainconi	Charrier	w" DLa	of Dol D	hlipptie	Co								
2	. r.c.	Dara "	и IVI. J 4 Теч	$\frac{1}{1}$ t Book c	of Engine	ering Che	y, Dhan <u>r</u> mistry" S	Chand &	2 Co I td									
Supp	lement	ary Rea	ading	s DOOR (	. Lugino				~ 00. Liu	•								
1	. <u>M</u> . G.	Fontan	na, "C	Corrosion	Engineer	ing", Mc	Graw-Hill	Book Co	mpany.									
2	• R. Go	palan, ʻ	"Engi	ineering	Chemistry	, Vikas	Publishing	g House P	vt. Ltd.			_	-	_	_			
3	. B. K.	Sharma	ı, "En	ngineerin	g Chemis	try", Kris	hna Praka	shan Med	lia (P) Lto	d								

ASTITUTE WICHOUT
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Pr De	ogramn epartme	ne <b>B</b> ent <b>C</b>	achelor of hemistry	Technolo	gy (All b)	ranches)						Year of R Sem	egulation		201	9-2020 II
Cor	irse		J							Credit St	tructure	~ • • • •		Marks D	istributi	on
Co	de			Coι	irse Name	e			L	Т	Р	C	INT	MID	END	Total
CY	102			Environ	mental S	cience			2	0	0	2	50	50	100	200
		To prover related stakehold environn	ide the bas socio-ecor ders to p nent improv	sic knowle nomic properticipate vement provement provement	edge abou oblems in env ogrammes	It the env by mo vironment	vironment tivating protectio	and its various on and		CO1	Able to natural conserv	develop resource retions for	the kno es, their maintaini	wledge of proper ng ecologi	f variou utiliza ical bala	is types of ations and nce.
Cou	irse	The sup compour emphasis between	pply the lands in the as on the dirighted in the dirighte	knowledge atmosphere fferent pro segments o	s of chee, water a bocesses the of environ	emistry of nd soil, an at define nment.	of elemen nd to give the linkag	nts and e special ges	Course	CO2	Able to resourc large so develop	o determines, their es, their es, their es, their es, their es, their es, the second s	ine the fo establishm er they m	eatures of ent and pr ay find w	renew roper fu vays for	able energy nctioning a sustainable
Objec	Luves	To give processe	student the s those are	e awarenes significant	to enviro	fundamen onmental p	ntal chemi problems.	cal	Outcomes	CO3	Able to types o the idea and tecl	understa f pollutio as of prob hnologies	nd the resonant of the resonan	ources and ironment, ions based	l impact futher t on curr	s of various hey will ge ent sciences
		To nurtu based on	re the know sustainable	wledge of e developn	protectio nent and u	n for the uses for th	natural re living be	esources eings.		CO4	Able to environ	distingui mental ch	sh the inte allenges	rrelation o	f multip	le factors in
No	COs			T		Mapping	with Prog	gram Outo	comes (POs)	)		Т	1	Map	ping wi	th PSOs
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
$\frac{1}{2}$				0	0	0	0	2	0	0	0		0			
2	$\frac{CO2}{CO3}$	0	0	0	0	0	0	2	0	0	0	0	0			
4	CO4	0	0	0	0	0	0	2	0	0	0	0	0			
5	CO5	0	0	0	0	0	0	0	0	0	0	0	0			
I I III IV	Introd Multidi develop mining Water: probler sources Elemer change nitroge Air po Source commu conseq CFC, in Water Natural applica BOD, ground	uction ar isciplinar pment. La , dam bui Use and ns. Energ s, growing y nts of ecc : Effect en, phosph llution and effe unities an uently on mpact of pollution l water; ttion, hea COD and water flo	d natural y nature of and resource lding on en l over-expl y resources g energy ne ology, defin of abiotic nate, sulphu ect of poll d agricultu sea water other green pollutants: vy metals, l TOC, oil ow.	resources of environ es: Land d avironment loitation of s: Renewal eds and ca nition of a factor on ar) and foo utants, pri- tre. Green level, agri- house gase their ori pesticides , Grease,	mental st legradatio t, forests, of surface ole and no se studies ecosystem populatio d chain. imary and -house ef culture ar es, effect gin and s, volatile pH. Lake	tudies, sc on, soil ero biodiversi e and gro on-renewa s. n, biotic a on, flow c d seconda ffects: De d marine of ozone n effects: o e organic e water:	Content cope and osion and ity and tril ound wate able energy and abioti chart of d ary pollut finition, i food. Dep modificati oxygen de compound	importan desertific bal popul r, floods y sources c compo ifferent of ants, cor impact of pletion of on. emanding ds. River ation, Gr	ace, concept ation. Defor ations. , droughts, , use of alter nents. Ecolo cycles with atrol measur f greenhous f ozone laye g wastes, p / lake/ grou cound water	t of sus restation: populati rnate ene ogical ba only ele res. Acid e gases r: CFC, o athogens ind wate : Aquife	tainability Causes a on growt rgy alance and ementary d rain: Ir on the g destructio s, nutrien er pollutio rs, hydra	and sust and impace th and as d consequence d consequence reaction of npacts or lobal clin n of ozon ts, salts, on: River ulic gradi	stainable ts due to ssociated aence of (oxygen, a human nate and e lair by thermal water – ent, and	06 02 03 03		COs CO1 CO2 CO3 CO4 CO3 CO4
v	Land I Lithosp convers	pollution phere con sion meth	position. P od waste a	Pollutants: nd waste n	Municipa nanageme	d, industri ent land fi	ial, comme lling, incir	ercial, ag neration,	ricultural, h composting.	azardous	solid was	stes; recov	very and	03		CO3 CO4
VI	Noise J Definit definiti	pollution ion of no ion of noi	ise, effect o se intensity	of noise po y, noise thr	llution, no eshold lin	oise classi nit value.	ification, t	ransport	noise, occup	ational n	ioise, neig	ghbourhoo	od noise,	03		CO3 CO4
VII	Human Human earthqu Environ Environ	n commu h health a hake, cyc nmental o nmental p	nities and nd welfare lones and ethics: Role protection A	the enviro , resettlem landslides e of Indian Acts.	onment lent and r l. Environ n and oth	rehabilitati nmental r ner nation	ion of affe novement s and cult	ected per s – Chip tures in e	sons, case s bko, Silent environment	tudies, d valley a al conse	isaster m nd Bishn rvations,	anagemen ois of Ra public aw	it: flood, ajasthan. vareness.	04		CO1 CO2
						Tota	al Hours							24		
-		odinga														

1. R. Daniels and J. Khrishnaswamy, "Environmental Studies", Wiley, 1<sup>st</sup> Edition, 2009.

#### 2. S. Somvanshi and R. Dhupper, "Fundamentals of Environmental Studies", S. K. Kataria& Sons, 1st Edition 2011.

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CURRICULUM

P	rogramn	ne	Bac	helor of T	echnolog	v in Com	nuter Scie	ence and	Engineer	ina		Y	ear of Re	nulation		2019-	20		
	enartme	nt	Com	nuter Sci	ience and	Engineer	rina		Engineer	ing		I	Semes	ter		I	20		
	uroo	110	0011			Engineer	ing				Credit S	Structure	Come		Marks Dis	tribution			
	ode				Cc	urse Nam	е				T	P	C.	INT			Total		
CS	102				Introduct	ion to Co	mputing			2	1	0	3	50	50	100	200		
		To intro	duce t	he basic ar	chitecture of	of a comput	er, the cond	cept of algo	rithm,		•	Able to ex	plain the ba	sic archite	cture of a co	mputer, the	concept		
		the basi of funct	c cond ional h	cepts and tenter to the contract of the contra	erminology code orgai	of program	ming in ger	neral and co	oncept		CO1	of algorith	m, and the ing in gene	basic cono ral.	epts and teri	minology of			
		To incul	cate t	he ability to	do algorith	mic thinkin	g to analys	e real-world	k		CO2	Able to de	velop the al	bility to do	algorithmic f	analyse			
Co	urse	To intro	duce p	orogrammir	ng using C l	anguage an	e. Id writing p	rograms in	C on a	Course	CO3	Able to us	e the C prog	gramming	language to	implement v	various		
Obje	ctives	compute To train	er, and the st	<u>d edit, comp</u> udents in c	<u>oile, debug,</u> hoosing rig	correct, rec ht data rep	compile and resentation	l run those. formats ba	sed on	Outcomes	000	Able to ch	s. oose the ric	ht data re	presentation	formats bas	sed on		
	-	a proble	em spe	ecification.		-					04	the require	ements of the	ne problem	i. nouter edit (	compile del			
											CO5	correct, re	compile an	d run thos	8.				
											CO6	Able to un organizati	derstand th on.	e concept	of functional	hierarchica	erarchical code		
No	COs						Mapping	with Progr	am Outco	mes (POs)					Марр	ping with PSOs			
INU.	COS	PC	)1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3		
1	CO1	3		0	1	0	1	0	0	0	0	1	1	1	0	0	0		
2	CO2	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$													1	1	1		
3	CO3	3		3	3	2	1	0	0	0	1	0	0	0	0	1	1		
4	CO4	3		1	1	2	0	0	0	0	0	0	0	0	0	2	3		
5	CO5	3		0	3	1	3	0	0	0	1	0	0	0	0	1	1		
6	CO6	3		2	2	2	0	0	0	0	2	0	0	0	0	0	1		
									SYLLAB	US									
No.								Content							Hours	(	Cos		
		_															;01		
	Introdu	uction	n of a	Compute	er: Von N	eumann	architectu	Ire: CPU:	Memory:		I· Hardw	are: Softw	are.				502		
	Applic	ation P	rogra	ams; Syst	em Progr	ams; Ope	erating Sy	vstems; N	umber Sy	/stems.	, 1101010		ure,						
I	• Conc	ept of I	Progr	ramming a	and Prog	ramming	Language	es: Machi	ne Langu	age; Assen	nbly Lan	guage; Hi	gh-Level	line	07				
	and in	an IDE	lang	juage; Co	mplier; A	ssembler	; interpre	ter; Linke	er; Loader	; Compliin	g a C pro	bgram in c	ommand	line					
	• Conc	ept of A	Algor	ithm, Flov	wchart, P	seudo co	de, Illustr	ative Prol	blem Solv	ing Examp	les.								
																0	:03		
	Introdu	uction t	o C p	programm	ning langu	lage										C	04		
	• Featu	ires of	a Pr	ogrammir	ng Langu	age: Cha	racter Set	t; Consta	nts; Esca	ape Sequen	ces; Ide	ntifiers; K	eywords;	Data		0	05		
	Types;	Data 1	Гуре verat <i>i</i>	Qualifiers	s; Variabl Sal Opera	es; Decla tors Rela	rations; e tional Or	enum; typ perators	edef; Op Bitwise O	erators & E	Expression Assignm	ons - Bina ent Opera	ry operat	ors :-					
	Assigr	ment (	Opera	ators; Una	ary Opera	ators; Ter	nary Ope	rators; S	pecial Op	perators; si	zeof(); O	perator P	recedence	e and					
	Assoc	iativity	in ex	pression	s; Data t	ype conv	ersion: co	oercion (i	implicit ty	ype conver	sion), ty	pe casting	g (explicit	type					
	convei	sion);	State	ments: A	ssignmer	it stateme	ents, inpu		statemen	its for stand		ut/output	devices.						
	Flow C	ontrol	- Cor	nditionals	and Brai	nching :- 3	Simple if	Statemen	t, if-else	Statement,	Nested i	if-else Stat	ement, L	adder					
	structu	ire of it	-else	, switch-c	case state	ement, go	to statem	ent;								0	:06		
	Iteratio	on - whi	ile Sta	atement,	do-while	Statemen	t, for Stat	ement, br	reak and o	continue.									
	Functi	one: Ei	unctio	n Types	- standar	dlibrary	functions	ucor do	fined fun	ctions: syn	tax of fu	inctions: /	raumont	c and					
	Param	eters; (		by Value;	Call by F	leference	; paramet	terized ma	ain functi	ion; Storag	e Classe	es - auto, i	register, s	static,	20				
- 11	extern	; Scope	Rule	e: Variabl	e scope -	local, glo	bal; Recu	irsion.					-		29				
	Arravs	- Sind	ale D	)imensior	al Arrav	s. Multi-R	)imensior	nal Arrav	s. Introdu	uction to s	strinas ·	- Definitio	on of a s	trina.					
	charac	ter arr	ays a	and string	gs, pointe	ers and s	trings, st	andard li	brary str	ing functio	ns, arra	ys of strir	ngs; Poin	ters -					
	differe	nt type	s of p	pointers,	pointer ar	ithmetic,	pointers	and array	'S.										
	Struct	ures - (	creati	ing struct	tures usi	ng struct,	Arrays i	n Structu	ıres, Arra	y of Struct	ures, Di	fference b	etween a	rrays					
	and st	ructure	s; Un	nions - cre	eating str	uctures u	sing unio	n, differe	nce betwe	een structu	res and	unions.		-					
	Prepro	cessor	dire	ectives a	nd Files	- Prepro	cessor d	lirectives	:- File i	nclusion b	w macro	o. macros	. macros	and					
	functio	ons; Ba	sic Ir	nput/ Out	out opera	tions on I	Files :- Te	ext files a	nd binary	files, file o	pening r	nodes, op	ening, clo	osing,					
	readin	g, writi	ng an	nd append	ling to a f	ile.													
	(A pro	gramm	ing la	anguage	like C/ C-	++ shall b	e used a	s a basis	language	e. The sam	e langua	age is to b	e used fo	or the					
	labora	tory).		-							-								
							Total	Hours							36				
Esse	ntial Re	adings																	
1	. E. Bal	agurusa	ımy, ʻ	'Programr	ning in Al	NSI C", M	cGraw-Hi	ll Education	on, 6 <sup>th</sup> edi	tion, 2019.									

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- 2. V. Rajaraman, "Fundamentals of Computers", PHI Learning, 6th revised edition, 2014.
- 3. Yashavant Kanetkar, "Let Us C", BPB Publications, 16<sup>th</sup> edition, 2017.

#### Supplementary Readings

- 1. Byron S. Gottfried, "Programming with C", McGraw-Hill Education, 4<sup>th</sup> edition, 2018.
- 2. Brian W. Kernighan, Dennis M. Ritchie, "The C Programming Language: ANSI C Version", Pearson Education India, 2<sup>nd</sup> edition, 2015.
- 3. Darrel L. Graham, "C Programming Language", Createspace Independent Publishing, 1<sup>st</sup> edition, 2016.

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CURRICULUM

P	rogramme	e Ba	chelor of '	Fechnolog	gy in Mec	hanical H	Engineeri	ng				Year of Re	gulation		202	0-21				
D	epartmen	t M	echanical	Engineeri	ing							Seme	ster		Ι	Ι				
C	ourse			C						Credit St	ructure			Marks D	Distributior	1				
(	Code			C	urse main	e			L	Т	Р	С	INT	MID	END	Total				
Μ	E 152			Work	shop pra	ctice			0	0	4	2	100	0	0	100				
C	ourse	Explain carpent	the tools, ry, fitting,	equipmen welding a	ts and safe nd machin	ety procec e shops. (	lures of understan	ıding).	Course	CO1 CO2	Utilize t jobs in f dimensi Utilize t jobs in o dimensi	he tools as itting shopons. (Appi he tools as carpentry s	nd equipm p and con lying). nd equipm shop and o	nents to p pare with nents to p compare	erform spe n prescribe erform spe with prescr	cified d cified ibed				
Obj	Department   Course   Code   ME 152   ME 152     No.   COS   1   CO1   2   CO2   3   CO3   4   CO4     No.   I   To perfor   II   To develo   IV   To make	To expl	ain the wo	nd equipn op and co lying).	ments to perform specified ompare with prescribed															
		operado								CO4	Utilize ( (Application)	he lathe to ation)	lathe to develop the prescribed job on)							
No.	COs	Mapping with Program Outcomes (POs)												Ma	Mapping with PSO					
1	001	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3				
1	<u>CO1</u>	3	2	1	0	0	2	0	0	2	0	0	0	2		0				
2	<u>CO2</u>	3	2	1	0	0	2	0	0	2	0	0	0		1					
3	CO3	3	2	1	0	0	2	0	0	2	0	0	0		1	0				
4	04	3	<i>L</i>	1	U	U	2			2	U	U	U	2	1	U				
No							Content	SILLA	ADUS					Hours		COs				
110.							Content							Hours						
I	To perfo	rm T-joii	n with drill	ing in the	centre in	the fitting	with the	use of spo	ecific tools					08		CO1				
II	To perform T-join with drilling in the centre in the fitting with the use of specific tools08CO1To develop cross join, dovetail join and briddle join in carpentry shop with the use of specific tools08CO2																			
III	To deve	lop L-joir	n, Butt join	in Metal	arc weldir	ng and T-j	oin Oxy-a	acetylene	e gas weldin	g				08	C03					
IV	To make	specific	job using I	Lathe mac	hine in m	achine								08		<b>CO4</b>				
						Tota	l Hours							32						
Esser	ntial Rea	dings																		
1	• S.K. Ha	ajra Chau	dhary, Ele	ments of V	Workshop	Technolo	ogy Vol-I	and II, A	sia Publishi	ng House	e									
Supp	lementa	ry Readi	ngs		non Tesh-		Wy Dalh:	Unichtal	Dub Now F	olb:										
2	. Gupta I	$\mathbf{X}$ $\mathbf{X}$ $\mathbf{W}$ $\mathbf{W}$ $\mathbf{W}$	ausnish J.	nology 7	Tata McCr	ology, Ne	ublishing	$\frac{1}{Co I t^{2}}$	rud., New L	eim.										
3	WAI	Chanma	Worksh	on Techno	logy FL	BS Low P	rice Text	Edward	Donald Put	. Ltd										

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An Institute of National Importance

CURRICULUM

P	oaramı	me	Bac	chelor of	Technol	ogy in Ele	ectronics	and Com	nmunica	ation	Year of Regulation2018-19Vear of Regulation2018-19Credit StructureMarks DistributionTPCINTENDTotal0215050100 $I$ ColVerify the V-I characteristics of p-n junction diode, schottky diode, zener diode (Voltage Regulation), LED and study of rectifier and filtering Circuits.ColStudy the characteristics and switching action of BJT in CE, CB and CC mode.Co3Interpret the truth tables of logic gates and Demorgan's theoremsfor digital electronics circuits.Co4Work in teams to plan and execute the creation of complex Digitalsystems.OsMarks plan and execute the creation of 2 and 2 a							
			Eng	gineering			on En cin					1		gulation			1/11	
D	epartme	ent	Ele	ctronics a	and Com	municau	on Engin	eering			Cradit	Structure	Seme	ster	Mort	o Diatrih	I/II	
	urse ode				Co	ourse Nar	ne						<u> </u>	INI	iviar T			tal
FC	151			Bas	vic Flectro	nics Eng	ineering I	ah			0	г 2	1	50	<u> </u>	50	10	
		To de ofelec	eveloj etroni	p the stuc	dent's abi uit design	lity to ap ing.	oply the b	asic princ	iples		CO1	Verify t diode, z rectifier	he V-I ch ener dio and filte	haracterist de (Voltag ring Circu	tics of p- ge Regul uits.	n junctio ation), L	n diode, s ED and s	chottky tudy of
Co Obie	urse ctives	To de diode,	velop trans	o the stude sistor and	ent's abili digital lo	ity to des gic ICs.	ign circui	ts based o	n	Course Outcomes	CO2	Study th CE, CB	he charac	cteristics mode.	and swit	ching ac	tion of B	JT in
		To de know	velop ledge	the stude of electro	ent's abilionics and	ity to con commun	nmunicate	e effective stems.	ly the		CO3	Interpre theorem	t the trut sfor digi	h tables of tal electro	of logic gonics circ	gates and uits.	Demorg	an's
	CO4     Work in teams to plan and execute the creation of complex Digital systems.       Mapping with Program Outcomes (POs)     Mapping with PSOs																	
No	Mapping with Program Outcomes (POs)         Mapping with PSOs           No.         COs         Dot         Dot </td																	
110.	No.         COs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PSO2         PSO3         PSO3         PSO4																	
1	CO1	rot       roz       ros       r																
2	CO2	3	3	1	1	0	1	1	1	2	1	0	0	0	2	0	2	3
3	CO3	3	3	2	2	1	1	1	1	2	1	0	0	0	2	3	2	3
4	CO4	1		1	1	1	0	3	3	1	1	3	0	0	2	3	2	3
									SYL	LABUS								
No.							List of	Experime	nts	· · · · · ·					Hours		COs	
				1. 8.	I-V C 2. 3 7. Des 9. li 10. li	haracteris Reve 4. Zer 5. F 5. F 6 Truth sign of ba nput & ou nput & ou	stics of for rse charac her Diode falf-wave full-full-full-full-full-full-full-full	ward bias cteristics c as a refer rectifier us dge rectifie rification o ates using acteristics	ed P-N of Zener ence Di sing dio sing dio er. of Logic g NAND of BJT i of BJT i	Junction Dic Diode de de Gates. & NOR gat in CB mode in CE mode	es				12	C	01, CO2, CO4	CO3 &
							Total	Hours							12			
Esse	ential R	eading	gs											I				
1	. Basi	c Elect	tronio	cs, Chatt	opadhya	y & Rak	shit, New	Age Put	olisher,	2009								
Sup	olemen	tary R	eadiı	ngs														
-	I. Elect	ronics	Princ	ciples, Alb	ert P. Ma	lvino, Pu	blisher: Ta	ata McGra	w-Hill, 2	2010								
	2. Elect	ronics	Devi	ces, Thon	nas L. Flo	yd, Publi	sher: Pea	rson Educ	cation, 2	2008								

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CURRICULUM

	TUTE OF TECHNOLO	».															
Р	rogrami	ne	Bach	elor of Z	Fechnolog	gy (All Br	anches)					Ţ	Year of Re	gulation		2019	9-2020
D	epartme	ent	Cher	nistry				T		T			Seme	ster		Io	r II
Co Co	urse ode	Course	Nam	e				Pre-Rec	quisite	C	redit Stru	cture			Marks D	istributior	1
CV	151			Chamia	tur Iaha	antowy.		NI	•	L	Т	Р	C	Conti	nuous Ass	essment	Total
CI	131			Chemis	try Labor	ratory			1	0	0	2	1	01 Exp	eriment	10	100
	To provide the students with knowledge on various techniques for chemical analysisCO1Able to acquirekno quantitative analysisurse ctivesTo provide the students with knowledge on various techniques for chemical analysisCourse OutcomesCO2Able to acquirekno application in cher 													owledge sis and th anions	about vari eirapplica	ous techni tions for e	ques for stimation
Co Obje	Durse ectivesTo provide the students with knowledge on various techniques for chemical analysisCourse OutcomesCO2Able to acquirekno application in chem reactionsTo develop the student's ability to use of different instrumental methods for chemical analysisCO3Able to understand types of pollutions ideas of probable so technologies method												owledgea mical ana	bout spec lysis; kine	trophotom etics of che	etryand it emical	
	Jectives       To provide the students with knowledge on various techniques for chemical analysis       Outcomes       Able to adquireknowl application in chemic reactions         To develop the student's ability to use of different instrumental methods for chemical analysis       To develop the student's ability to use of different instrumental       CO3       Able to understand th types of pollutions on ideas of probable solu technologies methods         .       COs       Mapping with Program Outcomes (POs)       PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       H         CO1       2       2       0       0       0       0       0       0       0       0												d the reso s on envir solutions nods	ources and conment, f based on o	impacts o urther to a current sci	f various chieve the ences and	
	COs     Mapping with Program Outcomes (POs)       PO1     PO2     PO3     PO4     PO5     PO6     PO7     PO8     PO9     PO10     PO11														Map	ping with	PSOs
No.	COs	PO	1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1         CO1         2         2         0																	
2	CO2	1		2	0	0	0	0	0	0	0	0	0	0			
3	CO3         2         2         0																
									SILL	ABU S							
No.								Content							Hours		COs
1	To dete	rmine tł	ne alka	alinity of	f given wa	ater sample	e								2		CO1
2	Estimat	ion of F	e(II) i	in Mohr'	s salt solu	ition using	standard	KMnO <sub>4</sub> s	olution	via Redox tit	ration				2		CO1
3	Conduc	tometric	c titrat	tion of a	n unknow	n acid solu	ution using	g a standa	rd base	solution					2		CO3
4	pH-met	ric titrat	ion of	f an unkı	nown acid	solution	using a sta	indard bas	e soluti	on					2		CO3
5	Comple	exometri	ic dete	erminatio	on of hard	ness of wa	ater								2		CO3
6	Iodome	tric dete	ermina	ation of c	copper in	brass alloy	7								2		CO1
7	Spectro	photom	etry o	n copper	sulphate	solution									2		CO2
8	Determ	ination	of par	tition co	efficient o	of acetic ac	cid betwee	en <i>n</i> -butan	ol and v	water					4		CO1
9	Determ	ination	of per	centage	compositi	on of suga	ar solution	from visc	cosity						4		CO1
10	Estimat	ion of F	e(II) i	in a solut	tion using	standard	K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> s	olution via	a potent	tiometric titra	tion				2		CO1
							Total	Hours							24		

#### References

1. J. Mendham, R. Denny, J. Barnes, M. Thomas, 'Vogel's Quantitative Chemical Analysis', Prentice Hall

2. V. D. Athawale, P. Mathur, 'Experimental Physical Chemistry', New Age International (P) Limited Publishers

3. Departmental laboratory manual

A CALL NATIONAL	AT IT IT A RAY >	ADDALIAN E. P. I.				Na	ational	<b>Institut</b> An Institu	e of Te te of Nat	echnolog ional Importa	<b>y Meg</b> ance	halaya				CURRIC	CULUM
Pr D	ogramn	ne	Bach Com	nelor of "	Fechnolo	gy in Me d Engine	chanical ]	Engineer	ing				Year of R Sem	legulation		2019	9-20 T
	epartitie	int	Com			u Engine	, cring				Credit	Structure	Jein		Marks Dis	stribution	L
	urse ode				Co	ourse Nar	ne			L	Т	Р	С	Continuo	ous Oui	z/ Viva	Total
CS	152				Cor	nnuting	Lah			0	0	2	1	Evaluatio	on Car	30	100
	102	To intr	oduce	e prograt	nming us	ing C lan		to write			CO1	Able to	explain th	ne basic cor	ncepts and	terminolo	bgy of
		program	ns in	C on a c	omputer,	and to ed	lit, compil	e, debug,				program	nming in g	general.	ing to ana	vsa a pro	blem and
		correct,	, reco	mpile ar	nd run tho	ose.					CO2	develop	an algori	thm to solv	ve it.	lyse a pro	
Col	irse	To incu	ilcate	the abili	ity to do a	loorithm	ic thinking	o to analy	se real-	Course	CO3	Able to	use the C	programm	ing langua	ge to imp	lement
Obje	ctives	world p	proble	ems and	develop a	lgorithms	s to solve	those.	se reur	Outcomes	CO4	Able to	choose th	ne right data	a represent	ation forn	nats
	_											based o	n the requ write pro	irements of grams on a	f the probl computer	em. edit.com	mile
		To train	n the	students	in choosi	ng right c	lata repres	entation f	formats		CO5	debug,	correct, re	compile an	d run thos	e.	ipiie,
	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$																
No	No.Mapping with Program Outcomes (POs)Mapping with PSOsNo.COsPO1PO2PO3PO4PO5PO6PO7PO8PO9PO10PO11PO12PS01PS02PS031CO130101000110002CO223321100100110																
INO.	Image: Non-         COs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS02         PS03           1         CO1         3         0         1         0         1         0         0         0         1         1         1         0         0         0           2         CO2         2         3         3         2         1         1         0         0         1         0         0         1         1         0         0         0         1         1         0         0         0         1         1         0         0         0         0         1         1         0         0         0         0         0         1         1         0         0         0         0         1         1         0         0         0         1         1         0         0         0         1         1         0         0         0         1         1         0         0         0         1         1         0         0         0         0         1																
1	I         CO1         3         0         1         0         1         0         0         0         0         1         1         1         0         0         0         0         1         1         1         1         0         0         0         0         1         1         1         1         0         0         0         0         1         1         1         1         0         0         0         0         1         1         1         1         0         0         0         0         1         1         1         1         0         0         0         0         1         1         1         0         0         0         0         1         1         1         0         0         0         0         1         1         1         0         0         0         0         1         1         0         0         0         1         1         1         1         0         0         1         1         1         1         1         1         0         1         1         1         1         1         1         1         1 <th1< th=""> <th1< th=""></th1<></th1<>																
2	CO1     3     0     1     0     1     0     0     0     1     1     1     0     0     0       CO2     2     3     3     2     1     1     0     0     1     0     0     1     1     0     0     1     1     0       CO2     2     3     3     2     1     1     0     0     1     0     0     1     1     0       CO3     3     3     2     1     0     0     0     1     0     0     0     3     0       CO4     3     2     1     2     0     0     0     0     0     0     0     1     0																
4	CO4	3		2	1	2	0	0	0	0	0	0	0	0	0	1	0
5	CO5	3		0	3	2	3	1	0	0	1	0	0	0	0	2	0
6	5         CO5         3         0         3         2         3         1         0         0         1         0         0         0         2         0           6         CO6         3         2         2         2         0         0         0         1         0         0         0         0         2         0           6         CO6         3         2         2         2         0         0         0         2         0         0         0         1         0           SYLLABUS																
No.	5     COS     C<																
I II IV V	No.       Content       Hours       COs         I       C program to print the paragraph as shown below: "Hello World"       02       02         I       % Hello World %       02       02         I       % Hello World %       02       02         I       C program to print the result of the following arithmetic expression where a=4, b= 5. 5a + ab <sup>2</sup> a <sup>2+9</sup> 02       C         II       C program to check a given number is odd or even and positive or negative. C program to check a given numbers and find the greatest one.       02       CO1         III       C program to read five numbers and find the greatest one.       02       CO1         III       C program to read five numbers and find the greatest one.       02       CO2         V       C program to store ten numbers in an array and find the largest and smallest. C program to store ten numbers in an array and find the largest and smallest. C program to store ten numbers in an array and count the total positive, negative, odd and even numbers [0 < N < 11].																
VI	Im the Im an Im of	plement plement algorith plement an algor	tation tation tation tation	tion of an al of an al display of an al to displa	gorithm to n algorith gorithm to the condit gorithm to ay the con	m to disp o delete a tion of the o reverse adition of	n element lay the co n element e array bet the eleme the array	in an arra fore and a nts of an a before and	the arra ay of inte after dele array of d after re	y before and eger numbers tion. integer numbers eversal.	after ins after ins and also pers and	o the implated of the implant of the	ementatic	on of ation	02		CO5 CO6
VIII	C I C I	program program	to so to ge	olve Tow enerate n	er of Han Fibonace	oi proble ci number	em for n di rs using bo	sks. oth recurs	ive and r	non-recursive	e method	ls.			02		
IX	C I C I	program program	to in to st	nplemen ore the n	t a swap f ame, roll	unction to number,	o swap the marks and	e values o l grades o	f two va f 5 stude	riables. ents using arr	ay of str	ucture.			02		
X	C I ma	program irks of N	to cr stud	eate a fil lents, wh	le named ere N is a	"Studentl a natural r	Database" number be Total	and storin etween 2 t Hours	ng the na o 10.	ame, roll nun	nber, pho	one numb	er and ave	erage	02 20		
Esser	ntial Re	adings		( <b>D</b> )													
1. ว	E. Ba	lagurusa	amy, '	"Program	nming in	ANSI C"	, McGraw	rning 6 <sup>th</sup>	revised	$b^{\text{in}}$ edition, 20	)19.						
3.	Yasha	vant Ka	i, ru inetka	ar, "Let	Us C". BI	PB Public	ations. 16	th edition.	2017.	<i>J</i> anuon, 2014	•						
Supp	lement	ary Rea	ding	S	, = 1												
1.	Byror	S. Gott	tfried	, "Progra	amming v	with C", N	AcGraw-H	Iill Educa	tion, 4 <sup>th</sup>	edition, 2018	3.						
2.	Brian	W. Ker	nigha ham	an, Denn	18 M. Rite	thie, "The	e C Progra	mming L	anguage	: ANSI C Ve	ersion", 1	Pearson E on $2016$	ducation	India, 2 <sup>nd</sup> ec	dition, 201	5.	

4 Sta L NATIONAL	A fin and Ri Ray	A T A A A			Na	ational	<b>Institu</b> An Institu	<b>te of T</b> ute of Na	echnolog ational Impo	<b>gy Meູ</b> rtance	ghalaya	l			CURRI	CULUM
Pr	ogramr	ne I	Bachelor o	f Techno	ology							Year of R	egulatior	ı	20	18
De	epartme	ent I	Mathemati	ics					1			Seme	ester		I	II
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										CO1	series f	or a giver	n periodi	c function	n cosme al 1	iu sine
		To intro Fourier	duce the fu transforms	undament and Lap	tal conce lace tran	pts of Fo sforms	urier seri	es,		CO2	Able to transfor fundam	determin rm of a fu ental pro	e Fourie nction an perties	r and invo nd unders	erse Fourie tand the	er
Co	urse								Course	CO3	Able to and unc	determin lerstand t	e Laplac he funda	e transfo mental p	rm of a fur operties	nction
Obje	ctives								Outcomes	CO4	Able to solving	apply Fo ODEs ar	urier and d PDEs	l Laplace	transform	in
		To intro	solution f	or Legend	re's and											
		COs       Able to classify the second order PDE the solution of heat, wave and Laplace using Fourier series         COs       Mapping with Program Outcomes (POs)       Mapping														
No	COs     Mapping with Program Outcomes (POs)     Mapping with PSOs       COs     PO1     PO2     PO3     PO4     PO5     PO5     PO8     PO9     PO10     PO11     PO12     PSO1     PSO2     PSO2     PSO2															n PSOs
110.	005	Mapping with Program Outcomes (POs)           PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12           CO1         3         0														
1	CO1	3	0	1	0	0										
2	CO2	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3	CO3	3	0	0	0	0	0	0	0	0	0	0	0		0	0
4	C04	2	0	0	0	0	0	0	0	0	0	0	0	1		0
6	CO6	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0
0	000	U	v	v	v	v	v	v	v	U	Ŭ	Ū	v	-	v	Ū
No.							С	ontent							Hours	COs
Ι	Fourie Period of peri	e <b>r Serie</b> s ic functi od 2π, F	s: ons, trigon ourier serie	ometric s es of ever	series, Fo n and od	ourier seri d function	ies of a fu ns, half-r	inction v ange Foi	vith arbitrar irier series.	y period	with spec	ial empha	sis on fu	inctions	11	CO1
п	Integr Fourie transfo Laplac convol	al Transf r Transf orm of d e transfo lution the	<b>asforms:</b> Form: Four lerivative of form of a fur eorem, use	ier integr of a function, ex of Lapla	cal theore tion, app xistence ce transf	em, Four blications theorem, form in so	ier sine a of Four Laplace plving dif	and cosin ier transf transforn fferential	ne integrals form in bou n of derivati equations.	, comple indary va ves and i	ex form of alue probi integrals, i	f Fourier lems; Laj inverse La	integral, place Tra aplace tra	, Fourier ansform: ansform,	20	CO2 CO3 CO4
III	Series Legen	Solution dre's and	n to ODE: l Bessel's d	lifferentia	al equation	ons.									6	CO5
IV	<b>Partia</b> Introdu	l Different	ential Equ partial dif	ations ferential	equation	s, separat	ion of va	riable							11	S
							Total H	Iours							48	
Esse	ntial R	eadings														
1	• E. Kı	eyszig, <sup>6</sup>	"Advanced	Enginee	ring Ma	thematics	", John V	Viley &	Sons, $10$ th $\epsilon$	dition 20	015.					

# 2. R. K. Jain and S. R. K. Iyengar, "Advanced Engineering Mathematics", Narosa Publishing House, 5th edition, 2016. Supplementary Readings

1. P. Dyke, "An Introduction to Laplace Transforms and Fourier Series", Springer Undergraduate Mathematics Series, 2005



An Institute of National Importance

	OF TECHNOLS																
P	rogramn	ne	Bachel	or of <sup>·</sup>	Technolo	gy in Cor	nputer So	cience an	d Engin	eering		١	ear of Re	gulation		2019	)-2020
D	epartme	ent	Compu	ter So	cience an	d Engine	ering						Seme	ster			
Со	urse				C	ourse Nar	ne				Credit	Structure			Marks D	istributio	<u>1</u>
C	ode									L	Т	Р	С	INT	MID	END	Total
CS	201				Dat	a Structu	res		- 1	3	0	0	3	50	50	100	200
		To une algorith	derstand ims.	the	fundamen	tal concep	ot of data	a structure	es and		CO1	Students dynamic asymptot	shall be memory tic notation	able to u manager and basic	nderstand nent, data data struct	of basic of types, tures.	concepts of algorithms,
		To deve	elop skill	for cho	oosing data	structures	for differen	nt application	ons.		CO2	Students searching structure	shall be g and so s for variou	able to orting alg us applicat	design, an gorithms ເ tions.	alyze and using diff	erent data
Co	urse	To deve such as	elop skill s divide a	for sol nd con	ving proble equer and v	ems using a vriting prog	algorithm do rams for th	esign techr ese solutio	niques ons.	Course	CO3	Students structure code usin	shall be a s, formula ng learned a	ble to find te new so algorithms	I the bugs i plutions and s and data s	in progran d improve tructures	is with data in existing
Obje	ectives	To deve algorith	elop skill Ims using	for des g vario	signing, an us data stri	alyzing, cor uctures.	rectness a	nd impleme	enting	Outcomes	CO4	Students implement real work	shall be at nting nonlind application	ole design near data ons.	of algorithr structure s	n for repre uch as Tre	senting and e, Graph in
		To impl	ement ha	ashing,	linear and	nonlinear o	lata structu	ires for real	l word		CO5	Students space an linear and	shall be a nd time co d nonlinear	able to an omplexities data struc	alysis of a s for differ ctures.	lgorithms ent applic	in terms of ation using
	application as per requirements.       Students shall be able to realize the base of the schemes, collision concepts and implications.         COS       Mapping with Program Outcomes (POs)       N												ze the basi and impler	c concepts nent hash	of hashing ing shames		
	COs DO1 DO2 DO1 DO5 DO2													ping with	ו PSOs		
NO.	COs	PO	1 P	02	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3		2	3	2	2	0	0	1	2	0	0	0	3	2	3
2	CO2	2		2	3	3	1	0	1	1	2	1	2	2	2	3	2
3	CO3	1		3	3	2	2	0	2	2	1	1	2	0	2	3	3
4	<u>CO4</u>	2		3	3	3	2	1	1	1	1	1	2	2	2	2	3
5 6	CO5	2		2	ა ი	ა ე	2	1	1	1	1	1	2	2	<u> </u>	2	
0	000	2		3	5	2	•				I	•	2	Z	5	L	<b>Z</b>
No								Content	OTLEA	000					Hours		COs
110.	Introdu	uction	& Over	view:	Concept	of data	type, defi	inition and	d brief c	description	of variou	is data st	tructures,		Tiouro		CO1
	operati	ons on	data st	ructur	es, algori	thm comp	lexity, Big	Oh notati	ion, recu	rsion, some	illustrativ	/e exampl	es of recu	rsive			CO2
Ι	Reviev	v of Po	ointers	and	Dynamic	Memory	Manage	ment: Un	derstand	ling pointer	s, usage	of point	ers, mem	ory	10		
	manag Arrays storage	ement f : Linear e.	unctions r and mu	s, deb ulti-din	ugging po nensional	inters. arrays an	d their rep	oresentatio	on, opera	ations on ar	rays, spa	rse matric	es and th	eir			
	eteragi																CO2
	Linked	I Lists:	Linear inked lis	linke	d list, op	erations o	on linear	linked list	, doubly	linked list,	operatio	ons on do	ubly linke	ed list,			CO3
	Stacks	: Seque	ential a	nd lin	ked repr	esentatior	ns, operat	tions on	stacks, I	multi stack	s, applic	ation of s	stacks su	ch as			
II	parenth	nesis ch	hecker,	evalu	ation of p	ostfix exp	pressions,	conversi	ion from	infix to po	stfix repr	esentation	n, implem	enting	11		
	Queue linked i	s: Sequereprese	uential intation of	repres of a qu	entation ueue and	of queue, operations	linear qu s on it, prio	ueue, circ ority queu	ular que es, applie	ue, operati cations of q	ons on li ueues.	near and	circular o	queue,			
																	CO3
	Sorting	g & Sea	arching	: Sort	ing arrays	s using bu	ıbble sort,	selection	n sort, ins	sertion sort,	quick so	ort, merge	sort, hea	p sort,			CO4
	shell so	ort, tree	sort,	radix	sort, etc	., search	ing an e	element u	ising line	ear search	and bi	nary sea	rch techn	iques,	<u>05</u>		
111	Heaps heaps	enation : Repre	or arra senting ithm.	a hea	ap in men	y sorted a nory, opei	rays. ations on	heaps, a	pplicatio	n of heap i	n implem	enting pri	ority queu	ie and	US		

	heapsort algorithm.		
	<b>Trees:</b> Basic terminology, array and linked representations of trees, traversing a binary tree using recursive and non-		CO4
IV	recursive procedures, inserting a new node, deleting a node, counting nodes, finding height, finding a mirror image of a binary tree, threaded binary trees, AVL trees and B-trees. <b>Graphs:</b> Basic terminology, representation of graphs (adjacency matrix, adjacency list), traversal of a graph (breadth first search and depth-first search), adding nodes, deleting nodes, applications of graphs in problems such as finding shortest	10	CO5
	paths, obtaining minimum cost spanning tree, etc.		CO5
V	<b>Hashing:</b> Comparing direct address tables with hash tables, hash functions, concept of collision and its resolution using open addressing and separate chaining, double hashing, rehashing	03	CO6
	Total Hours	39	-
isse	ential Readings		<u>.</u>
1	. Dr. D.S. Kushwaha, Dr. Arun Kumar Mishra, "A Programming approach with C ", 2 <sup>nd</sup> Edition, PHI India, 2014.		
2	. Seymour Lipschutz, "Data Structures", Revised 1 <sup>st</sup> Edition, Tata McGraw hill Publication, 2013.		

3.	Mark Allen Weiss.	"Data Str	ructures And A	Algorithm .	Analvsis In C	". 2nd Edition.	Pearson Education.	2002.
-	)				1	, , , , , , , , , , , , , , , , , , , ,	, , , , , , , , , , , , , , , , , , , ,	

#### Supplementary Readings

1. A.K. Sharma," Data Structures using C", Pearson, 2011.

2. Yedidyah Langsam, Aaron M. Tenenbaum, Moshe J. Augenstein, "Data Structures Using C and C++, 2nd Edition, PHI, 2011.

3. Kyle Loudon, "Mastering Algorithms With C Useful Techniques From Sorting To Encryption"1st Edition, O'Reilly, 2009.

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F	Programm	ne B	Sachelor of '	Technolog	y in Com	puter Sci	ence and E	ngineer	ing		Ye	ar of Reg	ulation		20	020-2	21
Ι	Departme	nt C	Computer S	cience and	Engineer	ring						Semest	er			III	
Co	ode			С	ourse Nar	ne			T	Credit S	Structure	C	INIT	Marks I	Distribut	ion	Teto1
	3 203			Digit	al Logic I	)esign				1 1	P 0	С 4	1N1 50	MID 50	END 100		200
	205	To intro	duce the con	cept of dig	ital and bi	nary syste	ems, numbe	er			Have a	- thorough	understar	nding of t	he funda	amer	ntal
		represent digital el	tation and co	onversion b cuits and to	between di bacquire f	fferent rep he knowle	presentation	ns in tal			concept	ts and tec	hniques u	sed in dig	ital elec	troni	CS.
		logic lev	els and Boo	lean logic.			0.80 01 0181			CO2	number	systems	and its ap	plication	in digita	l des	ign.
Co	urse								Course	CO3	The abi	lity to und	lerstand, a	analyse ar	nd desig	n var	ious
Obje	ectives	To make	student be	able to desi	ign and an	alyse com	binational	logic	Outcomes	CO4	The abi	lity to und	lerstand, a	analyse ar	nd desig	n var	ious
		circuits a	and design a	nd analyse	sequentia	l logic cire	cuits.				sequent	tial circuit	s. Iogic and	annly it to	n solve r	eal li	 fe
									-	CO5	problen	ns.			5 30100 1	carn	
	problems.           To understand concept of Programmable Devices, RAM, ROM, PLA, PAL.           No.         Cos         Mapping with Program Outcomes (POs)           1         CO1         3         2         Mapping with PSOs           2         CO2         2         1         0         0         0         0         Mapping with PSOs           3         CO2         2         1         0         0         0         0         0         Mapping with PSOs           1         1         0         0         0         0         0         0         0          Mapping with PSOs																
No	Cos	,				Mapping	with Progra	am Outco	omes (POs)					Ma	apping w	vith F	<b>'SO</b> s
110.	COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO	D2	PSO3
1	CO1	3	2	2	1	0	0	0	0	0	0	0	0	1	1		1
2	CO2	2	1	2	1	0		0	0	0	0	0	0	1	1		1
3 4	2       CO2       2       1       2       1       0																 1
5	CO5	3	3	1	2	1		2									
	Image: Second																
No.	S     COS     3     3     1     1     0     0     0     0     0     1     2     1     2       SYLLABUS       No.       Content       Number systems and codes: Addition, Subtraction, Multiplication and Division using Different Number Systems;																
Ι	SYLLABUS         No.       Content       Hours       COs         Number systems and codes:       Addition, Subtraction, Multiplication and Division using Different Number Systems; Representation of Binary Number in Sign-Magnitude, Sign 1's Complement and Sign 2's Complement Notation; Rules for Addition and Subtraction with Complement Representation; BCD, EBCDIC, ASCII, Extended ASCII, Gray and other Codes.       05       CO1,CO2         Boolean algebra and switching functions : Basic Logic Operation and Logic Gates, Truth Table, Basic Postulates       Image: Content Systems in State Content Systems in Sta																
II	Boolean and Fun Forms, Combin	n algebra ndamenta Simplific national I	and switch Il Theorem cation of Sy Logic Circu	ning functi s of Boole witching F uits.	ions : Bas an Algeb functions	sic Logic ra, Stand -K-Map a	Operation ard Represent and Quine-	and Lo sentation -Mcclus	ogic Gates, 7 ns of Logic skey Tabula	Fruth Tab Functior r Method	ole, Basic 1s- SOP a ls, Syntho	Postulat and POS esis of	es	07	0	201,	CO5
III	Combin Encode and Mu 7-Segm Program	national l r, Decod Iltiplexer nent Disp nmable I	ogic circuit er, Multiple , Arithmetic lays, Rande Logic Array	s using m exer and I c and Log om Access /s(PLA) a:	si integra Demultipl ic Units, s Memory nd Progra	ted circui exer Circ BCD-To- y, Read C ammable	its: Binary uits, Imple -Segment I Dnly Memo Array Log	Paralle ementat Decoder ory and gic(PAL	el Adder, BC ion of Boold r, Common Erasable Pr .).	CD Adde ean Func Anode a ogramma	r, Encode ctions usin nd Comr able ROM	er Priority ng Decod non Cath As,	y ler ode,	13	C	CO1,	CO3
IV	Introdu NOR C Excitat Elimina	ction to f lates, JK ion Table ation of S	lip-flops: E Flip-Flop F s for Flip-f witch Bour	Basic Cond Rise Cond Top. Mast nce using	cepts of S itions, Cl er Slave ( Flip-flop	equential ocked Fli Configura , Flip-floj	l Circuits, p-flops, D ation, Edge p with Pres	Cross C -Types e Trigge set and	Coupled SR and Toggle ered and Lev Clear.	Flip-Floj Flip-floj vel Trigg	p Using N ps, Truth gered Flip	NAND or Tables a -flop,	nd	10	(	C <b>O</b> 1	,CO4
v	Sequen State D and Re Counte Parallel Flip-flo	tial logic iagram, S gister, Bi r using S Load, So p.	circuit des State Table nary Count tate Diagra erial -in-Pa	ign : Intro , Transitio ers, BCD ms and Ta rallel-Out	duction to n Table, ' Counters ables, Sec (SIPO) an	o State M Table Ex , Up Dov juence Ge nd Paralle	lachine, M citation, T vn Counter enerators, el-In-Seria	lealy an 'able and r, Johns Shift Le ll-Out(P	d Moore Me d Equation, on Counter, eft and Righ ISO), Regis	odel, Sta Basic Co , Module at Registe ster Using	te Machi oncepts o e-N Coun er, Regist g Differe	ne Notati f Counter ter, Desig ers with nt Types	on, rs gn of of	12	C	201,	CO4
VI	Digital Emitter semico	logic fan Coupled nductor (	nilies : Dig l Logic (EC CMOS) Lo	ital IC Ter L), Metal gic.	minology Oxide So	y, Transis emicondu	stor-Transi actor(MOS	istor Lo S) Logic	gic(TTL), Ii c, Compleme	ntegrated entary M	l Injection letal oxid	n Logic(I e	2L),	03	0	201,	CO5
Esse	ntial Re	adings:				Total	Hours							50			
1. L.	Thomas	Floyd and	d R.P. Jain, "	Digital Fun	damental	s", 11 <sup>th</sup> ed	l., 2015, Pea	arson Ed	lucation.								
2. Ki	me Chari	es R and I	Morris Man	o, "Logic ar	ld Compu	ter Design	ı Fundamer	ntals", 4 <sup>t</sup>	<sup>h</sup> ed., 2014, F	Pearson E	ducation.						
3. M Supp	lorris Ma plementa	no, "Digita ary Read	al Logic and lings:	Computer	Design",	1 <sup>າ</sup> ed., 20	04, Pearsor	n Educat	ion.								
1. R 2. Sa 3. St	.P. Jain a amuel C tephen B	and M.H. Lee, "D rown and	S. Anand, ' igital Circu d Zvonko V	<sup>•</sup> Digital E its and Lo 7ranesic. •	lectronics	s Practice gn", 2009 entals of 1	using Interview edition, 1 Digital Los	egrated PHI (Pr gic with	Circuits", 1 entice-Hall Verilog De	l <sup>st</sup> ed., 20 of India) esign", 2 <sup>r</sup>	004, Tata <sup>nd</sup> ed., 20	McGraw	<sup>,</sup> Hill. McGraw	Hill.			



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	OF TECHNO																
P	rogramr	ne	Ba	chelor of	Technolo	ogy in Cor	mputer S	cience a	nd Engir	neering		Y	ear of Re	gulation		2019	-20
D	epartme	ent	Co	mputer S	cience ar	nd Engine	ering						Seme	ster		V	
Co	urse				Co	ourse Nam	1e				Credit S	Structure			Marks D	istribution	
Co	ode									L	Т	Р	С	INT	MID	END	Total
CS	205				Discre	te Mather	natics			3	0	0	3	50	50	100	200
		1. Th gr an M	nis co aphs, id und athem	urse intro and trees u erstand the natics.	duces the used in com propertie	elementai puter algo s of some	ry structur rithms and of the disc	res such <i>a</i> l systems. rrete struct	as sets, Define tures in		CO1	Able to structure applicat	o acquire es of ma ion in corr	knowled athematic puter sci	dge about es and id ence area	different	discrete n of its
		2. Tł de	nis co eductiv	urse illust ve proofs i	rates elem n propositi	ional and f	oofs, proo irst order l	fs by ind logic.	luction,		CO2	Able to proofs in and ider	acquire land propositint the second s	knowledg onal logi of applic	e about d c and first o ation in rea	ifferent me order predie al world pre	ethods of cate logic oblems
Co Obje	urse ctives	3. Th re	nis co curren	ourse expl ace relation	lains the	principles erating fun	of count of count	ting; und	erstand	Course Outcomes	CO3	Able to recurrent these pr	work ou ce relation oblems in	t on dif ns and g real worl	ferent prol enerating t d scenarios	olems on functions a s	counting, and solve
		4. Th gr	nis cou oup ai	urse illustrand ring the	ates the un cory	derstand th	ie basic co	ncepts of	graphs,		CO4	Students graphs optimize	s will be a to solve j ation etc.	able to ap problems	oply discre of conne	te structure ctivity, sc	e such as heduling,
	5. This course introduces the formulation of generating function and series evaluations       Students will be able to express recurrence relations and solve them, represent sequences and series using generating functions.         No.       COs       Mapping with Program Outcomes (POs)       Mapping with PSOs																
No	Mapping with Program Outcomes (POs)     Mapping with PSOs       No.     COs     PO1     PO2     PO3     PO4     PO5     PO6     PO7     PO8     PO9     PO10     PO11     PO12     PSO1     PSO2     PSO3															PSOs	
INO.	Io.         COs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11           1         CO1         2         2         1 <t< td=""><td>PSO1</td><td>PSO2</td><td>PSO3</td></t<>														PSO1	PSO2	PSO3
1	PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11           CO1         3         3         -         1         -         -         -         2         -         -														3	-	3
2	CO2		3	3	-	-	2	-	2								
3	CO3		2	3	3	1	2	-	-	-	-	-	-	-	2	3	2
4	CO4		2	2	3	0	2	2	3	-	2	-	-	1	2	3	2
5	CO5		2	2	3	0	2	2	3	-	2	-	-	1	3	3	3
6	CO6		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
									SYLLA	BUS							
No.							(	Content							Hours		COs
Η	Introdu History union, relatio Princip	uction y and powe ns and ple of	Over er sets l parti inclus	view of d , inverse tions. sion and ex	iscrete str of functio xclusion, j	ucture and ns, compc pigeonhol	1 general sition of e principle	problems functions e	Basic og	perations o ns, properti	n sets, ca es of bina	rtesian pr ry relatio	oducts, di ns, equiva	sjoint alence	08		CO1
II	Propos Introdu	sitiona uction	al Log to fir	gic: Synta st order lo	ax and s ogic.	emantics,	proof sy	/stems, s	atisfiabil	lity, validit	y, sound	ness and	complete	eness.	08		CO1
===	Introdu	uction	to rec	currence r	elations a	nd generat	ing functi	ons							05		CO1 CO2
IV	Posets	, lattic	ces, ch	ains and a	anti-chains	3									03		CO2 CO3 CO4
V	Graph	s and	their b	oasic prop	erties – de	gree, path	, cycle, su	ıbgraphs,	isomorp	hism, Euler	ian and H	amiltonia	n cycles,	trees	04		CO4 CO5
VI	Group	s and	Rings	: Groups,	Subgroup	s, Cosets,	Lagrange	's theorem	n, Homo	morphisms	and Norr	nal subgro	oups, Ring	gs.	08		CO2 CO4
							Total	Hours							36		
Esse	ntial R	eadin	gs							_	•						
1. T	rembly	, Man	ohar, ʻ	"Discrete	Mathemat	tical Struct	tures with	Applicat	ions to C	Computer Se	cience", N	lcGraw H	ill.				

2. C. L. Liu, D. P. Mahapatra, "Elements of Discrete Mathematics", Tata McGraw Hill.

3. Harry Lewis and Rachel Zax, "Essential Discrete Mathematics for Computer Science", Princeton University Press, 2019

#### **Supplementary Readings**

- 1. Norman L. Biggs, "Discrete Mathematics", Oxford University Press.
- 2. Albert R. Meyer, Eric Lehman, and Frank Thomson Leighton, "Mathematics for Computer Science", Samurai Media Limited, 2010
- 3. V.K. Balakrishnan, "Introductory Discrete Mathematics", Dover Publications Inc., 2000

2 NATIONAL BARRIER
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Pr	ogramn	ne	Bach	nelor of T	Fechnolog	ov in Mec	hanical E	ngineerin	g				Vear of Re	gulation		201	9-20
D	epartme	ent	Mec	hanical I	Engineeri	ng			8				Seme	ster		201	<u>v</u>
Cou	ırse				0	N					Credit S	tructure			Marks D	istributio	ı
Co	ode				Cot	irse Name				L	Т	Р	С	INT	MID	END	Total
ME	291			S	AFETY I	ENGINE	ERING			2	0	0	2	50	50	100	200
		To expl acciden	lain t its in	the basic industrie	concept or concept of the concept of	of safety, r preventi	Philosoph on.	y of safet	у,		CO1	Students industry	will be and the p	able to correventive	outline of measures	safety, ao	ccidents in
Cours	se	To exp associat to unde mechan	plain ted h erstar nical	the imp azards, r nd differ material 1	lication o isk invol ent types handling.	of safety ved and tl of mach	engineeri ne mitigat ine guard	ng in ind ion metho ing, manu	lustries, ds and ual and	Course	CO2	Students engineer assessin like maa techniqu	s will u ring in b g the risk whine guan wes etc to o	inderstand by way i involved ding and ensure saf	d the n of identi l and the safe mate Yety at wor	ecessity ifying the mitigation rial handl rk.	of safety e hazards, n measures ing
Objec	cuves	To exp underst in the in	blain and t ndust	the use the electrony.	of hand t ical safety	ools & po y, fires, ex	ortable po plosions a	wer tools and toxic	and to releases	Outcomes	CO3	Students deal wit release i	s will be a h electrica n industri	ble to Illu al safety, es.	istrate dif fires, exp	ferent safe losion and	ety tools to l toxic
	_	To explain the safety in construction industries and to understand the use of personal protective equipments.Students will be able to describe the personal protecti equipments and safety measures in construction sites.To explain the process of First Aid for the workers and safety management in the industries.CO4Students will be able to Illustrate the First Aid process															protective n sites.
		To explain the process of First Aid for the workers and safety management in the industries.       CO5       Students will be able to Illustrate the First Aid process.         Mapping with Program Outcomes (POs)       Mapping with PSOs															
No	COs						Mapping	with Progr	ram Out	comes (POs)		-		•	Maj	pping wit	n PSOs
110.	0.03	PO	1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3		0	0	0	0	3	0	0	0	0	0	2	0	0	0
2	CO2	3		0	0	0	0	3	0	0	0	0	0	2	0	0	0
3	$\frac{CO3}{CO4}$	3		0	0	0	0	3	0	0	0	0	0	2	0	0	0
4 5	C04	3		0	0	0	0	3	0	0	0	0	0	2	0		0
5	005	0		U	U	U	U	0	SYLLA	ABUS	U	U	U	-	v	U	v
No.								Content	5 I LLI						Hours	5	Cos
Ι	Conce	pt of saf	ety, I	Philosoph	ny of safet	ty, safety t	erminolog	gy, behavi	our base	ed safety, Ac	cident - c	cause and p	preventior	1.	3		CO1
II	Safety ergono	engine omics of	ering	in indu	stry, staturding, med	utory prov	visions, P nd manual	rinciples of material l	of Macl handling	hine guardir g, hand tools	ng, types and port	and selected able powe	ction of g r tools.	guards,	4		CO2
III	Electric	cal safet	ty, sa event	ifety mea ive meas	sures for ures there	electric w	ork, fires a	and explos	sion, cla	ssification fi	res and f	ïre extingu	iishers, to	xic gas	4		CO3
IV	Safety materia	in cons als, Pers	struct sonal	tion indu protectiv	istry, und ve equipm	erground ent, select	works, at ion and cl	oove grou assificatio	nd worl n of PP	ks, underwa E, statutory j	ter work provision	s, movem s to ensure	ent of me safety at	en and work.	4		<b>CO4</b>
V	Need of Safety	of First A Audit, J	Aid, l Job sa	Electrical afety ana	l injuries, lysis, Safe	artificial 1 ety motiva	espiration	, poisonin	g, first a	aid and antid	otes, Ind	ustrial safe	ety manag	gement,	5		CO5
	-						Total	Hours							20		
Esser	ntial Re	adings															
1. Dr.	. K.U. N	Aistry, '	Fund	amentals	of indust	rial safety	and healt	h, Siddhar	th Praka	ashan, 1 <sup>st</sup> edi	tion,2008	3.					
G		D															

**Supplementary Readings** 

Charles D. Reese, <u>Industrial Safety and Health for People-Oriented Services</u>, CRC Press,
 <u>C. Ray Asfahl</u>, <u>David W. Rieske</u>, <u>Industrial Safety and Health Management</u>, Pearson,



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	OF TECHNOLO	-														
Ρ	rogramı	me	Bachelor of	Technolo	ogy in Co	mputer S	cience an	d Engiı	neering		γ	ear of Re	gulation		2019	<del>)</del> -20
D	epartme	ent	Computer S	cience ar	nd Engine	ering						Seme	ster		I	
Со	urse			C	ourco Non	20				Credit	Structure			Marks Di	stribution	
C	ode			C		le			L	Т	Р	С	INT	MID	END	Total
CS	5251			Data	Structure	e Lab			0	1	2	2	50	50	100	200
		To devel	op the student	t's ability to	understan	d the basic	concept of	data		CO1	Able to <mark>u</mark> such as a	nderstand array using	and <mark>implen</mark> pointers.	nent the bas	sic data stru	ucture
		To prov algorithr	ide the stude n required in v	ents with w arious app	various kind lications.	ds of sorti	ng and se	earching		CO2	Able to in searching various a	nplement a g and algor pplications	nd <mark>analyse</mark> ithms using 5.	the various g different o	s types of s lata structu	orting an res for
Co Obje	urse ectives	To deve linear an	lop the stude d non-linear d	nt's ability ata structu	to implem e applicabl	ent and ar e to various	nalyse the s application	various ns	Course Outcomes	CO3	Able to ir queue an efficient a	nplement u d analyse v according t	sing data s which parti o the appli	tructure su cular data s cation.	ch linked li tructure wi	st, stack, Il be
-		To famili	iarize the stude	ent the vari	ous hashing	g schemes.				CO4	Able to ir Graph an efficient a	nplement u d analyse v according t	sing nonlir which partie o the applie	lear data st cular data s cation.	ructure suc tructure wi	h as Tree Il be
										CO5	Able to schemes	understar for applica	nd and in tions.	nplement t	he various	s hashir
						Mapping	with Progra	am Out	comes (POs	)				Мар	ping with	PSOs
NO.	COs	PO	1 PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO
1	CO1	101         3         2         0												2	0	3
2	CO2	01         3         2         0												2	2	2
3	CO3	3	3	2	2	0	0	2	0	0	0	0	1	2	3	2
4	CO4	3	3	2	2	2	1	1	0	0	0	0	1	3	2	2
5	CO5	3	3	2	2	2	1	1	0	0	0	0	1	2	1	3
						S	Suggeste	d List o	of Experim	ents						
No.							Content							Hours		COs
Ι	Impler impler	nent an a nent an a	algorithm to i algorithm to o	nsert and display the	delete an condition	element a of the arr	at any arbi ay before	trary po and afte	sition in an a er insertion.	array of in	iteger num	bers and	also	2		CO1
II	Write a. b. c. d.	a C prog Bubble Selectio Insertio Quick s	ram to imple sort. on sort n sort. sort. sort.	ment sorti	ng of n nu	mbers usi	ng							6		CO2
111	a. b. c. d. e.	Write a Write a Implem the eler Implem elemen Implem displav	program for program for ent algorithn ments of the ent algorithr ts of the que ent algorithn the elements	addition of multiplica ns to inser stack.[Ass ns to inse ue.[Assur ns to inse s of the cit	of two poly tion of two t an eleme sume: initia ert an elem ne: initially rt an elem rcular que	nomial usi polynomi ent in a sta ally, top= - nent in a r, front= -1 ent in a ci ue.[Assum	ing linked al using lin ack(push) -1] queue, to , rear= -1] ircular que ne: initially	list. nked lis , to dele o delete eue, to c , front=	t ete an eleme an element delete an ele 0, rear= -11	nt from a from a ement fro 17.	stack(pop queue and m a circula	) and to c d to displa ar queue	lisplay ay the and to	6		CO3
IV	a. b.	Write a search. Write a positior	C program t a C program	o impleme to find a k	ent search ey from n	ing of a ke	ey from n r using sequ	numbers uential s	s (given in D search (Linea	escendin ar search	g order) us ) & if found	sing Binar d, show th	y ie	2		CO2
V	a. b. c. d. e.	Implem Implem Create Write a Implem	ent a binary ent a binary a binary sea C program t ent an AVL t	tree using search tre rch tree o o impleme ree.	array. e using lir f N nodes ent sorting	iked list ar with given of n numb	nd travers N elemer pers using	e in pre- nts and binary	- order, in-or search a giv search tree	der and p en key el	oost-order ement.			4		CO4
	a.	Create search	a Hash table and delete c	e to store ustomer d	the accou letails.	nt number	r and bala	nce of t	he custome	rs. Provid	le proper d	option to a	create,			

VI	<ul> <li>b. Write a c program to create a file, named "StudentDatabase". Store the the name, roll number, phone number and average marks of N students, where N is a natural number between 2 to 10.</li> <li>Ex: SI.No. Name roll number phone number average marks <ol> <li>xyz</li> <li>1234567</li> <li>9900221188</li> <li>After creating database, modify the phone no. and marks of ith student, 1&lt; i &lt; =N</li> </ol> </li> </ul>	4	CO5
	Total Hours	24	
Esser	ntial Readings		
1.	Dr. D.S. Kushwaha, Dr. Arun Kumar Mishra, "A Programming approach with C ", 2 <sup>nd</sup> Edition, PHI India, 2014.		
2.	Seymour Lipschutz, "Data Structures", Revised 1st Edition, Tata McGraw hill Publication, 2013.		
3.	Mark Allen Weiss, "Data Structures And Algorithm Analysis In C", 2nd Edition, Pearson Education, 2002.		
Suppl	ementary Readings		
1.	A.K. Sharma, "Data Structures using C", Pearson, 2011.		
2.	Yedidyah Langsam, Aaron M. Tenenbaum, Moshe J. Augenstein, "Data Structures Using C and C++, 2nd Edition, PHI, 201	1.	
3.	Kyle Loudon, "Mastering Algorithms With C Useful Techniques From Sorting To Encryption"1st Edition, O'Reilly, 2009.		

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	COP TECHN																	
P	rogramm	e	Bachelo	or of	Technolo	ogy in Cor	nputer Sc	tience and	l Engine	ering		Y	ear of Re	egulation	ı		2020-2	.1
D	epartmer	nt	Compu	ter S	cience an	d Engine	ering						Seme	ester			III	
Co	ourse										Credit	Structure			Marl	cs Distri	bution	
C	ode				C	Course Nai	ne			L	Т	Р	С		Continuou evaluation	s Quiz	/Viva	Total
CS	253				Digital	Logic De	sign Lab			0	1	2	2		70	3	80	100
		To intr represe	oduce the oduce	he co and c	ncept of d	ligital and n between	binary sys different	stems, nur representa	nber tions		C01	Have a and tec	thorough hniques	n unders used in (	tanding of t digital electi	he funda ronics.	amental	concepts
		in digi digital	al elect	ronic vels a	circuits a and Boole	and to acque an logic.	ire the kn	owledge o	of		CO2	To und	erstand a	ind exan	nine the stru	ucture of	fvarious	number
~			0							~	CO3	The abi	lity to un	derstan	d, analyse a	nd desig	n various	5
Co Obje	ourse ectives	To ma	ke stude	ent be	able to d	esign and	analyse co	ombination	nal	Course Outcomes		combin The abi	ational c lity to un	ircuits. derstan	d, analyse a	nd desig	n various	5
		logic c	ircuits a	und de	esign and	analyse se	quential l	ogic circui	its.		CO4	sequen	tial circu	its.	· ·		1.1.0	
											CO5	Develo	p a digita	l logic ai	nd apply it t	o solve r	eal life p	roblems.
		To unc PLA, I	lerstand PAL.	conc	ept of Pro	ogrammab	le Devices	s, RAM, R	ROM,									
No	Cos					Μ	apping wi	ith Progra	m Outco	omes (POs)						Mapping	g with PS	Os
10.	COS	PO1	PC	02	PO3	PO12	PSC	D1	PSO2	PSO3								
1	CO1	3	2	2	2	1	0	1		1	1							
2	CO2	2	1	L	2	0	1		1	1								
3	CO3	3	2	2	2	1	0	1		1	1							
4	CO4	3	2	2	2	1	0	1		1	1							
5	CO5	3	3	3	3	1	1	0	0	0	0	0	0	1	2		1	2
									SYL	LABUS								
No.	<b>T</b> • •	<u>a</u> .	·				Co	ontent							Hours		(	COs
Ι	Logic	Jates u	sing Di	scret	te Compo	onents.									02		CO	1,CO2
II	Half-A	dder/ H	lalf-sut	otarct	tor Circui	its using a	a serial In	iput.							02		CO	l, CO3
III	Full-A	dder/ F	ull-subt	tarcto	or Circuit	ts using a	serial Inp	put.							02		CO	l, CO3
IV	4-Bit C	Bray to	Binary/	Bin	ary to Gr	ay Code	convertor	using Se	elect inp	out.					02		CO	1,CO3
v	Implen	nenting	Logic	Func	tions usi	ng MUX	IC 74153	3.							02		CO	l, CO3
VI	Flip-flo	ops usir	ng NAN	ND/ N	NOR Gat	e.									02		CO	CO4
	Modul	o-m Ri	ople Co	ounte	r.										02			
	A_Bit S	hift I o	ft/Righ	t Rec	nistar										02		CO1, C	204, CO5
VIII				i neg	515101										02		CO1, C	CO4, CO5
IX	Sequer	ice Ger	erator												02		CO1, C	CO4, CO5
Х	Excess	-3 BCI	Adde	r/ Su	btractor v	with Selee	et Input.								02		CO1, C	CO4, CO5
XI	Quiz/V	'iva													02		CO	1-CO5
	I						Total H	ours							22			
Esse	ntial Re	adinos												I		I		

1. L. Thomas Floyd and R.P. Jain, "Digital Fundamentals", 11<sup>th</sup> ed., 2015, Pearson Education.

2. Kime Charies R and Morris Mano, "Logic and Computer Design Fundamentals", 4<sup>th</sup> ed., 2014, Pearson Education.

3. Morris Mano, "Digital Logic and Computer Design", 1<sup>st</sup> ed., 2004, Pearson Education.

#### **Supplementary Readings:**

R.P. Jain and M.H.S. Anand, "Digital Electronics Practice using Integrated Circuits", 1<sup>st</sup> ed., 2004, Tata McGraw Hill.
 Samuel C. Lee, "Digital Circuits and Logic Design", 2009 edition, PHI (Prentice-Hall of India).
 Stephen Brown and Zvonko Vranesic, "Fundamentals of Digital Logic with Verilog Design", 2<sup>nd</sup> ed., 2017, Tata McGraw Hill.



An Institute of National Importance

CURRICULUM

	OF TECHNOL	,															
P	rogrami	ne	Bac	helor of	Technolo	gy in Cor	nputer S	cience an	nd Engi	neering			Year of R	egulation		20	19-20
D	epartme	ent	Con	nputer Se	cience ar	d Engine	ering						Sem	ester			
Co	urse				C	oureo Nar					Credit	Structure			Marks	Distributio	<u>n</u>
C	ode									L	Т	Р	С	Evaluatio	us on	Quiz/ Viva	Total
CS	255			In	ternet W	eb Techn	ology La	b		0	0	2		70	onconto	30	100
		To intro	oduce	the basics	s of Interne	and basic	concepts o	of web tech	nology.		CO1	technolo	gy.				
		To give	e know	vledge of w	/eb designi	ng principle	∋s.				CO2	Able to c	iesign web s.	pages with	simpler i		nts and their
Co	urse	To trai	n the s	students in	writing co	de in HTML	, CSS and	JavaScript.	1	Course	CO3	Able to forms an	use links, d HTML co	images, mu entrols in we	ltimedia, b pages.	blocks, ta	oles, frames,
Obje	ectives									Outcomes	CO4	Able to v styling.	vrite CSS c	ode and use	inline, iı	nternal and	external CSS
											CO5	Able to events.	write Java	Script code	and us	e predefine	d JavaScript
No.	COs					1	Vapping v	with Progra	am Outo	comes (POs	)		I		Ma	apping wit	1 PSOs
		PC	D1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	1 PSO	2 PSO3
1	CO1	$O_1$ $O_2$ $O_3$ $O_3$ $O_4$														0	0
2	CO2	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$														1	0
3 4	CO3	)3     3     3     3     2     2     1     0     0     1     0     0       )4     3     3     3     2     2     1     0     0     1     0     0														1	0
5	CO5	54     3     3     3     2     2     1     0     0     1     0     0       55     3     3     3     2     2     1     0     0     1     0     0														1	0
			I				1	I									
No.								Content							Hou	rs	COs
1	Worki paragr	ng with aphs, li	n HTN	ML - basi reaks	c structure	e of an HT	'ML docu	ment, crea	ating an	HTML docu	iment, m	arkup tag	s, heading	gs,	01		
2	Worki	ng witł	n HTN	ML - attri	butes, me	tadata, wo	rking wit	h text, too	ol tips, w	orking with	lists, tabl	es			01		
3	Worki	ng witł	n HTN	ML - wor	king with	hyperlink	s, images	and multi	media, v	web page log	gO				01		
4	HTMI	L block	s - div	v tag, HT	ML IDs, s	symbols									01		CO1
5	Worki	ng witł	n HTN	ML - wor	king with	frames									01		COT
6	Worki	ng witł	n HTN	ML - wor	king with	forms and	l controls								01		CO2
7	Introd	uction	to CS	S - sampl	le example	es for synt	ax introdu	uction							01		CO3
8	Conce	pt of C	SS - (	CSS styli	ng (backg	round, tex	t format,	fonts), CS	SS colou	rs					01		CO4
9	Conce	pt of C	SS - (	CSS IDs,	classes ar	nd CSS Sty	yling, woi	rking with	lists an	d tables					01		CO5
10	Conce	pt of C	SS - 1	Box Mod	el (introdu	iction, bor	der prope	erties, pado	ding pro	perties, marg	gin prope	erties)			01		
11	Introd	uction	to Jav	vaScript -	sample ex	camples for	or syntax i	introductio	on						01		
12	JavaSo	cript bu	ilt-in	functions	s, alert bo	k, confirm	box, pro	mpt box							01		
13	Writin	g Javas	Script	t user-def	ined funct	ions									01		
14	Desigi	ning sir	nple a	animation	is using Ja	waScript,	JavaScrip	t image sl	lideshow	/					01		
Fsse	ential R	eading	s				TOIDI	nours							14		
1	Laur	a Lema	v. Ra	fe Colbu	rn and Ien	nifer Kvrı	nin. "Mas	tering HT	ML CS	S & Javascri	nt Web I	Publishing	,". BPR P	ublications	. 1 <sup>st</sup> edi	tion 2016	
			.,u				, 1/100				r		, , <u>-</u> , <u></u>		,		

2. DT Editorial Services, "HTML 5 Black Book", Dreamtech Press, 2<sup>nd</sup> edition, 2016.

3. P. Deitel, H. Deitel, A. Deitel, "Internet and World Wide Web: How to Program", Pearson Education, 5<sup>th</sup> edition, 2018.

4. w3schools Tutorials, http://www.w3schools.com/

#### **Supplementary Readings**

- 1. Thomas Powell, "HTML & CSS: The Complete Reference", McGraw Hill Education, 5<sup>th</sup> edition, 2017.
- 2. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson Education India, 1<sup>st</sup> edition, 2008.

3. Uttam K. Roy, "Web Technologies", Oxford University Press, 1<sup>st</sup> edition, 2010.

A CONTRACT OF TECHNO	A A A A A A A A A A A A A A A A A A A					Natio	o <b>nal In</b> An	<b>stitute</b> Institute	of Te of Natio	<b>chnology</b> onal Importa	nce	halaya	1			CURRI	CULUM
Pro	ogramm	е	Ba	achelor	of Techr	nology ir	n Compu	iter Scie	nce & E	Ingineering		Ye	ear of Re	egulatio	n	2019 <sup>.</sup>	-2020
De	epartmer	nt	C	omputer	Science	e & Engi	neering			1			Seme	ester		Γ	V
Course				С	ourse N	ame				Cr	edit Str	ucture	0		Marks I		n Tatal
CS 202				Comp	iter Ara	anizatio	n			 3	0	Р 0	3	50	50	END 100	200
	COB1: execution Address	To deve on mode sing mod	lop the s I, instruc les.	student's	ability to u architectu	understan re and typ	d the conc es, instruc	ept of Ins ction form	truction lats and			Studen differe are	its shoul nt funct organize	ld be ab ional un	ble to Un nits of a l desig	nderstand a digital o gn, per	the how computer formance
	COB1: unit des	To dev ign base	elop the d on ha	student's	s ability t s well as n	o understa nicro-prog	and the co rammed c	oncept of ontrol app	control proach.		CO1	enhance perform of com	cement nance e mputer,	strateg volution arithm	gies th 1 of diff etic log	hat adoj ferent con gic design	oted in nponents n, cache
Course Objectives	COB3: associa	To pro ted with	ovide the the desi	e student gn of Aritl	s with sometic and	ome knov d Logic un	vledge an iit.	d analysi	s skills	Course Outcomes		transfe Studen	ry and o er. its sho	differen	t I/O m	to So	lve the
COB4: To develop the student's ability to understand the concept of memory design, cache memory and its mapping techniques and virtual memory.CO2performance re unit, cache and Analyze the performance reCO2Analyze the performance re unit, cache andAnalyze the performance re unit, cache and												elated pr l virtual	oblems memory	of arithm <sup>7</sup> .	etic logic		
COB5: To provide the students with some basic knowledge of I/O mapping and control, interrupt and DMA mechanism.       Analy mapping and repla													the period	erformatiques of A of A gorithm	f cache LU an s of virtu	rences of memory, d differe ual memo	different different ent page ry.
No		COs		ſ	1	M	apping w	ith Progr	am Out	comes (POs	)		r	1	Мар	ping with	PSOs
		003	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1		CO1	3	1	1	-	-	-	-	1	1	-	-	2	-	1	-
2		CO2	3	3	2	2	2	-	-	1	1	-	-	2	1	1	-
5		005	3	3	3	Z	Z	- SYLL/	- ABUS	2	Z	-	-	Z	Z	2	-
No.								Content							Hours	C	Os
<u> </u>		Block	diagran	n of a com	nputer sys	stem									02	C	01
Overview: (Hrs.: 4)		Instru	ction ex	ecution r	nodel.										02	C	01
		Instru	ction se	t archited	cture- typ	es, forma	ts, addres	sing mod	es						03	CO1 (	& CO2
Processor Organizati	on•	Data	path or	ganizati	on, Cont	rol unit de	esign - H	ardwired	control	, Microprogra	amming	<b>]</b> .			04	CO1 (	& CO2
(Hrs.: 10)	011.	CISC a	and RISC	architect	ture, Instr	uction pip	pelining.								03	CO1 8	& CO2
Arithmetic Logic unit:	e and	Comp	uter ari	thmetic-	Review of	addition	and subtr	action							03	CO1, C	CO2 & O3
(Hrs.: 8)		Multi	plicatior	n- Booth's	s, Array; D	ivision- R	estoring a	ind non-re	estoring						03	CO1 8	& CO2
		Floatir	ng point	arithmet	ic										02	CO1 8	& CO2
Memory		Interf	acing of	memory	with pro	cessor, Me	emory hie	erarchy, N	1ultiple-r	nodule memo	ory,				02	C	01
Organizati (Hrs.: 8)	Organization: Hrs.: 8)Cache memory, Virtual memory.														06	CO1, C	CO2 & O3
Input/outpu	t 	Synch	ronizatio	on of data	a transfer	- strobed	and hand	shaking;							02	C	01
(Hrs.: 6)	•	I/O m	apping	and contr	ol- Progra	am contro	lled, Inter	rrupt drive	en, DMA	, Interrupt an	d DMA	mechanis	sms.		04	C	01
						Tot	al Hours								36		
Essential F	Reading	s															
I. Ham	acher, Ca	arl, Zvor	iko Vrar	nesic, and	Satwat Z	aky. Com	puter org	anization.	McGraw	/-Hill, 2002.							
∠. Man	u, IVI. IVIOI	ris. Con	iputer s	ystem ard	riitecture.	Prentice	nall of Inc	uia, 2003.									

3. Stallings, William. Computer organization and architecture: designing for performance. Pearson Education India, 2003.

#### **Supplementary Readings**

1. Hennessy, John L., and David A. Patterson. *Computer architecture: a quantitative approach*. Elsevier, 2011.

2. Bryant, Randal E., O'Hallaron David Richard, and O'Hallaron David Richard. *Computer systems: a programmer's perspective*. Vol. 2. Upper Saddle River: Prentice Hall, 2003.

3. Ramachandran, Umakishore. Computer systems: An integrated approach to architecture and operating systems. Pearson Education India, 2011.



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	OF TECHNOL																
Р	rogramı	me	Bac	helor of	Technolo	gy in Cor	nputer So	cience an	d Engin	eering		Acade	mic Year	of Regula	ation	2018	8-19
D	epartme	ent	Con	nputer So	cience an	d Engine	ering						Seme	ster		IV	/
Co	urse				C						Credit	Structure			Marks Di	stribution	
Co	ode						le			L	Т	Р	С	INT	MID	END	Total
CS	204			Object (	Oriented	Programr	ning and	Design		3	1	0	4	50	50	100	200
		To prov Oriente	vide st d Pro	tudents in- gramming	depth theo paradigm	retical base	and funda	mentals of	Object		CO1	Able to d paradigm	emonstrate with conce	the proce	dural and ol a, functions	oject orient , classes ar	ed nd objects
		To prep Oriente	oare s d Pro	tudents to gramming	design and paradigm	code vario	us projects	using Obje	ect		CO2	Able to il using poi	ustrate dyn nters, cons	amic men tructors, d	ory manage lestructors (	ement techi etc.	niques
Co	urse									Course	CO3	Able to more a contract of the second	ake use of overloading	the conce g, type con	pt of functio version and	n overload I polymorpl	ing, nism
Obje	ctives									Outcomes	CO4	Able to ir types alo	terpret the ng with the	concept o understar	f Inheritanco ding of late	e and its va binding	rious
											CO5	Able to c handling	ompare the in C++	procedure	es of file har	ndling and e	exception
											CO6	Able to te Template	est the conc Libraries o	ept of tem f C++	plates and t	he use of S	itandard
NI -	~~~						Mapping v	vith Progra	am Outc	omes (POs)					Мар	ping with	PSOs
NO.	COs	PC	)1	PO2	PO3	PO11	PO12	PSO1	PSO2	PSO3							
1	CO1	3		0	1	0	1	0	0	1	1	1	0	0	0		
2	CO2	2		3	3	0	0	1	1	1							
3	CO3	3		3	0	0	0	1	1								
4	CO4	3		1	0	0	0	2	3								
5	CO5	3		0	3	0	0	0	1	1							
6	CO6	3		2	2	2	0	0	0	0	2	0	0	0	0	0	1
									SYLLA	BUS							
No.								Content							Hours		COs
I	Introd Introd encap	uction: uction sulatio	to ol n;	bject orie	nted prog	gramming	g, user de	fined typ	es, stru	ctures, unic	ons, poly	/morphisi	n,		02		CO1
11	Begin Gettin functi	ning wi Ig starte ons, sti	ith C ed w ring	++: ⁄ith C++ s class, sp	syntax, da ecifying (	ata types classes a	, variable nd object	s, data ty s;	/pes, ty	pe conversi	on – im	plicit and	explicit,	inline	04		CO2
	Class Data functi	es and hiding, on, poi	Obje mer nters	ects: mber fun s to mem	ction, m bers, con	emory al structors	location, and des	static m tructors;	embers	, static obj	ects, ar	ray of ol	ojects, fri	endly	06		CO2
IV	Conce Funct Polym	ept of O ion ove norphis	)verio erioa m	oading: ding, ope	erator ove	erloading	of unary	, binary, s	special	operators;	Туре со	nversion;	Compile	Time	04		CO3
V	Inheri Introd const Hierar functi	tance: luction ructor rchical ons; Co	to in and and once	heritance destruc hybrid in pt of VP1	e, differer tor in d heritance R and V	nt types; lerived c e; Virtual FABLE;	Single inh lass; Mu base clas	neritance Iltilevel a ss; Object	– public and mu t slicing	c and privat Iltiple inhe ; Pointer to	e deriva ritance; base ar	tion, prot Ambigu nd derived	ected me ty resolu d class; V	mber, ution; ⁄irtual	12		CO4
VI	File H Strear types	andling ns, clas of files	j: sses , i/p ;	for file s and o/p f	tream, op unctions	ening a f for seque	ile, detec ential and	ting the E random	EOF, file access,	modes, file error hand	e pointer ling.	s and the	ir functio	ns,	04		CO5

	types of mes, i/p and o/p functions for sequential and random access, error handling.		
VII	Templates: Function templates, class templates, advantages and disadvantages, Standard Template Library.	04	CO6
	Tutorials – Programming Practice with different C++ features	12	CO2-CO6
	Total Hours	48	
Esse	ential Readings		
1	. Robert Lafore, "Object-Oriented Programming in C++", 4 <sup>th</sup> Edition, Sams Publishing, 2001.		
2	. E Balagurusamy, "Object-Oriented Programming in C++", 8 <sup>th</sup> Edition, McGraw-Hill Education India, 2020.		
3	. Yashvant Kanetkar, "Let Us C++ ", BPB Publication, 2020.		
Sup	plementary Readings		
1	. P.J. Deitel and H.M Deitel ,"C++ How to Program", 10th Edition, Pearson Publication, 2016.		
2	Herbert Schildt, "C++: The Complete Reference", 4 <sup>th</sup> Edition, McGraw-Hill Education India, 2017.		
3	Bjarne Stroustrup, "The C++ Programming Language", 3 <sup>rd</sup> Edition, Pearson Education India, 2002.		



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CURRICULUM

	OF TECHNOR																
P	rogram	ne	Bach	nelor of <sup>-</sup>	Technolo	gy in Co	mputer Se	cience an	nd Engin	eering		١	ear of Re	gulation		2019	-20
D	epartme	ent	Com	puter So	cience an	d Engine	ering						Seme	ster		IV	1
Co	urse				C	Nan Asi	no				Credit	Structure			Marks Di	stribution	
C	ode									L	Т	Р	С	INT	MID	END	Total
CS	206				Data C	Communi	cation			3	0	0	3	50	50	100	200
		To intro	duce t	he compo	onents of D	ata Commu	inication				CO1	Able to le	earn the fun	damentals	of data cor	nmunicatio	n
		To analy	yse the	e Analog a	and Digital	Transmissi	on				CO2	Able to U	nderstand sion over d	the digital : ifferent typ	signal and a es of trans	analog signa mission me	al dia.
Co	urse	To desc	ribe th	e structu	re of Physi	cal and Dat	a Link Laye	er		Course	CO3	Able to d	istinguish o	different te	chniques of	error detec	tion and
Obje	ctives	To desc	ribe th	e functio	n of wireles	s networks				Outcomes	CO4	Able to a	cquire know	vledge abo	ut the gene	rations of v	vireless
												networks					
							Manning	with Progr	am Outo	nmes (POs)					Mar	ning with	PSOs
No.	COs	PO	)1	PO2	PO3	PO4					PO9	PO10	PO11	PO12	PSO1	PSO2	PS03
1	CO1	2		0	0	0	0	0	0	0	0	0	0	0	2	1	0
2	CO2	2		1	1	1	0	0	0	1	0	0	1	1	<u> </u>	1	1
3	CO3	1		1	1	1	0	0	0	0	0	0	0	1	1	1	1
4	CO4	1		1	2	2	0	0	0	0	1	0	1	1	1	1	1
	l								SYLLA	BUS							<u> </u>
No.	Io. Content Hours																COs
	o. Content Hours Co																
I	Content       Hours       COs         Overview       Objectives and Applications of Computer Communication. Computer Communication Network Architecture: ISO       06       CO1, CO4         - OSI reference model, design philosophy, layer, protocol, interface, and service concepts. Layer - wise       06       CO1, CO4															1, CO4	
11	Physic Conce techni transr	cal Laye epts of iques, nission	er Data Trans	a and S smissio	ignals, <i>i</i> n Media	Analog a , Switch	nd Digita ing Tecl	al Data 1 nniques	Fransmis and Te	ssion, Ban lephone a	dwidth nd Cab	utilizatior le Netwo	n: Multipl orks for	exing Data	12		CO2
III	Data L Frami perfor	Link Lay ng and mances	/er Codi s. Me	ing tech dium Ac	iniques, cess Col	Error Det ntrol in bi	ecting an oadcast	nd Correc networks	cting Co : ALOH	odes, data I A, CSMA, C	ink con SMA/CI	trol proto ), token ri	ocols and ing, toker	their bus.	12		CO3
IV	Wired Etheri WANs	and Wi net, Coi s : IEEE	ireles nnect 802.1	s LANs ing Dev 1, Bluet	rices, Ba cooth, Ce	ckbone N Ilular tele	letworks, phony, s	Standaro atellite ne	d LAN F etworks.	Protocols (II SONET/SD	EEE 802 H, Fram	2.X). Wire e Relay a	less LAN nd ATM.	s and	06		CO4
							Total	Hours							36		
Esse	ential Re	eadings	5					*						I		I	
1	. Behr	ouz A Fo	orouza	an, "Data	a Commu	nication a	nd Netwo	rking", 5 <sup>th</sup>	Edition.	McGraw-Hill	Education	on, 2018.					
2	. Andre	ew S Ta	inenba	aum, Da	vid J. We	therall "Co	omputer N	etworks",	5 <sup>th</sup> Editio	on, Prentice	Hall. 201	1.					
3	. Willia	m Stalli	ngs, "	Data and	d Comput	er Comm	unication"	, 10 <sup>th</sup> Editi	ion, Pear	rson, 2017.							
					· · ·												
Supp	olement	tary Rea	ading	S													
1	. Jame	s F Kur	ose, ł	Kaith W F	Ross, "Co	mputer N	etworking	A Top-D	own App	oroach", 6th I	Edition, F	Pearson, 2	017.				
									-								

2. A L Garcia, I Widjaja, "Communication Networks: Fundamental Concepts and Key Architectures", 2<sup>nd</sup> Edition, Tata McGraw Hill, 2017.

3. B. Buchanan, "The Handbook of Data Communications and Networks", 1<sup>st</sup> Edition, Springer, 2004.

4. James F Kurose, Kaith W Ross, "Computer Networking | A Top-Down Approach", 6<sup>th</sup> Edition, Pearson, 2017.



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	OF TECHNOLS																
P	rogramn	ne	Bach	nelor of T	Technolo	gy in Co	mputer S	cience ai	nd Engiı	neering		Y	ear of Re	gulatior	ı	2019	-20
D	epartme	nt	Com	puter So	cience an	d Engine	ering						Seme	ster		IN	/
Co	urse				Co	ureo Nor	no				Credit S	Structure			Marks	Distribution	
Co	ode									L	Т	Р	С	INT	MID	END	Total
CS	5212			Anal	ysis and	Design o	of Algorit	hms		3	0	0	3	50	50	100	200
		To tea algorit	ach p hmsa	aradigms	and appr reciate the	oaches u	sed to an algorithm d	alyze and lesign in pr	design actice.		CO1	Analyze	the asymp	ototic pe	formance of	algorithms.	
	-	To ma	ake st	tudents u	nderstand	how asy	mptotic no	tation is	used to		CO2	Write rig	gorous cor	rectness	proofs for a	lgorithms.	
Co	-	To ex	plain	different	computati	onal mod	els and v	arious cor	nplexity	Course	CO3	Apply in	nportant al	gorithmi	c design pa	adigms and r	nethods of
Obje	ctives	To tea	ires to ich va	analyze tl arious adv	he complex anced des	sign and a	nance of di analysis te	fferent algo chniques s	such as	Outcomes	CO4	Synthes	s. Size efficier	nt algorit	hms in com	non engineer	ing design
-	-	greedy Know t classes	v algor the co s P, N	rithms, dyu oncepts of P and NP-	namic prog tractable a complete p	ramming. nd intracta problems.	able probler	ns and the				situatio	ns.				
							Manainau								NA		
No.	COs		4		DOO						DOO	DOIO	DO14				rous
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2	CO2	1		1	0	2	2										
<u>з</u>	CO3	2		2	0	1	1	1									
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110.								Content							Tiour	,	CO1
	Introdu	uction															CO2
I	Algori	thm Sp	ecifi	cation, A	lgorithm	Analysi	s, Analysi	is of Rec	ursive A	lgorithms.					06		
	Cantin			4													<u> </u>
	Brute	g and a Force A	Appro	baches-	Sequenti	al Searc	h, Bubble	Sort, Se	lection	Sort, Exhau	stive Se	arching,					CO2
II	Divide Decrea	-and-C ase-and Sortin	onqu d-Cor a – C	ier Appro nquer Ap Counting	oach – M oproach - Sort, Bu	erge Sor - Insertic cket Sor	t, Quick S on Sort, T t, Radix S	Sort, Clos opologic Sort	sest-pair al Sort,	Problem, C	Convex H	Hull Prob	lem,		09		003
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n <i>i</i>	Basics	ic Prog	gram vnam	iming nic Proa	rammino	, Fibona	acci Proh	olem. Mu	Itistage	Graph Pro	blem. 4	All Pairs	Shortes	t-path			CO3
IV	Algori	thm, T	ravel	lling Sal	lesman I	Problem,	Chain M	Matrix Mu	ultiplicat	tion, Knaps	sack Pro	oblem, C	ptimal E	Binary	80		
	Search	n Trees	,														
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V	String	proces	ssing	l											0.4		CO4
v	String	search	ning a	and Patte	ern matc	hing, Kn	uth-Morris	s-Pratt al	gorithm	and its ana	lysis.				04		
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\/I	Comp	utation	al Co	mplexity	y Classes	i lase P N	IP Class	NP- Com	nlete						02		CO4
VI	Chhei					1455 I , N			piere						02		
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Total Hours	36
Essential Readings	
1. A. Aho, J. Hopcroft and J. Ullman, "The Design and Analysis of Computer Algorithm	ns", 4 <sup>th</sup> Impression, Addison-Wesley, 2009.
2. E Horowitz, S Sahni, and S Rajasekhran, "Fundamentals of Computer Algorithms",	2 <sup>nd</sup> Edition, Universities Press, 2008.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Intro	oduction to Algorithms", 3 <sup>rd</sup> Edition, Pearson, 2010.
4. S. Sridhar, "Design and Analysis of Algorithms", 1 <sup>st</sup> Edition, Oxford University Press	s, 2015.
Supplementary Readings	
1. J. Kleinberg, E Tardos, "Algorithm Design", 1 <sup>st</sup> Edition, Pearson, 2014.	
2. S. Dasgupta, C. H. Papadimitriou, and U. V. Vazirani, "Algorithms", 2 <sup>nd</sup> Edition, Tata	a McGraw Hill, 2016.
3. Steven S Skiena, "The Algorithm Design Manual", 2 <sup>nd</sup> Edition, Springer, 2011.	
4. H Bashin, "Algorithms Design and Analysis", 1 <sup>st</sup> Edition, Oxford University Press, 20	015.

A the second sec	NOLOGY HER NOLOGY						Natio	o <b>nal I</b> A	<b>nstitu</b> n Institu	<b>te of T</b> a	e <b>chn</b> ional	<b>lology</b> N Importanc	<b>/leghal</b> ce	aya			C	URRICU	IJ <b>LU</b>	Μ
Pr	ogran	nme	B	achelor	of Tech	nology	in Con	nputer	Science	& Engin	eerin	ıg		Year of Re	gulation			2019-2	020	
D	epartn	nent	C	Computer	r Scieno	ce & En	gineeri	ing						Seme	ster			IV		
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	conc and COI time cons	cepts of H architect B2: To of time traints for	develop ure. develop ing cons or model	the stude traints and developm	ent's ab nd moo	ility to lelling	underst various	tand di such	fferent timing			CO1	Stu moo poli reso	dents shou delling re cies, mo ource shar	ald be ab eal-time delling ing amor	le to Un tasks. complex ng real-t	derstand The dif atties br time task	the prin ferent s rought as and s	ncipl scheo abou scheo	es for duling ut by duling
Course Objectives	COI analy sche	<b>B3:</b> To ysis skil duling.	provide ls assoc	the stu- iated wit	dents y h the j	with so principle	me kn es of r	owledg eal-tim	e and e task	Cours	se nes		amo	dents sho	uld be a	sors.	Solve th	e sched	ulin	g and
	conc	cepts of ng them.	resource	sharing	and w	ays to	handle	depend	lencies				Ana	ource shari	ng related	d problem	ms for rea	al time s	yster ems	ms. with
	COI mult	B5: To j iprocess	provide f or schedu	the stude uling mod	nts with delling.	h some	basic l	knowled	dge of			CO3	var per	ying const formance l	traints an	id scena	rios, inc	luding i	dent	ifying
No.		COs			1	1	Ma	pping v	vith Prog	gram Out	come	s (POs)					Mappi	ng with F	PSOs	i
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8		PO9	PO10	PO11	1 PO1	2	PSO1	PSC	02	PSO3
1		CO1	3	1	1	-	-	-	-	1		1	-	-	2		-	1		-
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Module 1: definitions Systems	Basic relate	concept ed to Rea	s and al Time	Defin Syster Timin in Rea	ition of m, Chan ng const al-Time	Real-7 cacterist raints o System	Time Sy ics of R f Real-T ns.	ystems, Real-Tir Time Sy	Applica ne Syste ystems, 2	ations of ems, Safet Events in	Real- y and Real	-Time Sys l reliabilit -Time Sys	stems, B y, Taxon stems, M	asic Model omy of Rea odelling Ti	of a Rea al-Time Sy ming Con	ll-Time ystems, straints	6	C	D1, (	C <b>O2</b>
Module 2: Scheduling	Initial constraintsTiming constraints of Real-Time Systems.Initial constraintsTiming constraints of Real-Time Systems.Initial constraintsBasic concepts in real-time sched Tasks scheduling: Basic concepts scheduling algorithms, Clock-driv Generalized Task schedulers, Cyc Hybrid schedulers Event-driven schedulers: Earliest										ny of gies, Tab lriver (EDI	Real-Tin Classific le-driven n schedul F), Rate I	me Task ation of schedul lers. Monotor	s and their Real-Time ing, Cycli ic Schedu	characte e task c schedul ling (RM	ristic, ers, A),	16	co	)1, 2	& 3
Module 3: Handling r dependence Tasks	Aodule 3:Resource sharing and inversion. Priority Inheritance Protocol (HLP). Different types of									sks, Pric (PIP) an ity inver	ority d Pri sions	inversion ority Cei under P	n and r il Protoc CP, Han	neans to ol (PCP), dling Task	handle p Highest I t depende	riority Locker encies.	8	СС	01, 2	& 3
Module 4: Scheduling Multi-proc Systems	Image: Addition of the second systemsMulti-processor task Allocation, DynaMulti-processor and Distributed systemsMulti-processor task Allocation, DynaImage: Multi-processor and Distributed bystemsMulti-processor task Allocation, Dyna									allocation ock syn	of T chron	asks, Fau	lt-toleran centralize	t allocation ed clock	of tasks, synchroni	Clocks zation,	6	0	CO18	&3
				·			7	Fotal H	ours								36			
Essential R	Readin	igs																		
1. Ma	ll, Raji	b. <i>Real-t</i>	time syst	ems: theo	ory and	practice	e. Pears	on Edu	ication Ir	ndia, 2009	9.									

2. Liu, Jane W S, Real-time systems, Pearson Education India, 2000.

- 3. Williams, Rob, Real-time Systems Development, Butterworth-Heinemann, Elsevier, 2006.

#### **Supplementary Readings**

1. Krishna , C. M.; Shin, Kang G., *Real-time systems,* Tata McGraw Hill, India, 2010.

2. Kopetz, Hermann. Real-time systems: design principles for distributed embedded applications. Springer Science & Business Media, 2011.

3. Laplante, Philip A. "Real-Time Systems Design and Analysis: An Engineer's Handbook, Piscataway." 1996.

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Prog	gramr	me	В	achelor o	f Techr	ology i	n Com	puter S	cience &	& Engineeri	ng		Y	ear of R	gulation			2019	-2020	1
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Course Code				Co	urse Na	me				L	Credi	t Stru T	cture P	С	INT	Ma M	a <b>rks Distr</b> IID	ibution END	]	Fotal
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	CO of arch CO fund thei Proo	<b>B1:</b> To cyber phitecture <b>B2:</b> To damenta ir archi cessors. <b>B3:</b> To	develop physical c. develo dis of mi tecture	the stude systems op the sicroprocess with spe e the stu	nt's abi ' chara tudent's sor and ecial en udents	ability micro-c mphasis	ndersta s, requ y to u controlla ome ki	nd the c nirement nderstar er famili Digital	oncept ts and nd the ses and Signal re and	-		CO1	Stude archi enhai evolu micro proce archi	ents sho ectural ncement tion o process ssor ssor	uld be a design strategi f differ or / mi architectu nd distril	able to prine es that ent co crocont ure at outed sy	Underst ciples t adopte omponen troller a nd dist ystems.	and the and p d in p ts of nd Dig tributed	e cor perfor perfor con gital m	mputer mance mance nputer, signal emory
Course Objectives	ana orga CO con on sche	lysis       s.         anisation <b>B4:</b> To         cepts       of         real       tin         eduling.	kills as n and bu o develo cyber p ne oper	sociated s structure op the st hysical sy ating syst	with the of cyb tudent's ystem so	the pri er physi ability oftware d partic	nciples ical syst y to u with sp cularly	of m tems. nderstar ecial em real tin	nd the phasis ne job	Course Outcome	s	CO2	Stude probl	ents sho ems of i	ıld be ab eal time	le to <mark>Sc</mark> operatii	<mark>olve</mark> the p ng systen	erforma 1.	ance 1	related
	CO pow	<b>B5:</b> To ver awa	provide re archite	the stud cture & h	ents wi ardware	th some e softwa	e basic are co de	knowle esign.	dge of			CO3	Analy mem perfo	yze the ory, but rmance	perforr efficien h/w s/w o	nance icies, r codesig	of emb real time n.	edded operat	proce	essing, system
No.		COs			1	1	Ma	pping w	ith Prog	gram Outcon	nes (PC	Ds)					Mapp	oing with	n PSO	S
		~~ .	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO	9	PO10	PO1	1 PO	12	PSO1	PS	02	PSO3
		CO1	3	1	1	-	-	-	-	1	1		-	-	2		-		1	-
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Module 1: Fu Cyber Physic	unda cal Sy	mentals ystems	s of -	Cyber-I Basic p AutoSA	Physica rinciple AR, IIO	ll Syste es of de T impl	ms (CI esign an ication	PS) in th nd valid s, Build	ne real lation o ling Au	world of CPS, Indu tomation, I	ustry 4 Medica	.0 1 CPS	5				5		CO	1
Module 2: Pl Components Systems	latfor for (	rm Cyber P	hysical	CPS HY CPS Ne Schedu Hybrid	W platf etwork ling Re schedu	orms - - Wirel al Tim lers	Proces lessHar e CPS	sors, Se t, CAN tasks: T	ensors, , Autor 'able-di	Actuators notive Ethe riven and E	ernet vent d	riven	schedule	°S			8	C	201, 2	2 & 3
Module 3: Principles of I	Dynm	ical Syst	ems	Dynam Control Perform	ical Sy ler Des nance u	stems a sign Te nder Pa	und Stal chniqu acket d	bility es rop and	l Noise								8		CO1 (	& 2
Module 4: CPS implement	Formance under Packet drop and IFrom features to automotive softwareMapping software components to ECPS implementation issuesCPS Performance Analysis: Effect or control performance, network congesBuilding real-time networks for CPS									ponents duling, bus	latenc	y, sen	ise and ac	tuation	faults on		8		CO1	&2
Module 5: Intelligent CP	S			Safe Re Gaussiz	einforce an Proc	ement I ess Lee	Learnin	g: Rob Smart (	ot moti Grid De	on control, emand Rest	Auton	omou Build	s Vehicle	control			7	C	201, 2	2 & 3
							T(	otal Ho	irs				6				36			
Essential Rea	ading	gs																		

1. Suh, Sang C., U. John Tanik, John N. Carbone, and Abdullah Eroglu, eds. Applied cyber-physical systems. Springer New York, 2014.

2. Alur, Rajeev. Principles of cyber-physical systems. MIT Press, 2015.

3. Colombo, Armando W., Thomas Bangemann, Statmatis Karnouskos, Jerker Delsing, Petr Stluka, Robert Harrison, Francois Jammes, and Jose L. Lastra. "Industrial cloud-based cyber-physical systems." *The Imc-aesop Approach* 22 (2014): 4-5.

**Supplementary Readings** 

- 1. Andrew M Sloss, Dominic Symes, Chris Wright, "ARM System Developers Guide: Designing optimizing System Software" (Online resource)
- 2. <u>http://eee.guc.edu.eg/Courses/Electronics/ELCT912%20Advanced%20Embedded%20Systems/Lectures/ARM%20System%20Developer%27s%20Guide.pdf</u>
- 3. <u>https://ptolemy.berkeley.edu/projects/cps/</u>

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Co	ourse	To disc	cuss di	ifferent v	ways of ha	rdware des	ign for ari	thmetic		Course	CO3	Underst hardwa	and the c re realizat	tion of bir concept o tions.	f multipli	bers. ers and th	eir
Obje	ectives	operati	ons.							Outcomes	CO4	Underst hardwa	and the c re realizat	concept of tions.	fadvance	d divider:	and their
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2	CO2	3		2	3	2	0	0	0	2	3	1					
3	CO3	3		2	3	2	0	0	0	2	3	1					
4	CO4	3		2	3	2	1	0	0	0	0	0	0	0	2	3	1
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IV	Dividen Dividen Divisio Genera Square Algorit	rs: Basic rs, Nonr on, Radi 1 High-J -rooting hm, Hig	c divi restor x-2 S Radix g meth gh-Ra	ision sch ing and RT Div & Divide hods: Pe adix Squ	nemes, Sh Signed ision, Usi ors. encil-and- uare-Rooti	ift/Subtra Division, ng Carry- Paper Alg ng.	ct Divisio Division Save Add corithm, E	on Algorit by Consta lers, Choc Binary Res	hms, Pro ants, Fast osing the storing S	ogrammed t Dividers, Quotient l hift/Subtra	Division, Basics of Digits, Ra act Algori	, Restorir f High-Ra adix-4 SF ithm, Nor	ng Hardw adix RT Divis: nrestorin	vare ion, g	08		CO4
v	Floatin excepti Floatin floating comput errors,	g-point: ons, rou g-point g-point tational forward	diffe anding arithr multij errors l error	erent rep g schem metic: fl pliers, fl rs, invali r analys	presentation les, logari loating-po loating-po dated law is, backw	ons, floati thmic nur bint adders bint divide s of algeb ard error a	ng-point s nber syste s/subtracte ers, logari ora, worst- analysis.	standards, ems, ors, pre ar thmic arit -case erro	basic flo nd post sl hmetic u r accumu	oating-poir hifting, rou unit, errors ulation, err	nt algorith unding ar and error or distrib	hms, con nd except control, pution and	versions ions, sources l expecte	and of ed	09		C05

Total Hours	39	
Essential Readings:		
1. Behrooz Parhami, "Computer Arithmetic: Algorithms and Hardware Designs", 1 <sup>st</sup> ed., 2000, Oxford university press.		
2. Mi Lu., "Arithmetic and logic in computer systems", 1 <sup>st</sup> ed., 2004, John Wiley and Sons.		
3. Paul Zimmermann and Richard Brent, "Modern Computer Arithmetic", 1 <sup>st</sup> ed. 2010, Cambridge university press.		
Supplementary Readings:		
<ol> <li>Donald e. Knuth., "The art of computer programming", 2<sup>nd</sup> ed., 1985, Addison-Wesley publishing company.</li> <li>M Ercegovac, T Lang, "Digital Arithmetic", Hardware and Programming", 1<sup>st</sup> ed., 2004, Morgan Kaufmann publishers.</li> <li>Israel Koren, "Computer Arithmetic Algorithms", 2<sup>nd</sup> ed., 2002, A.K. Peters.</li> </ol>		

4 PA A BARMAN					Na	itional I	<b>nstitute</b> An Institute	e of Te	<b>chnology</b> onal Importa	<b>/ Megh</b> ance	alaya				CURRIC	ULUM
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D	epartme	ent	Compute	Science a	ind Engine	ering		-				Semes	ster		IV	1
Co	urse				Course Nor	20				Credit	Structure			Marks Di	stribution	
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CS	220	Pri	nciples of	Program	ning Langu	lages			3	0	0	3	50	50	100	200
	-	To enabl respectiv choose a	e the stude ve comparis a suitable p	nts to learn a ons in differ ogramming	bout various ent high-leve anguage for	constructs l languages solving a p	s and their s so that he particular pr	can oblem.		CO1	Able to un introduce paradigm	nderstand the abstraction s, and an or	he history n, the cond verview of	of program cept of diffe language d	ming langu rent langua lesign criter	ages and ge ia.
	-	To devel landscap	op the stud be of progra	ent's ability f mming lang	o understan lages.	d the salien	t features in	n the		CO2	Avail to u language grammar	nderstand I can be pree rules in Bae	how the sy cisely spec ckus-Naur	ntactic stru cified using form (BNF)	cture of a context-fre	e
Co	urse	To provi example	de the stud programm	ents to gain on the second s	experience w s.	ith these pa	aradigms by	y using	Course	CO3	Able to u during th	nderstand t e translatio	he abstrac n and exec	tions of the tion of pro	operations ograms.	that occur
Obje	cuves .	To devel by using	op the stud example p	ent's ability ogramming	o gain exper anguages.	ience with t	these parad	ligms	Outcomes	CO4	Able to u	nderstand t	he usage o	of data type	s in various	languages
	-									CO5	Able to u passing;	nderstand t and excepti	he proced ons and e	ure activation ka	on and para ndling.	meter
						<u> </u>			(50)	CO6	Able to us subprogr manner.	nderstand t ams, and w	he concep ill be able	ts like abstr to apply the	ract data typem in a reali	bes, stic
No.	COs				DO 4			am Outo			DO10		DO10	Map		-SUS
1	C:01	2		· PO3	P04 0	P05	PU6	2	P08	1	1	0	0	2	1	1
2	CO2       2       3       1       1       0       2       1       0       3       2       1       2       1       2       2         CO3       3       2       1       0       2       3       0       1       0       1       3       1       3       2       2         CO3       3       2       1       0       2       3       0       1       0       1       3       1       3       2       2         CO3       4       5															
3	CO2       Z       S       I															
4	CO3       3       2       1       0       2       3       0       1       0       1       3       1       3       2       2         CO4       1       0       3       2       0       2       1       0       3       2       1       0       1       2       2         CO4       1       0       3       2       1       0       3       2       1       0       1       2       2         CO5       2       0       1       0       2       3       1       0       1       2       1       0       3       2       3															
5	CO4       1       0       3       2       0       2       1       0       3       2       1       0       1       2       2         CO5       2       0       1       0       2       3       1       0       1       2       1       0       1       2       2         CO5       2       0       1       0       2       3       1       0       1       2       1       0       3       2       3         CO6       1       2       0       3       1       2       0       2       0       1       0       0       2       3       2															
6	5       CO5       2       0       1       0       2       3       1       0       1       2       1       0       3       2       3         6       CO6       1       2       0       3       1       2       0       2       0       1       0       3       2       3         6       CO6       1       2       0       3       1       2       0       2       0       1       0       0       2       3       2         SYLLABUS															
No.	Introd The O Parad	uction: rigins o igms, La	f Progran anguage l	ming Lang Definition,	guages, At Language	ostractior Translati	Content ns in Prog on, The F	Jrammin Juture of	ng Language f Programm	es, Com ing Lang	putational guages;	l		Hours 2		COs <b>CO</b> 1
II	Langu Histor Pytho	iage Des ical Ov n: A Gei	sign Crite erview, E neral-Pur	ria: fficiency, pose Scrip	Regularity ting Langu	, Securit lage;	y, Extens	sibility,	C++: An C	bject-O	riented E	xtension	of C,	2		CO1
II	Synta Lexica Synta Tools	x and A al Struc x Trees, Lexics	nalysis Pa ture of P Ambigui vs. Svnta	arsing: rogrammii ty, Associ x vs. Semi	ng Langua ativity, and antics. Cas	ges, Cor I Precede e Studv:	ntext-Free ence, EBN Building	e Gramn IFs and a Synta	nars and B Syntax Dia x Analyzer	NFs, Pa grams, l for Tinv/	rse Trees Parsing T Ada:	s and Abs echniques	stract s and	6		CO2
IV	Basic Attrib Resol Dangl	Semant utes, Bi ution ar ing Refe	ics: inding, a nd Overlo erences, a	nd Semar bading, Al nd Garbag	tic Functi ocation, L je, Case St	ons, Dec lifetimes, udy: Initi	clarations and the al Static S	, Block Enviro Semanti	s, and Sco nment, Va c Analysis	ope, The riables a of TinyA	e Symbol and Cons da;	I Table, ∣ tants, Ali	Name iases,	6		CO3
V	Data T Data T Type Study	Types: Types ar Equivale : Type C	nd Type I ence, Typ Checking	nformatior e Checkin n TinyAda	, Simple T g, Type Co ;	ypes, Ty nversion	pe Consti , Polymoi	ructors, rphic Ty	Type Nom /pe Checkir	enclatur ng, Expli	e in Samp cit Polym	ole Langu orphism,	ages, Case	5		CO4
VI	Expre Expre Loop	ssions a ssions, Exits, Ex	and State Condition xception	nents: al Statemo landling, (	ents and G Case Study	uards, Lo /: Compu	oops and ting the V	Variatio /alues o	ns on WHIL f Static Exp	.E, The C ressions	GOTO Cor s in TinyA	ntroversy .da;	and	4		CO5
VII	Proce Proce Enviro Enviro	dures a dure De onments onments	nd Enviro finition a s, Activati s, Case St	nments: nd Activati ons, and A udy: Proce	on, Proced Ilocation, I essing Para	lure Sema Dynamic ameter M	antics, Pa Memory I odes in T	arameter Manager inyAda;	r-Passing N ment, Exce	lechanis otion Ha	ms, Proce ndling an	edure d		5		CO5
VIII	Abstra The A Comp Langu	act Data Igebraic ilation i lages, P	Types ar Specifica n C, C++ I roblems	d Modules ation of Ab Jamespac vith Abstra	:: stract Data es, and Jav ict Data Ty	a Types, <i>I</i> va Packag vpe Mecha	Abstract I ges, Ada I anisms, T	Data Typ Package The Math	be Mechania es, Modules nematics of	sms and in ML, N Abstrac	Modules Modules in t Data Typ	, Separate n Earlier bes;	)	6		CO6
E	ntial D					Total	Hours							36		
⊏SS6			arammina	anguagoor	rinciples on	Innactions	Congogo	Learning	· 2011							
2	. Louder	a RW. Co	oncepts of	anguages: p programming	l languages	Pearson F	Education Ir	ndia: 201	, 2011. 6.							
3	. Sethi R	, Sethi R	. Programn	ning languag	es: concepts	s and const	tructs. Read	ding: Add	lison-Wesley;	1996 Feb	o 2.					
Supp	olement	ary Rea	dings		· ·											
1	. Gabbri	elli M, Ma	rtini S. Pro	gramming la	nguages: pr	inciples an	d paradigm	ns. Spring	er Science &	Business	Media; 201	0.				
2	. Dowek	G. Princi	ples of pro	gramming la	nguages. Sp	ringer Scie	ence & Busi	iness Me	dia; 2009.							
3	. Kedar S	S, Thakar	e S. Princi	oles of Progr	amming Lan	guages. To	echnical Pu	ublication	s; 2009.							



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P	rogramme	e Ba	chelor of	Technol	ogy in Co	omputer	Science	and Enginee	ering			Y	ear of Re	gulation		2019	9-20
D	epartment	t Co	mputer S	science a	nd Engin	eering							Seme	ster		P	/
											Cre	dit Structure	;		Marks Di	stributior	า
Cou	rse Code				Coi	Irse Nam	е			L		ГР	С	INT	MID	END	Total
C	CS222				Prograr	nming in	Java			3	0	0 0	3	50	50	100	200
		To intr langua	oduce prog ige, platforr	Jramming in n independ	n the Java lence, byte ther basic (	programm code, the (	ing concepts .lava		CO1	Able to e Java.	xplain	and use the b	oasic featu	res and co	oncepts of	program	ning in
		To trai	n in object-	oriented pr	rogrammin	g concepts	s w. r. t. to		CO2	Able to w	vrite ob	oject-oriented	programs	in Java.			
C	Course	Java. To trai feature	n the stude	nts in using	g special p cs, exception	rogrammir on handlin	ng g,	Course	CO3	Able to u	ise spe	ecial program	ning featu	res, collec	tions and	generics	in Java.
Ob	jectives	To give collect	e knowledg	e of Java A igning star	PI class lik ndalone de	oraries and sktop and	l web	Outcomes	CO4	Able to d	lo exce	eption handlin	g, advance	ed I/O and	multi-thre	ading in J	lava.
		арриса	itions.					-	CO5	Able to w	vrite ne	etworking prog	grams, dat	abase acc	ess progr	ams and (	GUI
									000	program	s in Ja	va.					
						Mapr		 Program Outo	nomes (E						Man		PSOs
No.	COs			PO3	PO4						מר	PO10	PO11	PO12			
1	CO1	3	2	1 00	1 04	100	0	0	10		) )	0	0	0	1	1 302	0
2	CO2	3	2	1	1	1	0	0	0		, ,	0	0	0	1	1	0
3	CO3	SO2         SO3         SO3 <thso3< th=""> <thso3< th=""> <thso3< th=""></thso3<></thso3<></thso3<>													2	2	1
4	CO4	2O3       3       3       2       3       2       0       0       0       0       0       0         2O4       3       3       2       3       2       1       0       0       0       0       0       0													3	2	1
5	CO5	O4         3         3         2         3         2         1         0         1														2	1
	11	CO5         3         3         2         3         2         1         0         0         0         1         1         3         2         1           SYLLABUS															
No.							Con	tent							Hours	1	COs
I	SYLLABUSContentHoursCOsJava fundamentals Introduction; Structure of Java platform: JDK, JRE, JVM; Advantages of Java; All code in classes; Compiling source code into bytecode; Data types: primitive and reference types; Comments; Variables; Operators; Flow Control statements: if, else, switch, switch expressions, loops, enhanced for loop, labelled for loop, return, break and continue; Array declaration; Multidimensional arrays; Type conversion and Casting; Wrapper classes and Boxing;07CO1, CO2																
11	Object- Creating overloa initializa Interfac Abstrac	oriented g new d ding; C ation; A es; Mul et classe	<u>d progran</u> lata types onstructo rray initia tiple inhe es and m	nming in class, L ors; Initia alization; ritance; I ethods; M	<u>Java</u> _ocal var lization a Reusing Upcastin Vesting ir	iables; E Ind Clear classes; g; The fii nterfaces	ncapsula nup; Clea ; Associa nal keywo ; Inner C	ation; Java a nup: finaliza ation; Aggreg ord; Method lasses; Usin	ccess s ation and gation; ( overriding this a	pecifiers d garbag Composi ing; Con nd new;	; Abs e coll tion; struct Anon	traction; Me lection; Mer Delegation; tors and Po ymous inne	ethod mber Inherita lymorph er classe	nce; ism; s	09	со	2, CO3
ш	<u>Special</u> Collecti	<u>feature</u> ons: Li	<u>s in Java</u> st, Set, Q	ueue; Ite	rating co	llections	; Maps; C	Seneric colle	ections i	n Java; (	Class	Object; Cla	iss Class	5	06	,	CO3
IV	Advanc Arrays a exceptio class; ro class; C	ed topic are first on; Cres eaders Creating	<u>cs</u> -class ob ating use and write J, Startinç	jects; Ob r-defined ers; Typic g and Sto	oject seria l exceptic al uses c opping a t	alization; ons; Perf of I/O stre hread; S	; Error ha orming c eams; File haring re	andling with leanup with e reading an sources; Co	exceptio finally; d writin operatio	ons; Bas Input and g utilities on betwe	ic exc d Out s; Bas en ta	ceptions; C put in Java sic threadin sks; Deadlo	atching a ; The File g: the Th ocks	an e hread	10	(	CO4
v	Advanc Java ne user int	ed proc tworkin erfaces	Iramming Ig fundan AWT an	<u>in Core</u> nentals; I id Swing	<u>Java</u> Networkiı classes,	ng classe Capturir	es and in ig events	terfaces; Jav	va datak	base con	nectiv	vity (JDBC);	; Graphic	al	08	(	CO5
							Total Ho	urs							40		
Ess	ential Rea	adings															
	1. E. Bal	agurus	amy, "Pro	ogrammir	ng with J	ava", Mc	Graw-Hi	II Education,	, 6 <sup>th</sup> edit	tion, 201	9.						

2. Herbert Schildt, "Java - A Beginner's Guide", McGraw-Hill Education, 7<sup>th</sup> edition, 2017.

#### **Supplementary Readings**

- 1. Herbert Schildt, "Java: The Complete Reference", McGraw-Hill Education, 9<sup>th</sup> edition, 2017.
- 2. Cay S. Horstmann, "Core Java Volume II Advanced Features", Pearson Education; 10<sup>th</sup> edition, 2017.

3. Barry A. Burd, "Beginning Programming with Java for Dummies", Wiley, 2017.



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Pr	ogramme	Ba	chelor of	Technol	oav in Co	omputer	Science	and Enginee	rina				Y	ear of Re	aulation		201	9-20
De	partment	t Co	mputer S	Science a	nd Enain	eerina							I	Seme	ster		<u></u> ľ	V
											(	Credit S	Structure			Marks D	istributio	า
Cou	se Code				Coι	irse Nam	e				L	Т	Р	С	INT	MID	END	Total
С	S224			GU	I Design	and Prog	gramming	g			3	0	0	3	50	50	100	200
		To intrusabili	oduce GUI	programm	ing in Java esign	, egronom	ic and		CO1	Ab in .	le to exp	ain fund	amental	concepts o	of GUI des	ign and G	UI design	facilities
		To trai	n the stude	ents in usin	g Java AW	T and Swir	ng GUI	-	CO2	Ab	le to use	many Ja	iva GUI c	ontainers a	and comp	onents.		
C	ourco	To trai	n the stude	ents in even	nt handling	in GUI app	olications.	Courso	CO3	Ab	ole to do p	orogram	ning in Ja	ava for eve	ent handlir	ıg.		
Obj	ectives	To trai	n in using o	different GU	JI layouts,	look and fe	eel,	Outcomes	CO4	Ab	le to use	differen	t GUI layo	outs, look a	and feel, g	raphics a	nd images	s in GUIs.
		graphi		ges in Gois	5.				CO5	Ab	le to do e	error and	exceptio	n handling	g for GUI p	rogramm	ing and u	se some
									005	adv	vanced G	UI comp	onents/ v	vidgets.				
						Mapr	oina with F	L Program Outo	comes (F	POs	)					Марі	oina with	PSOs
No.	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO	8	, PO9	Р	O10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3	2	1	1	1	0	0	0	-	0		0	0	0	1	1	0
2	CO2	3	3	2	3	2	1	0	0		0		0	0	0	2	1	0
3	CO3	3	3	2	3	2	1	0	0		0		0	0	1	2	2	1
4	CO4	3	3	2	3	2	1	0	1		0		0	1	1	2	2	1
5	CO5	CO5         3         3         2         3         2         1         0         0         0         0         1         0         2           SYLLABUS															2	1
	. Content Hours COs																	
No.	STLLABUS       D.     Content     Hours     COs																	
I	J.       Content       Hours       COs         Introduction; Principles and Motivation of GUI Design: Fundamental Human Computer Interaction principles, Ergonomics and usability; Java event-driven programming summary; Java IDEs; Overview of AWT and Swing       09       CO1         Design: Fundamental Human Computer Interaction principles, Ergonomics and usability; Java event-driven programming summary; Java IDEs; Overview of AWT and Swing       09       CO1																	
II	II       Components and containers: JComponent, JFrame, JWindow, JPanel, Content Pane; Introduction to event processing; Deployment of GUI application in jar and other executable formats; Some basic components: JButton, JLabel, JTextfield, JTextArea, combo boxes, JMenu, check boxes, option buttons; Simple Swing dialogues; setting borders and styles; keyboard and mouse access, tab control; file selection       14       CO2, CO3																	
III	Basic La Dimens Drawing Buffere	ayout N ions; Lo g in Jav dImage	lanagers ook and I a: Graph	: Border, Feel ics class	Flow, Gr ; points;	id, Card, lines; sh	Tabbed, apes; aff	GridBagLay	out; Fo ns; colc	nts; ors;	; Colors fills; wo	; Spaci orking v	ng; Cor with ima	nstraints ages usir	; ng	09		CO4
IV	Error ar JTable	nd exce	ption har	ndling; Ad	dvanced	widgets:	Swing s	pinner, slide	r, toolba	ar; p	orogres	s bar, .	IList, JS	crollPan	ie,	08		CO5
							Total Ho	urs								40		
Esse	ntial Rea	adings																
1	. E. Bal	agurus	amy, "Pro	ogrammii	ng with J	ava", Mo	Graw-Hi	Il Education,	, 6 <sup>th</sup> edit	tion,	, 2019.			<b>C</b>				
2	. Ben S	hneidei	rman, Ca	therine F	Plaisant,	Maxine (	Cohen, S	iteven Jacob	os, "Des	sign	ing the	User li	nterface	: Strateg	gies for I	ttective	) Humar	۱-
3	Paul F	uter inte Deitel H	larvev De	eitel "Jav	va How te	o Progra	<u>, ə<sup></sup> edilid</u> m: Farlv	01, 2014. Objects" Pe	earson	Edu	Ication	11 <sup>th</sup> ea	lition 2	018				
0				51.51, 041		<u>- iogia</u>				Luu		60						
Supp	olementa	ry Read	lings															
1	. Yasha	vant P.	Kanetka	ar, "Let us	s Java", I	3PB Put	lications	, 4 <sup>th</sup> edition,	2019.									
2	. Herbe	rt Schil	dt, "Java	: The Co	mplete R	eference	e", McGra	aw-Hill Educ	ation, 9	<sup>th</sup> e	dition, 2	2017.						
3	. Cay S	. Horstr	mann, "C	ore Java	Volume	II - Adva	anced Fe	atures", Pea	arson Ed	duca	ation; 1	0 <sup>th</sup> edit	ion, 20'	17.				



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	OF TECHNOLO	-															
Pi	rogramr	ne	Bac	helor of	Technolo	ogy in Co	mputer So	cience an	d Engir	neering		Y	ear of Re	gulation		2019	)-20
D	epartme	ent	Con	nputer So	cience ar	nd Engine	ering						Seme	ster		IV	<u>/</u>
Cou	urse				Co	ourse Nan	ne				Credit	Structure			Marks Di	stribution	
Co	ode									L	Т	Р	С	INT	MID	END	Total
CS	226				Pytho	n Prograr	nming			3	0	0	3	50	50	100	200
		To devo progran	elop nming	the studen g	nt's ability	to underst	and the pr	inciples of	python		CO1	Able to a program	cquire <mark>knov</mark> ning	vledge abo	ut the data	types in Py	thon
		To prov function	/ide t ns, file	he student es, object o	ts with fun priented for	damental of writing py	concept of thon progra	data types ming.	, loops,		CO2	Able to condition	understand ons, loops e	and <mark>write</mark> tc.	python pro	graming us	sing
Co Obje	urse ctives	To deve	elop ti	he student'	's ability to	design sof	tware using	Python.		Course Outcomes	CO3	Able to function	understand is, tuples e	and write tc.	python pro	graming us	sing
		To fami	liarize	e the stude	nt to write	clear and e	ffective pyt	non progra	mming.		CO4	Able to modules	understand s, packages	and <mark>write</mark> s, strings e	python pro tc.	graming us	sing
											CO5	Able to u oriented	nderstand a concepts a	and <mark>write</mark> p nd files har	ython prog ndling.	raming usin	ıg object
											CO6						
Nia	00-						Mapping v	vith Progra	am Outo	comes (POs)	)				Мар	ping with	PSOs
INO.	COs	PC	)1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$														0	3
2	CO2	3         2         0         1         0														3	2
3	CO3	3		3	2	2	2	1	0	0	0	0	0	0	3	3	2
4	CO4	3		3	2	3	2	2	2	0	2	0	0	1	3	2	2
5	CO5	3		3	2	3	2	2	2	0	2	0	0	1	3	3	3
6	CO6	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
									SYLLA	BUS							
No.								Content							Hours		COs
I	Introd Opera	uction t tors	o Py	thon and	Compute	er Progran	nming, Da	ta Types,	Variable	es, Basic Inp	out-Outp	ut Operatio	ons, Basio	þ	07		CO1
II	Boolea	an Value	es, C	Condition	al Executi	on, Loops	s, Lists an	d List Pro	ocessing	g, Logical ar	d Bitwise	e Operatio	ons		08		CO2
III	Functi	ons, Tu	ples	, Dictiona	aries, and	Data Proc	cessing								08		CO3
IV	Modul	es, Pac	kage	es, String	and List I	Methods,	and Excep	otions							08		CO4
V	The Ol and W	bject-Or orking	riento with	ed Appro Files	ach: Clas	ses, Meth	ods, Obje	cts, and t	he Stan	dard Objecti	ve Featu	res; Exce <sub>l</sub>	ption Han	dling,	09		CO5
							Total	Hours							40	<u> </u>	
Esse	ntial Re	eadings	6											I			
1.	Mark	Lutz,"	Prog	gramming	Python",	Prentice I	Hall India,	7 <sup>th</sup> Edition	n, 2017								
2.	Allen	Downe	ey, "	Think Pyt	hon", O'R	eilly Media	a, 1 <sup>st</sup> Editi	on, 2012									
3.	Marl	Pilgrim	, "Di	ive into P	ython", A	Press Med	lia LLC, 1	st Edition,	, 2005								
											-		-				

**Supplementary Readings** 

1. Mark Lutz, "Learning Python", McGraw-Hill publication, 2nd Edition, 2010

2. Luciano Ramalho, "Fluent Python", O'Reilly Media, 1<sup>st</sup> Edition, 2015

3. Brett Slatkin, "Effective Python: 59 Specific Ways to Write Better Python", Pearson Education, Inc, 1<sup>st</sup> Edition 2015



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	OF TECHNOL																
Ρ	rogrami	ne	Bac	chelor of	Technolo	gy in Cor	nputer So	cience an	d Engir	neering		Acade	mic Year	of Regula	ition	2018	-19
D	epartme	ent	Cor	mputer So	cience an	d Engine	ering						Seme	ster		IV	1
Co	urse				Co	ourse Nam	ne				Credit	Structure		ſ	Marks Di	stribution	
00	ode									L	Т	P	C	INT	MID	END	Total
CS	272	_		0	bject Orie	ented Pro	gramming	g		2	0	0	2	50	50	100	200
		To pro Oriente	vide s ed Pro	students in- ogramming	depth theoi paradigm	etical base	and fundai	nentals of	Object		CO1	Able to de paradigm	with conc	e the proced epts of data	dural and ob a, functions	ject oriente, classes ar	ed nd object
		To pre Oriente	pare s ed Pro	students to	design and paradigm	code vario	us projects	using Obj	ect		CO2	Able to ill using poi	ustrate dy nters, cons	namic mem structors, d	ory manage estructors e	ement techr etc.	niques
Co	urse									Course	CO3	Able to m operator	ake use of overloading	the concep g, type con	ot of functio version and	n overloadi I polymorpl	ing, nism
Obje	ctives									Outcomes	CO4	Able to in types alo	terpret the ng with the	concept of understan	f Inheritance ding of late	e and its va binding	rious
											CO5	Able to contract to handling	ompare the in C++	procedure	es of file har	ndling and e	exceptio
											CO6	Able to te Template	est the cond Libraries o	cept of tem of C++	plates and t	he use of S	tandard
	$CO_{2}$						Mapping v	vith Progr	am Outo	comes (POs)			· · · · · · · · · · · · · · · · · · ·		Мар	ping with	PSOs
۱U.	008	P	D1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO
1	CO1	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$												1	0	0	0
2	CO2	D2     2     3     3     2     1     1     0     0     1     0												0	1	1	1
3	CO3	3	3	3	3	0	0	0	0	1	1						
4	CO4	3	3	1	1	2	0	0	0	0	0	0	0	0	0	2	3
5	CO5	3	3	0	3	1	3	0	0	0	1	0	0	0	0	1	1
6	CO6	3	3	2	2	2	0	0	0	0	2	0	0	0	0	0	1
								Content	SYLLA	BUS					Hours		<u></u>
NU.	lin tin o al							Someric							110015		005
I	Introd Introd encap	uction uction sulatio	: to ol on;	bject orie	nted prog	gramming	j, user de	fined typ	es, stru	ictures, unic	ons, poly	/morphisr	n,		01		CO1
II	Begin Gettin functi	ning w g start ons, st	vith C ted w tring	++: vith C++ s class, sp	syntax, da ecifying d	ata types classes a	, variable nd object	s, data ty s;	ypes, ty	pe conversi	on – im	plicit and	explicit,	inline	03		CO2
	Class Data functi	es and hiding, on, poi	Obje , mei inters	ects: mber fun s to mem	ction, mo bers, con	emory all structors	location, and dest	static m tructors;	embers	s, static obj	ects, ar	ray of ot	ojects, fri	endly	04		CO2
IV	Conce Funct Polym	ept of C ion ove orphis	Overl erloa sm	oading: ding, ope	erator ove	erloading	of unary	, binary,	special	operators;	Туре со	nversion;	Compile	Time	03		CO3
V	Inheri Introd const Hierar functi	tance: uction ructor chical ons;	to in and and	heritance destruc hybrid in	e, differer tor in d heritance	nt types; { lerived c e; Virtual	Single inh lass; Mu base clas	neritance Iltilevel is; Objec	– publio and mu t slicing	c and privat ultiple inhe g; Pointer to	e deriva ritance; base ar	tion, prote Ambigui nd derived	ected me ity resol d class; \	mber, ution; /irtual	09		CO4
VI	File H Strear types	andling ns, cla of files	g: isses s, i/p	for file s and o/p f	tream, op unctions	ening a f for seque	ile, detect ential and	ting the E random	EOF, file access	e modes, file , error hand	e pointer ling.	s and the	ir functio	ns,	02		CO5

	types of mes, wp and op functions for sequential and random access, error nanding.		
VII	Templates: Function templates, class templates, advantages and disadvantages, Standard Template Library.	02	CO6
	Total Hours	24	
Esse	ential Readings		
1	. Robert Lafore, "Object-Oriented Programming in C++", 4 <sup>th</sup> Edition, Sams Publishing, 2001.		
2	E Balagurusamy, "Object-Oriented Programming in C++", 8th Edition, McGraw-Hill Education India, 2020.		
3	. Yashvant Kanetkar, "Let Us C++ ", BPB Publication, 2020.		
Sup	olementary Readings		
1	. P.J. Deitel and H.M Deitel ,"C++ How to Program", 10th Edition, Pearson Publication, 2016.		
2	. Herbert Schildt, "C++: The Complete Reference", 4 <sup>th</sup> Edition, McGraw-Hill Education India, 2017.		
3	. Bjarne Stroustrup, "The C++ Programming Language", 3 <sup>rd</sup> Edition, Pearson Education India, 2002.		

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CURRICULUM

ProgrammeBachelor of Technology in Computer Science EngineeringYear of RegulationDepartmentComputer Science EngineeringSemesterCourse CodeCourse Name $Credit Structure$ Credit StructureC course Course Course CodeCourse Course Course Course $Course Torganization Lab$ Conce the theory of computer organization with hardwareCourseCourse CourseCourseCourseCourse the theory of computer organization with hardwareCO1To develop knowledge about ALU operationsCO2Able to acquire knowledge aboutCourseApply fundamentals of digital design and extend the learning toCO3Understanding of additionCourseCO3	Mark ation peration out asse and su Resto fultiplin	Marks nuous lation operation and sul - Restor <u>Vultiplic</u> ters and	s Distributes and a construction of the second seco	2019 IV oution /iva nber sy nguage n, Mul nd nor	Total Total 100 'stems code tiplication- n-restoring									
DepartmentComputer Science EngineeringSemesterCourse CodeCourse Name $Credit Structure$ ICredit StructureComputer Organization LabComputer Organization LabIConnect the theory of computer organization with hardwareCourseConnect the theory of computer organization with hardwareCO1To develop knowledge about ALU operationsCO1Able to understand different operationCourseApply fundamentals of digital design and extend the learning toCourseCO3Understanding of additionCourseCO3Understanding of addition	Mark ation peration out asse and su Resto <u>fultiplic</u> ers and	Marks nuous lation operation oout assen and sul - Reston <u>Multiplic</u> ters and	s Distributer Quiz/V 30 Is on num mbly lang btraction, ring and	IV oution /iva nber sy nguage n, Mul nd nor	Total 100 'stems code tiplication 1-restoring									
Course Code       Course Name       Credit Structure         CS 252       Computer Organization Lab       L       T       P       C       Contin Evaluation         CS 252       Connect the theory of computer organization with hardware       0       0       2       1       70         Course       Connect the theory of computer organization with hardware       CO1       Able to understand different or CO2       Able to acquire knowledge about ALU operations         Course       Apply fundamentals of digital design and extend the learning to       Course       CO3       Understanding of addition	Mark ation peration out asse and su Resto <u>fultipli</u> ers and	Marks nuous lation operation oout asser and sul - Restor Multiplic ters and	s Distributer of the second se	vition /iva nber sy nguage n, Mul nd nor	Total <b>100</b> 'stems code tiplication n-restoring									
CS 252Computer Organization LabLTPCContin Evaluation002170Connect the theory of computer organization with hardwareCO1Able to understand different or CourseCO1Able to understand different or CO2CourseApply fundamentals of digital design and extend the learning toCourseCO3Understanding of addition	ation peration out asse and su Resto fultipli	nuous lation operation oout assen and sul - Reston <u>Multiplic</u> ters and	Quiz/V 30 Is on num mbly lang btraction, ring and	/iva nber sy nguage n, Mul nd nor	Total 100 'stems code tiplication n-restoring									
OOO2170Connect the theory of computer organization with hardwareCO1Able to understand different oTo develop knowledge about ALU operationsCO2Able to acquire knowledge about ALU operationsCourseApply fundamentals of digital design and extend the learning toCO3Understanding of addition	peration out asse and su Resto <u>fultipli</u> ers and	0 operation oout asser and sul - Restor <u>Multiplic</u> ters and	30 Is on num mbly lang btraction, ring and	nber sy nguage n, Mul nd nor	100 /stems code ltiplication -restoring									
Connect the theory of computer organization with hardwareCO1Able to understand different oTo develop knowledge about ALU operationsCO2Able to acquire knowledge about acquire knowledge about ALU operationsCourseApply fundamentals of digital design and extend the learning toCO3Understanding of addition	and su Resto <u>fultipli</u>	and sul • Restor Multiplie ters and	is on num mbly lang btraction, ring and	nber sy iguage n, Mul id noi	vstems code tiplication n-restoring									
To develop knowledge about ALU operations       CO2       Able to acquire knowledge ab         Course       Apply fundamentals of digital design and extend the learning to       Course       CO3       Understanding of addition	and su Resto <u>fultipli</u> ers and	and sul - Restor <u>Multiplie</u> ters and	mbly lang btraction, ring and	nguage n, Mul nd nor	code Itiplication 									
Course Apply fundamentals of digital design and extend the learning to Course CO3 Understanding of addition	and su Resto <u>fultipli</u> ers and	and sul Restor	btraction,	n, Mul nd nor	ltiplication									
Objectives       design sequential circuits       Outcomes       Booth's, Array	Resto <u>Aultipli</u> ers and	- Restor Multiplie ters and	ring and	id nor	n-restoring									
To apply the concept of memory design, cache memory and its mapping techniques and virtual memory. CO4 Introduce basics Division-Floating point arithmetic	Aultipli ters and	Multiplie ters and	or ALLI											
CO5 Able to Designing Adder, N	ters and	ters and	el, ALU	on a s	simulator.									
CO6 Exhibit the design of Regist simulator.			Counter	ers on a	ì									
Mapping with Program Outcomes (POs)		Ν	Mapping	g with I	PSOs									
NO.         COS         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12	PS	2 PSC	01 PS	SO2	PSO3									
1 CO1 3 3 0 1 0 0 0 2 0 0 0	3	3	}	0	3									
2         CO2         3         3         0         1         0         0         0         0         2         0         0         0         2         0         0         2         0         0         2         0         0         2         0         0         2         0         2         0         2         0         2         0         2         0         2         0         2         0         2         0         2         0         2         0         2         0         2         0         2         0         2         3         2         3         2         3         2         3         3         3         1         2         0         0         0         0         0         0         2         3         2         3         2         3         3         3         3         1         2         0         0         0         0         0         0         0         0         0         2         3         2         3         2         3         3         3         3         3         3         3         3         3         3         3         3														
3 CO3 2 3 3 1 2 0 0 0 0 0 0 0 0	2	2	2	3	2									
3       CO3       2       3       3       1       2       0       0       0       0       0       0       2       3         4       CO4       2       2       3       0       2       2       3       0       2       3       0       2       3       0       1       2       3														
5 CO5 2 2 3 0 2 3 0 2 1 0 0 1	3	3	6	3	3									
6         CO6         2         3         2         1         2         2         2         0         2         0         0         1	2	2		3	3									
SYLLABUS					00-									
No. Content	H0		urs		COs									
	02	02		-										
Addition and subtraction, Multiplication	02	02		co	)1									
5 Dootris, Anay	02	02		co	)2									
4 Division- Restoring	02	02			-									
5 Non-restoring	02	02			13									
6 Floating point arithmetic.	02	02		CO	)4									
7 Designing Adder, Multiplier	02	02		CO	)5									
8 Design of Registers and Counters	02	02		CO	)6									
9 Designing memory unit on a simulator.	02	02												
10 Designing CPU on a simulator.	02	02												
Total Hours	20	20												
Essential Readings														
Hamacher, Carl, Zvonko Vranesic, and Safwat Zaky. Computer organization. McGraw-Hill, 2002.														
Z. IVIANO, IVI. IVIONIS. Computer system architecture. Prentice-Hall of India, 2003.     Stallings. William. Computer organization and problemature: designing for performance. Decrean Education India, 2002.														
S. Stallings, William. Computer organization and architecture. designing for performance. Pearson Education India, 2003.														
1. Hennessy John L. and David A. Patterson. <i>Computer architecture: a quantitative approach</i> . Elsevier, 2011														

2. Bryant, Randal E., O'Hallaron David Richard, and O'Hallaron David Richard. Computer systems: a programmer's perspective. Vol. 2. Upper Saddle River: Prentice Hall, 2003.

3. Ramachandran, Umakishore. Computer systems: An integrated approach to architecture and operating systems. Pearson Education India, 2011.

A State and a state of the		į			Na	itional I	<b>nstitute</b> An Institute	of Te	e <b>chnol</b> onal Imp	<b>ogy</b> ortar	<b>Megh</b> nce	alaya					CURRIC	ULUM
P	rogramn	ne	Bachelor	of Techno	logy in Co	mputer Se	cience an	d Engin	neering			Y	ear of Re	aulatio	n		2018	-19
D	epartme	ent	Computer	Science a	ind Engine	ering		<u> </u>					Seme	ster			IV	
Co	urse										Credit	Structure			Mark	s Dis	tribution	
Co	ode				Jourse Nar	ne			L	-	Т	Р	С	Cont Eval	nuous uation	Qui	z / Viva	Total
CS	254	Object	Oriented	Program	ning and D	esign La	C		C	)	1	2	2	-	70		30	100
		To provid Oriented	de students Programmi	in-depth the ng paradign	oretical base	e and funda	mentals of (	Object			CO1	Able to ill using poi	ustrate dyr nters, cons	amic m tructors	emory ma s, destruct	nager ors et	nent techn tc.	iques
		To prepa Oriented	re students Programmi	to design a ng paradign	nd code vario	ous projects	using Obje	ect			CO2	Able to m operator	ake use of overloading	the con g, type c	cept of fu	nction and	overloadi polymorph	ng, ism
Co	urse								Cours	se	CO3	Able to in types alo	terpret the ng with the	concep unders	t of Inheri tanding of	tance late t	and its var binding	ious
Obje	ctives								Outcon	nes	CO4	Able to contract handling	ompare the in C++ and	proced test the	ures of file	e hand of tem	dling and e	xception
	00-	Mapping with Program Outcomes (POs)         Mapping with PSOs           PO1         PO2         PO3         PO4         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PSO1         PSO2         PSO3																
NO.	COs	PO	PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02       PS03         2       0       0       0       1       0       2       0       0       0       2       1       1       1															
1	CO1	2	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$															
2	CO2	2	2         0         0         0         1         0         2         0         0         2         1         1         1           2         2         2         1         2         0         0         2         0         1         1         1           2         2         2         1         2         0         0         2         0         1         2         2         1															
3	CO3	3	2	2	3	0	0	2	1		0	1	1	1	2	2	1	1
4	004	I		U		U	v Suggeste	d List d	of Exper	imer	nts		U	2		)		5
No.							Content								Hours		CO	S
I	Assign	ments a	nd Tutoria	s on basic	classes an	d objects									02		CO	1
- 11	Assian	ments a	nd Tutoria	s on friend	function										02			
	Assian	ments a	nd Tutoria	s on differ	ent call-by t	echniques									02			
IV	Assian	ments a	nd Tutoria	s on const	ructors and	destructo	rs								04			
V	Assian	ments a	nd Tutoria	s on funct	on and ope	rator over	loading								02		С	02
VI	Assign	ments a	nd Tutoria	s on comp	lie time pol	ymorphisn	<u></u> า								01			
VII	Assign	ments a	nd Tutoria	s on inher	tance										06		С	03
VIII	Assign	ments a	nd Tutoria	s on run-ti	me polymo	rphism									01			
IX	Assign	ments a	nd Tutoria	s on file ha	andling										02		С	04
X	Assign	ments a	nd Tutoria	s on temp	ates										02			
	0			•		Total	Hours								24			
Esse	ntial Re	adings													<u>.</u>			
1	. Robei	rt Lafore	, "Object-0	Driented Pr	ogramming	in C++", 4	4 <sup>th</sup> Edition,	Sams F	Publishin	g, 20	001.							
2	. E Bala	agurusa	my, "Objeo	t-Oriented	Programm	ing in C++	", 8 <sup>th</sup> Editio	on, McG	Graw-Hill	Educ	cation Ir	ndia, 2020.						
3	Yash	/ant Kan	etkar, "Le	Us C++ ",	BPB Public	cation, 202	20.											
Supp		ary Rea	aings			11 · - 4b ·			<u> </u>	-								
	. P.J. D	vertel and	a H.M Deit	el ,″C++ H	ow to Progr	am″, 10 <sup>m</sup>	Edition, Pe	earson F		on, 20	U16.	7						
2	. Herbe	ert Schild	π, C++: I	ie Comple	ie keteren	ce , 4"' Ed	uon, McG	raw-Hill	Education	on In	ula, 201	1.						

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	OF TECHNO															
P	rogramı	me	Bachelor of	Technolo	ogy in Cor	mputer So	cience an	d Engi	neering		Y	ear of Re	gulation		201	9-20
D	epartme	ent	Computer S	science ar	nd Engine	ering						Seme	ster			V
Co	urse			0						Credit	Structure			Marks [	Distributior	<u>\</u>
Co	ode				ourse Nam	10			L	Т	Р	С	Continuo Evaluatio	on L	.ab Test/ Viva	Total
CS	256			Data Co	mmunica	tion Lab			0	1	2	2	70		30	100
		To intro	duce the comp	onents of D	ata Commu	inication			-	CO1	Able to le	earn the fur	damentals	of data co	ommunicati	on
		To analy	vse the Analog	and Digital	Transmissi	on				CO2	Able to U transmis	Inderstand sion over d	the digital s	ignal and	analog sig Smission m	nal edia.
Со	urse	To desc	ribe the struct	ure of Physi	cal and Dat	a Link Laye	)r		Course	CO3	Able to d	<mark>istinguish</mark> ( n and medi	different tec um access	hniques control.	of error det	ection and
Obje	ctives	To desc	ribe the function	on of wirele	ss networks	5			Outcomes	CO4	Able to a networks	cquire knov	wledge abou	ut the ger	nerations of	wireless
No	$C_{0}$					Mapping v	with Progra	am Out	comes (POs)					Ma	apping with	I PSOs
110.	003	PO	Mapping with Program Outcomes (POs)         Mapping           01         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01           2         0         0         0         0         0         0         0         0         2											I PSO2	PSO3	
1	CO1	2	0	0	0	0	0	0	0	0	0	0	0	2	1	0
2	CO2	2	1	1	1	0	0	0	1	0	0	1	1	1	1	1
2         CO2         2         1         1         0         0         0         1         0         0         1         1         1         1         1           3         CO3         1         1         1         0         0         0         0         0         1 <td>1</td>														1		
4	CO4	1	1	2	2	0	0	0	0	1	0	1	1	1	1	1
								SYLLA	ABUS					<u> </u>	<u> </u>	
No.	Study	and diag	uccion on vo	mious Com	nutor notu	vork comp		h ag Din	a Notatat Tr	incort Al	DD Nibtata	t Notch o	nd	Hours	<u>s</u>	COs
1	execut	tudy and discussion on various Computer network commands such as Ping, Netstat, Tracert, ARP, Nbtstat, Netsh and <b>03</b> xecution of the commands.														
11	Install	ation and	d Setur of Pa	acket Trace	er Tool St	udy and e	vecution o	of basic	commands of	f Packet '	Tracer suc	has		03		
	Tracer	oute, ifc	onfig, Telnet	t and other	s.	utry and C		n basic	commands of	I I acket	Tracer suc	11 as		00		
111	Setting	y up a Lo	ocal Area Ne	twork in P	acket Trac	er with St	tatic Routi	ing –						03		
	(i)	Sta	tic Routing v	vithout CL	I and			0								
11/	(ii)	) Stat	tic Routing v	vith CLI.			De alvat Tua							02		
IV	Initian	ization a	nd Setting up	) a Router	with Energ	yption in F		icer.						03		CO1
V	Config	nuration	of DHCP Se	rver and N	etwork A	ddress Tra	nslation ir	n Packet	t Tracer					06		CO2
·	Conng	Suration			etwork / R		instation in	IIII deke	t Hacel.							CO3
VI	(i)	То	understand	the workin	g of LAN	Trainer k	it.							09		004
	(ii)	Sto	op & Wait Pr	rotocol imj	olementati	on on LAI	N Trainer	kit.								
	(iii)	) Go	-Back N Pro	otocol impl	ementatio	n on LAN	Trainer k	tit. Sinor kit								
VII	Data T	ransmis	sion through	wired and	wireless (	communic	ation with	nout any	outside supp	ort.				06		
			8					J	The second se							
VII	Setting	g a local	server for ac	cess of file	es									03		
	To be	done ne	ecessarily a	s mini-pro	oject grou	p-wise in	groups c	of at lea	ast two/three	studen	ts.					
						Total	Hours							36		
Esse	ntial R	eadings											·		<b>!</b>	
1	. Behr	ouz A Fo	prouzan, "Da	ta Commu	nication a	nd Networ	rking", 5 <sup>th</sup> [	Edition,	McGraw-Hill	Educati	on, 2018.					
2	. Andr	ew S Ta	nenbaum, Da	avid J. We	therall "Cc	omputer N	etworks",	5 <sup>th</sup> Editi	on, Prentice I	Hall. 201	1.					
3	. Willia	m Stallir	ngs, "Data ar	nd Comput	er Comm	unication"	, 10 <sup>th</sup> Editio	ion, Pea	arson, 2017.					_		

4. A Jesin, "Packet Tracer Network Simulator", 1<sup>st</sup> Edition, Packt Publishing Ltd., 2014.

**Supplementary Readings** 

1. James F Kurose, Kaith W Ross, "Computer Networking | A Top-Down Approach", 6<sup>th</sup> Edition, Pearson, 2017.

2. A L Garcia, I Widjaja, "Communication Networks: Fundamental Concepts and Key Architectures", 2<sup>nd</sup> Edition, Tata McGraw Hill, 2017.

3. B. Buchanan, "The Handbook of Data Communications and Networks", 1<sup>st</sup> Edition, Springer, 2004.

4. James F Kurose, Kaith W Ross, "Computer Networking | A Top-Down Approach", 6th Edition, Pearson, 2017.



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CURRICULUM

	TO OF TECHNOL	, ,															
P	ogram	me	Bac	helor of	Technolo	gy in Cor	nputer Se	cience an	d Engiı	neering			ear of Re	gulation		201	9-20
D	epartm	ent	Con	nputer So	cience an	d Engine	ering						Seme	ster			V
Co	urse				C						Credit	Structure			Marks D	istribution	
Co	ode						IC			L	Т	Р	С	INT	MID	END	Total
CS	301				Opera	ating Sys	tems			3	1	0	4	50	50	100	200
		To intro	oduce	the compo	onents of o	perating sy	stem				CO1	Able to le	earn the fur	damentals	of Operati	ng Systems	5
		To anal	yse th	ne process	scheduling	g and execu	ition				CO2	Able to a technique	<mark>cquire kno</mark> v es.	wledge abo	out differen	t process s	cheduling
Co	Ireo	To desc	cribe t	the structu	re of main	nemory, vii	rtual memo	ory		Course	CO3	Able to s	olve proces	ss synchro	Marks       Ustribution         MID       END         50       100         of Operation       System         uit different process       Inization and deadloor         uit different memory       area         area       Inization         Marks       Various         inization       Inization         Mapping       with         PSO1       PSO         2       1         2       1         1	d deadlock	handling
Obje	ctives	To desc	rihe t	the function	n of file svs	tems		-		Outcomes	CO4	Able to a	s cquire knov	wledge abo	out differen	t memory	
-		To expl	ore th	e structure	e of an ope	rating syste	em's I/O sul	bsvstem and	d	-	004	Managen Able to d	nent techni escribe file	ques and p concepts a	age replac	ement algo e various d	rithms. isk
		hardwa	re.					, <b>,</b>			CO5	scheduli	ng and stor	age strateg	gies		
No.	No.         COs         Mapping with Program Outcomes (POs)           PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10										Map	oping with	PSOs				
		PC	)1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1         2         0									0	2	1	0				
2	CO2	2		1	1	1	0	0	0	1	0	0	1	1	2	1	1
3	CO3	2		2	2	1	0	0	0	0	0	0	0	1	2	1	1
4	004	2		2	2	2	0	0	0	0	1	0	1	1	1	1	1
5	005	1		0	1	1	U	U			U	U	0	1	1	1	U
Nia								Contont	SYLLA	4802							00-
INO.								Content							Hours		COs
	Introd	uction															<u>CO1</u>
I	Opera	ting Sy	yster	ms Func	tionalitie	s - Form	al Defini	ition - Ev	olutior	n – Types	of opera	ating sys	tem, Ser	vices,	06		001
	Opera	iting sys	stem	Design	and Impl	ementatio	on, Opera	ating Syste	em Stru	ucture.							
	Proce	ss Man	ager	nent													
	Proce	ss con	cept	- Proces	s contro	l block, P	rocess H	lierarchy,	Thread	ds – Single	Thread a	and Multi	Thread M	/lodel,		C	D2. CO3
П	IPC m Proce	10dels: ss Svn	sha	red mem	ory and	message rson's So	e passing	j. CPU So Process S	cheduli Synchr	ng algorithi	ms, Mult Semant	tiprocess hores Cr	or Sched itical Re	luling,	16		
	Monit	ors -	Dea	dlock p	revention	- Deadlo	ock avoid	dance an	d Dea	dlock Detec	ction an	d Recov	ery - Ba	nkers			
	Algori	ithm.															
	Memo	ry Man	aden	nent													
111	Overv	iew of \$	Swaj	pping - M	lultiple P	artitions -	– Paging	, Page tab	ole, Seg	gmentation,	Demand	d paging-	Fragmen	tation	14	C	<b>D1, CO4</b>
	& Con	npactio	n- Pa	age repla	cement a	lgorithm	s, Memor	y allocati	on algo	orithms: firs	t fit, Bes	t fit, wors	t fit.				
	File S	vstem															24 005
IV	Acces	s Metl	hods	s, Contig	guous-Se	quential	and Ind	dexed Al	locatio	n, File sy	stem in	terface ·	File S	ystem	08		J1, CO5
	imple	mentati	on, S	Secondar	y Storag	e Structu	re.										
	I/O Sv	stem															
V	RAID-	disk sc	ched	uling- D	evice dri	vers -	block a	nd charac	cter de	vices-strean	ns, Char	racter and	d Block o	device	04	2019-         V         Distribution         END         100         ating Systems         ent process sch         and deadlock ha         ent memory         acement algorith         yse various disk         apping with P         1         <	J1, CO5
	switcl	n tables	5														
							Tatal	Hours							40		
Ease	ntial P	oodin	•				rotal								40		
⊏SS6	ntial R	eadings	5														

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Concepts", 9<sup>th</sup> Edition, John Wiley & Sons Inc. 2012.

2. Andrew S Tanenbaum, "Modern Operating Systems", 4th Edition, Prentice Hall. 2014

3. William Stallings, "Operating System: Internals and Design Principles", 9<sup>th</sup> Edition, Pearson, 2018.

#### **Supplementary Readings**

- 1. Harvey M. Deitel, Paul J. Deitel, David R. Choffnes, "Operating System", 3<sup>rd</sup> Edition, Pearson, 2013.
- 2. D M Dhamdhere, "System Programming and Operating Systems", 2<sup>nd</sup> Edition, Tata McGraw Hill, 2009.
- 3. Gary Nutt, "Operating Systems: A Modern Perspective", 2<sup>nd</sup> Edition, Addison Wesley, 2001.

4. Achyut S Godbole, "Operating Systems", 3<sup>rd</sup> Edition, Tata McGraw Hill, 2010.



	OF TROUGHT																
Pr	ogramr	me	Bac	helor of	Technolo	gy in Co	mputer So	cience an	d Engi	neering		١	ear of Re	gulation		2019·	-2020
D	epartme	ent	Con	nputer So	cience an	d Engine	ering						Seme	ster		١	/
Co	urse				Co	ourse Nam	ne.				Credit	Structure			Marks D	istribution	
Co	ode									L	Т	Р	С	INT	MID	END	Total
CS	303	To und	lersta	Dat nd the fu	tabase M	anageme	nt Syster	ns ase, opera	ition of	3	1	0 Able to	4 describe th	50 ne fundam	2019-2020Marks DistributionMarks DistributionMIDENDTo501002amental components of dataase Management System andta models, analyse the real is, to give the appropriate soRelationship Diagram.understanding of SQL, conveoor relational tables, operations of normalization to removincy to improve the performoncurrent transactions, Protos of normalization to removincy to improve the concurrency protigiesMapping with PSO22PSO12PSO2302PSO12PSO2302PSO1Osolve the concurrency protigiesand a label difference0CO2302PSO1PSO2PSO2302PSO10Solve the concurrency protigies302PSO10CO2302CO30C	200 database	
		To unde	al dat	a model ar	ous relation	al data mo	n organizat	cion.	lational	-	001	need tow	ards an org	Database anization.	wanagen	nent Syste	m and its
0		data m databas databas	odels se nor se que	to design malization ries using	n logical ( And also ) Struct	database i write the sin ured Query	ncluding E mple and o Language	E-R diagrar ptimized ad (SQL).	ns and Ivanced		CO2	Able to o problems using the	demonstrate and requi principles	e the data rements, to of Entity Ro	models, an o give the elationship	nalyse the appropriat Diagram.	real world e solution
Obje	ctives	To deve using S	elop a tructu	nd ability Ired Query	to design a Language	and implerr (SQL).	ient a sma	II database	project	Outcomes	CO3	Able to a Entity re store the Able to a	ttain the pr lationship data using apply the p	actical und model to r queries. principles o	derstanding relational f	g of SQL, c tables, ope	onvert the erations to emove the
		To unde transac	erstar tion, i	nd the requinct the required the required the required to the	irement of oncurrency	database t control, ba	uning, con ackup & rec	cept of a da covery, data	atabase a object		CO4	redundar using dat	abase tunir	consistency	y to impro	ove the petition.	Problems
		locking	proto			ase aumin	istrator.				CO5	such as a & recove	failures, sol ry from failu	utions to s are using p	solve the corotocols	oncurrency	problems
No	COs COs Dot									Мар	ping with	PSOs					
1.0.	. COs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11										PO12	PSO1	PSO2	PSO3			
1	CO1         3         3         0         0         0         0         0         2         0         0										0	3	0	3			
2	CO2         3         3         1         2         0         0         1         0         0													0	2	3	2
3	CO3	1		2	3	3	2	2	0	0	0	0	0	0	2	3	3
4	CO4	1		2	3	3	3	2	3	0	2	0	0	1	2	3	2
Ŭ	000			Ū	•	-	-	Ŭ	SYLLA	ABUS	-		•		•		Ū
No.							(	Content							Hours		COs
	Introd	luction	to	Database	e: Purpo	se of da	tabase s	systems,	data a	abstraction	and me	odeling,	instances	and	02		CO1
I	data c	dictional	ry, o	verall sys	stem stru	icture.	is and th		ctions,	data definit	ion and	manipula	ltion lang	uage,	03		CO2
	Entity Entitie	-relation	nshi entit	pmodel: vsets.r	elationsh	ips and	relations	hip sets.	mappii	na constrair	nts. E-R	diagram.	primarv	ke vs.			CO1
II	stron gener	g and w ralizatio	eak on an	entities, i d special	reducing lization, a	Ė-R diag ggregatio	rams to ta on.	ables, tre	es or g	raphs,	,		. ,		06		CO2
≡	Brief Data d	Introduo descript	ction tion a	to hiera and tree :	rchical ar structure	nd netwo diagram	rk model: for hiera	rchical m	odel, re	etrieval and	update f	acilities,	limitation	S;	05		CO2
	Datab	ase tas	k gro	oup (DBT	G) mode	l, record a	and set c	onstructs	retrie	val and upda	te facili	ties, limita	ations.				
	Struc	ture of	a re	elational	databas	e, operat	tion on	relations,	relatio	onal algebra	a, tuple	and dor	nain rela	tional			
IV	calcul SQI	lus, sali	ent f	eature of	fa query	language	, Structu	red query	/ langu	age: Descrip	otion an	actual RD	BMS and		09		003
	Impor	tance o gies, bi	of qu -rela	uery pro tional an	cessing, d multi-re	equivale alational	nce of c	queries, o ithms, alo	cost Es debraio	stimation fo manipulation	r proce on.	ssing a	query, ge	eneral			CO4
	Norm	alization	n:	<b>D</b> increased			etien fuu	, , , , , , , , , , , , , , , , , , ,			ain dan				00		CO4
V	limitat	tions of	RDE	s, import BMS.	tance of	normaliz	ation, fui	ictional,	muiti-v	alued and j	oin dep	endencie:	S, TNF to	JNF,	08		CO5
M	Datab	ase tun	ing:	nd clusta	ring tuni	ng of cor	contual	schoma (	donorn	nalization tu	ning qu	orios and	viows		05		CO2
	Crock	Selection			ing, tun		iceptual	Schema, G		nanzation, tu	ning qu	enes anu	views.		05		CO4
VII	Failur an act	e classi tual imp	ificat ficat	ion, trans entation	sactions,	log main	tenance,	check po	oint imp	ementation	ı, shado	w paging	, example	of	06		CO5
VIII	Conce Testi	urrency ing for s	Con cerial	trol in RI izability.	DBMS: lock base	ed and tir	ne-stamp	based p	rotoco	ls: Deadlock	detecti	on and Re	coverv		08		CO4
				<b>,</b>			To	tal					, <b>,</b>		50		005
Esse	ntial Re	eadings	5											I		<u> </u>	
1.	Silber	rschatz, K	orth	and Sudars	shan, Data	base syste	m concept	s, McGraw	Hill, 7th	Edition, 2019.							
2.	C.J. Da	ate, An Ir	ntrod	uction to D	Database S	ystems (8t	h Edition),	Pearson, 8	th Editio	on, 2004.							
3.	Steve	n Feuers	tein,	Bill Pribyl,	"Oracle PL	/SQL Progr	amming,"	, O'Reilly N	ledia, 6t	h Edition, 2014	4.						
Supp	lement	tary Rea	ading	js		<u> </u>											
	1. El	masri an		/athe, Fun	damentals	of databa	se systems	; Pearson,	/th Editi	ion, 2016.							
	2. Ra			and Polatic	Genrke, D		Anagemen	rate SOL C			n, 2014.	2015					
	3. L.	J. Date,	JUL 8	niu kelatio	Juai meor	y. NUW (O V	vinte ACCUI		Jue, U K	enty weata, 3		, ZUID.					

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Progran	mme	Ba	chelor of	Technolo	gy in Co	mputer So	cience an	nd Engin	eering		Y	ear of Re	gulation		2019	-20
Departn	ment	Co	mputer So	cience an	d Engine	ering				Crodity	Str. 104	Semes	ster	Morte D'	V	
Course Code				Сс	ourse Nan	ne			1			<u> </u>		IVIARKS DI		Total
CS 305				Comp	uter Net	works			3	0	0	3	<b>50</b>	<b>50</b>	100	200
	To d netw	levelop t vorking,	he student's packet swit	s ability to	understand	d the basic tching etc.	concept of		~	CO1	Able to un	nderstand t	he brief of I packet sw	internet and vitching.	d also the c	oncept of
	To d netw	levelop t vork mod	he student's del along wi	s ability to th the abilit	understand y to perfor	d the application for the socket p	ation layer rogrammin	of the g.		CO2	Able to un various a	nderstand t pplication la	he purpose ayer protoc	e of applications such a	tion layer and s DNS, FTP,	nd SMTP.
Course	To p asso	provide t	he students vith transpo	with some	knowledge	e and analy P and UDP.	sis skills		Course	CO3	Able to un TCP, and	nderstand v various me	various trai	nsport layer to control T	protocol lil CP conges	ke UDP, tion.
Objectives	To d mod	levelop t lel like IF	he student's	s ability to	understan c.	d the netwo	rk layer of ı	network	Outcomes	CO4	Able unde mechanis	erstand the	IPV4 addro e relevant	essing and problems.	forwarding	
										CO5	Able to un solve rele	nderstand t evant proble	he routing ms.	algorithms	and protoco	ols and
										CO6	Able to un managem	nderstand t nent, and the	he concep e future tre	ts of netwo ends of netw	rk security a vorking.	and
						Mapping v	vith Progra	am Outc	omes (POs)					Мар	ping with I	PSOs
No. CO	os —	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1 CO	CO1         2         0         0         0         1         0         2         0         0         0           CO2         C <td>2</td> <td>1</td> <td>1</td> <td>1</td>											2	1	1	1	
2 CO	CO2         2         2         1         2         0         0         2         0         2         0										1	2	2	1		
3 CO	03	3	2	2	3	0	0	2	1	0	1	1		2	1	1
4 CO	74	1	1	0	1	0	0	0	2	1	1	U 4	2	3	1	3
	,5 )6	2	1 0	3	0	1	3 1	1	1	1	2	1	1	3	2	3
		-	J	~	<b>·</b>	<u> </u>		SYLLAI	BUS		-	· ·	<b>'</b>			<b>`</b>
No.							Content		-					Hours		COs
Basi Inter cable cong	ics of I rnet Se e, FTT gestio	Interne ervice ΓΗ, Eth n; dela	et: Providers ernet, Wif ys; traffic	s (ISPs); p Fi, WiMax intensity	rotocols ; Networ /; throug	and stan k core - c hput; prot	dards; Ne ircuit swi tocol laye	etwork e tching: 1 ering;	dge - acces multiplexing	s netwo g; packe	orks: dial-u et switchin	up, DSL, ig: traffic,	,	04		CO1
Appl Arch The Sock	lication hitectu Web a ket pro	n Laye ire – cl and HT ogramr	r: ient-servo TP - Wha ning; File	er, peer-t at actually transfer:	:o-peer, l y happer : FTP; Ele	hybrid; DN ns, HTTP ectronic n	NS: brief, request a nail: SMT	hierarcl and resp P, POP3	hical databa oonse, web 8, IMAP, We	ase; Inte cache; I b-based	rnet trans Process c I e-mail;	sport serv ommunica	vices; ation;	05		CO2
Tran Real TCP Ⅲ Tran Coni dete Mult	nsport I Life / P UDP nsmiss nectio ection, tiplicat	Layer: Analog Examp sion Co on Ter , Slow tive De	y; Multiple les; UDP ontrol Pr mination; Start: E crease; T	exing and Segmen otocol; T SYN Flo xponenti CP Varia	d De-mul t; TCP S CP Cor poding A al Increa nts - Tah	Itiplexing egment; nection Attack; TC ase, Con noe and R	; TCP and Flow Con Establish CP Conge gestion eno;	d UDP s htrol - St hment - estion ( Avoidan	ockets; We op and Wait Three-Wa Control - c ce: Additiv	b Serve t, Go-Ba y Hands ongestic e Incre	rs and T( ick-N, Sel shaking, I on windo ase, Add	CP; Why L ective Re Data Tran w, conge itive Incr	JDP?; epeat; nsfer, estion rease	06		CO3
IV Outp subr	work L ctions; put Pre netting ocol s	.ayer – ; Packe ocessi g; Spec steps; N	Part 1: et Switch ng; IPV4 / cial Addre letwork A	ing - Virt Address - sses; IP ddress T	ual Circu - Classfu Datagrar ranslatio	uit, Datag I Address n, Fragme n;	ram; Wha sing, Clas entation;	nt's insid ssless A Dynamic	le a router? ddressing - c Host Cont	? - Input address figuratic	Processi s mask, bl n Protoco	ing, Switc ock alloca ol - prope	ching, ation, erties,	08		CO4
∨ Dista Path	work La ance V n First;	ayer – /ector   ; Borde	Part 2 (Ro Routing; I er Gatewa	outing Alg Link State y Protoco	gorithms e Routing ol; Multic	and Prot g; Path Ve ast routin	ocols): ector Rou ig protoco	ıting; Ro ol; Wirel	outing Inforr less routing	nation F	Protocol; ( pl;	Open Sho	ortest	09		CO5
VI Secu Cryp	urity a otogra	nd Net phy an	work Man d Networ	agement k Security	: y; Interne	et Securit	y: IPSec,	SSL/TL	S and PGP;	SNMP;				02		CO6
VII Futu Inter	ire Tre rnet-of	ends: f-Thing	js (loT); S	oftware D	)efined N	letworkin	g (SDN)							02		CO6
						Total	Hours							36		
Essential I	Readir	ngs	Dece "O		Not		Der ^	wood-"			eth r-uer	0040				
1. J. F. 2 P E-	Kuros	e, K. W	. Koss, "C	omputer I	Networkin	ig: A Top-	uown App רס וווים וווים	proach",	Fearson Put	plication,	b" Edition	n, 2013.				
2. B. FC	Tanar	nhaum		herall "C		IKS, IVICGI	Pearson	Publication	1, 5 Ealtion	, 2012.						
Suppleme	ntarvl	Readin				, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				, ∠UII.						
1. W. S	Stalling.	, "Data	and Com	outer Com	municatio	ons", Pear	son Public	cation, 8 <sup>t</sup>	<sup>h</sup> Edition. 20	07.						
2. L. L.	Peters	son, B.	S. Davie, '	'Compute	r Network	ks: A Syste	ems Appro	oach", Mo	organ Kaufm	nann Put	olishers, 5 <sup>t</sup>	<sup>h</sup> Edition, 2	2012.			
	Garcia	a and L	Widiaia, "	Commun	ication Ne	etworks Fu	Indamenta	al Conce	pts and Key	Architec	tures", Tat	ta McGrav	v-Hill Pub	lication, 2	<sup>nd</sup> Edition,	2004.

A CONTRACT OF A
STITUTE OF TECHNOLOGY

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Programme       Bachelor of Technology in Computer Science and Engineering       Year of Regulation       20         Department       Computer Science and Engineering       Separation       20									2019	-20							
E	epartme	nt	Com	puter Sc	ience and	Engineer	ring						Semest	er		V	
Programme         Backelor of Technology in Computer Science and Engineering         Year of Regulation         2019-20           Department         Counse         Course Name         Credit Structure         Mark Distribution           Course         Course Name         L         T         P         C 1NT         MID         END         Tot           Course Code         Course Name         L         T         P         C 1NT         MID         END         Tot           CS 31         Introduce students about interfacing an external device with the processory councilers.         Recall and apply a backet about interfacing an external device with the processory councilers.         COI         Recall and apply a backet back theore interfacing an external device with the processory councilers.         COI         Recall and apply a backet back theore interfacing an external device with the processory councilers.         COI         Recall and apply a backet back theore interfacing an external device with the processory councilers.         COI         Recall and apply abacket back program councering theorem and theorem as the program counces on sale program and computer system.         COI         Recall and apply abacket back program counces on sale program and computer system.           Course Courses         Course Courses         Course Course Courses and transfer information through setal program and program backet back about interfacing and program backet back abacket bas obachas asembly language program ana provide solutions real-												1					
C	ode				C		lic			L	Т	Р	С	INT	On     2019-20       Marks Distribution     Marks Distribution       T     MID     END     Tot       0     50     100     200       ic concept of digital fundamen sed personal computer system.     tware & hardware structure of       erent peripherals (8255, 8253 of icroprocessor.     icroprocessor.       ie the properties of different crocontrollers.     ifferent crocontrollers.       isfer information through serial     ssembly language programs art will provide solutions real-wo       Mapping with PSO     D12     PSO1       D12     PSO1     PSO2       PS1     1     2       0     1     1       0     1     1       0     1     1       0     1     1       0     1     1       0     1     1       0     1     1       0     1     1       0     1     1       0     1     1       0     1     1       0     1     1       0     1     1       0     1     1       0     1     1       0     1     1       0     1     1       10     CO1, CO		
CS	311			M	icroproce	ssors and	Interfacio	ng		3	1	0	4	50	50	100	200
		Introdu 8-bit (8	ice stu 3085) 1	idents ab processo	out the arc r in detail.	hitecture,	internal or	rganizatior	n of an		CO1	Recall a	nd apply a pprocesso	a basic co r based r	oncept of d personal co	igital funda mouter sv	amentals stem
		This su	bject	also deal	s about in	terfacing a	an external	device wi	th the		CO2	Identify	a detaile	d softwar	re & hardw	are structu	are of the
		process	sors/ c	controller	S.	ing in acc	ambly land	11000				8085 M	icroproce	ssor.	thoriphor		252 otc )
C		muouu	ice stu		programm	ing in ass	emory rang	guage.		C	CO3	are inte	rfaced wit	th Micro	orocessor.	115 (8233, 6	5255 etc.)
Obje	urse ectives									Outcome	CO4	Distingu	iish and a	nalyse th	e propertie	s of differe	ent
												Analyse	the data	& Microo	informatio	n through s	serial &
											05	parallel	ports.				<u> </u>
											CO6	Design a	and evaluation	ate asser that wil	nbly langua I provide so	ige program	ns and al-world
											000	problem	ns.				
No.	COs						Mapping w	vith Progra	am Outco	mes (POs)			1	1	Mag	pping with	PSOs
		PO	1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	C01	3		1	1	1	0	0	0	0	0	0	0	1	1	2	
2	CO2	3		3	3	2	3	0	0	0	0	0	0	0	1		3
3 4	CO4	3		1	3	2	2	0	0	0	0	0	0	0	1	1	3
5	CO5	3		2	3	1	1	0	0	0	0	0	0	0	1	1	3
6	CO5         3         2         3         1         1         0														1	2	2
							1		SYLLA	BUS		1					1
No.							С	ontent							Hours	(	COs
	Introdu	ction to	DU COL	mputer	architectu	ire, Arch	itecture o	of a typic	cal Micr	oprocesso	r, Bus co	onfiguratio	on, The	CPU			
	module	, The Iv	11 U C		merocon	uoner.											
	Timing	g diagrai	m, Mo	emory I	nterfacing	g, Interfac	cing input	output- j	port,							CO1	
Ι	Program	mmed 8	errup z inte	rrupt dri	iven data	& paran transfer,	Direct me	mory acc	enne, æss,						17		3, CO2,
	Program	mmable	perip	pheral de	evices, Pr	ogramma	able interv	al timer,	Analog								
	input-o	output us	sing A	AD & D	A conver	ter											
	Introdu	iction to tion set	of type	mbly laı pical mi	nguage &	machine	alanguage 8085) Su	program	ming, & stack							~ ~ ~	
Π	msuuc	tion set	orty	picar mi	croproces	301 (C.g.	000 <i>5)</i> , 5u		a stack.						10	CO	I, CO6
	Basic I	nterfaci	ng Ca	oncepts													
	Dusie I	interration	ing ex	oncepto,													
	8255 P	rogrami	mable	e Periphe	eral Interf	face, Inte	rfacing Di	isplay, Ke	eyboards	, 8279							5 CO5
III	8253/5	4 Progra	amma	able Tin	ner, DMA	Control	ler, Interru	ipt Contro	oller,						15		5, 005
	ADC																
	And D.	AC Inte	rracir	ng.													
	8086 Ir	nternal A	Archi	tecture,													
IV	Memor	ry Segm	entat	ion, Ado	dressing N	Aodes,									06	CO	1, CO4
	Basic E	Bus Tim	ing D	Ouring R	lead And	Write Op	peration.										
							Total H	Hours							48		
Esse	ntial Re	adings	:														
1. Ga	onkar R.	S., "Mie	cropro	ocessor A	rchitectur	e, Progran	nming and	Applicatio	ons with	8085", 5 <sup>th</sup>	ed., 2000,	Penram Int	ernationa	1.			
2. Do	uglas Ha	ll And S	SSF	P Rao, "N	Microproce	essor and	Interfacing	, 3 <sup>rd</sup> ed., 2	2012, Tat	ta McGraw	-Hill.						
3. Aj	ay wadh	wa,"micr	oproc	cessor 80	85: archit	ecture, pr	ogrammin	g, and inte	erfacing",	$1^{st}$ ed., 20	0, PHI Le	earning.					
Supp	lement	ary Rea	ading	js:										_			
1. Ra	m B., "F	undamer	ntal of	f Micropi	rocessor &	Microcon	mputers", 6	5 <sup>th</sup> ed., 200	)3, Dhan	pat Rai Pu	lications.						
2. Le	venthal L	Lance, "I	ntrodu Intel	uction to	Micropro	cessor - Se	oftware, H	ardware ar	nd Progra	mming", 5 ng" 8 <sup>th</sup> ad	<sup>th</sup> ed., 199	2, PHI.					
J. Da	ת ים ים יוי	<i>cy</i> , 1110	mer.	meropi	A	, enneetul	e, i iograill	ming, and	meriael	ng,o tu	, ∠000, re	u 5011.					

					Nat	tional	l <b>Insti</b> t An In	<b>tute o</b> istitute c	<b>f Techn</b> of National	<b>olog</b> Importa	<b>y Me</b> ance	ghala	aya				CURRI	CULI	JM		
Pro	gramme	Э	Ba	chelor	of Tec	hnolog	yin Co	mputer	r Scien	ce &			Ye	ar of Re	gulation			20	)19		
Dep	partmen	t	Co	igineer ompute	ing r Scien	ce & E	nginee	ring						Semes	ster			CURRICULU         2019         VI         Distribution         END       Trite         100       2         oderstand       the conservation         Solve the performers of commer and Digital distributed         Mapping with PSO         Solve       the performerating system.         embedded       proce         1       1         2       2         Aapping with PSO       SO1         SO1       PSO2         -       1         1       1         2       2         OUTS         COS         01       PSO2         -       1         1       1         2       2         OUTS         O2       CO1         03       CO1, 2         04       CO1, 2         07       CO28         03			
Course				Со	urse Na	me					Credit	Struct	ure			Mark	s Dist	ribution			
Code CS 313				Fmbed	ded Sy	vstems				L 3		T 1	P 0	C 4	INT 50	MIC 50	)	END 100		Fotal 200	
	COB1	To de	evelop the	e studen	t's abilit	y to und	erstand	the con	cept of	•		-	Stude	nts shou	ld be ab	ole to	Unders	stand th	ne co	mputer	
	COB2 fundame archited	To Entals	develop of microp ith specia	the s rocesso al empha	tudent's r and mi sis on Di	ability icro-cont gital Sig	to un troller fa nal Proc	nderstan milies au essors.	nd the nd their		C	01	archite enhan evolut micro	ectural cement ion of processo	design strategies differen r / mic	S01002able to Understand the comprinciples and performer components of complex and Digital are and distributed merecontroller and Digital are and distributed merecontroller and Digital are and distributed merecontroller and performerecontroller and performerecontroller and performerecontroller and performerecontroller and distributed merecontroller and distributed merecontroller and distributed merecontroller and performerecontroller	rmance rmance nputer, signal				
Course Objectives	COB3 skills a structur	To p ssocia e of er	rovide the ted with t nbedded s	e studer the prind system.	nts with ciples of	some k f memor	nowledg y organi	e and a isation a	nalysis Ind bus	Course Outcome	s		proce archite	ssor a ecture an	nd distribu		rmance				
	COB4 embedo operatir	:Tode ledsy ngsyst	evelop the stem so em and pa	e student ftware articular	t's ability with sp ly real tir	y to unde ecial er ne job se	erstand f nphasis chedulin	the conce on rea g.	epts of al time			.02	related	d proble	ns of real		ng syste	em.			
	COB5 aware a	: To pr irchited	ovide the cture & ha	student ardware s	s with s software	ome bas co desig	sic know gn.	ledge of	f power		C	03	Analy memo perfor	ze the ory, bus rmance h	performa efficienci n/w s/w co	nce of les, rea odesign	f emb al time	edded e opera	proc ating	essing, system	
No.         COs         Mapping with Program Outcomes (POs)           1         0.01         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12											Марр	oing with	n PS(	Ds							
	No.         COs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12           1         CO1         3         1         1         -         -         1         1         -         -         2											2 1	PSO1	PS	SO2	3					
1	NO.         COS         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12           1         CO1         3         1         1         -         -         1         1         -         -         2           2         CO2         3         3         2         2         -         -         1         1         -         -         2           3         CO3         3         3         2         2         -         -         2         2         -         2         2         2         -         2         2         2         -         2         2         2         -         2         2         2         -         2         2         -         2         2         -         2         2         -         2         2         -         2         2         -         2         2         -         2         2         -         2         2         -         2         2         -         2         2         -         2         2         -         2         2         -											-		1	-						
3	I       I <thi< th=""> <thi< th=""> <thi< th=""></thi<></thi<></thi<>												2		2	-					
3     CO3     3     3     2     2     -     2     2     -     2       SYLLABUS       No.     Content																_					
NO.	SYLLABUS         No.       Content         Introduction to 8-Bit 8085 Microprocessor Architecture, Operation, Memory Interfacing, Interfacing I/O												I/O	HOUR	S	00	5				
Module 0: E 8085 progra & Interfacin	Basic Imming Ig	Devi Cycl and Perij	ices, Inst le, Asse Indexing pheral In	truction mbly L , Time nterface,	Classifi anguage Delay Interfa	ication, e Progr Progran cing Di	Overvie amming 18, Stac splay, 1	w of 8 Using k And Keyboa	3085 In Differen Subrour rds, 827	struction S nt Program tines, Basic 9 Programm	et Timi ming T Interfa nable I	ngs A Techniq cing C Keyboa	nd Ope jues Lil concepts ard/Disp	erations ke Loop s, 8255 l olay Inte	Of Instrue ing, Cour Programm rface.	ction nting able	CURI   Marks Distribution   MID END   50 100   Marks Distribution END   50 100   to Understand intropies and   hat adopted in components of and distribution and distribution   and Distribution		СО	1	
	No.         Content           Introduction to 8-Bit 8085 Microprocessor Architecture, Operation, Memory Interfacing, Interfacing Devices, Instruction Classification, Overview of 8085 Instruction Set Timings And Operations Of Instruction gramming facing           facing         Introduction, Classification, Overview of 8085 Instruction Set Timings And Operations Of Instruction and Indexing, Time Delay Programs, Stack And Subroutines, Basic Interfacing Concepts, 8255 Programmer Peripheral Interface, Interfacing Display, Keyboards, 8279 Programmable Keyboard/Display Interface.           Introduction, Characteristics, Application dependent requirements, Architecture, Challenges, Developmen Process.			elopment		02		CO1	& 2												
Module 1: Embedded s	systems	Emb	edded S C, CISC	ystem I	Hardwar	re: Micr	oproces	ssor, mi	icro-con	troller, Vo	n-Neun	nann a	und Har	vard arch	iitecture,	CURRING         Imarks Distribution         MID       END         50       100         ble to       Understand the principles and principles and principles and distributed in the operating system.         ible to       Solve the principles is, real time operating system.         ible to       Solve the principles is, real time operating system.         ible to       Solve the principles is, real time operating system.         ible to       Solve the principles is, real time operating system.         ince       O2         I/O       1         I/O       1         I/O       12         ing       2         I/O       12         ing       02         I/O       01         ing       02         ing       02         ing       04         ing       04         ing       02         ing       03	01, 2	2&3			
Module 2: PIC Microcontro Family	oller	PIC form	architec hat, Addi	ture, C ressing	locking modes,	scheme PIC per	e, Instru ripherals	iction e on chi	xecution	, Instructio rupts, PIC	n pipel timers.	ine. P	IC Inst	ruction s	et, Instru	ction	04		CO1	& 2	
Module 3: Case Study		805	1 micro-c	controlle	er, ARN	M proce	ssor										02		C01	&2	
Module 4: Digital Signa Processors	al	Feat Platf	ures, Ap forms, M	plication Iulti Pro	n, Mem ocessor	ory, Ao SOC.	ldressin	g. Syste	em on (	Chip (SoC):	Evolut	ion, E	Design,				03		CO1	& 2	
Module5: Memorv		Basi Mar	c organiz agement	zation, Unit (1	Embedo MMUD.	led SRA Paging	AM, En	ibedded	I DRAN	IS, Flash N	lemory	, Virtu	al Mer	nory, Me	emory		04		CO1	& 2	
Module6: Bus Structu interrupt ha	res, ndling	Bus	Structure	es, inter	rupt ha	ndling											04	C	CO1,2	2 & 3	
Module 7: Power Awar Archite ctury	es	Pow Pow	ver Densi ver Mana	ty, Pow gement.	ver Diss	ipation,	Power	vs Spec	ed, Pow	er consump	tion of	f CMC	S circui	its, Gatin	ıg, Dynar	nic	04	C	CO1,2	2 & 3	
Module 8: Software for Embedded s	systems	Feat	ures, Me	emory A	Allocatio	n, Hea	p Mana	gement.									501002toUnderstandthe contrinciplesand perforhat adopted in perforcomponentsofcomcomponentsofcomcontrollerandDigitalanddistributedmanddistributedmanddistributedmanddistributedmanddistributedmanddistributedmanddistributedmandconvertingsystems.eofembeddedprocerealtimeoperatingsystemeofembeddedprocerealtimeoperatingsystemeofembeddedprocerealtimeoperatingsystemeofembeddedprocerealtimeoperatingsystemefloatPSO1PSO2-11122CO1on04CO1on04CO1,2on04CO1,2on04CO1,2on03CO1,2on03CO1,2on03CO1,2on03CO1,2on03CO1,2on03CO1,2on03CO1,2on03CO1,2on03CO1,2on04CO1,2on<	&2			
Module9: Fundamen Embedo Operating S	tals of led System	Real	l time op	perating	system												07		CO2	&3	
Module 10: Hardware - Software Co	o-de sign	Intro	oduction,	method	lology	and cor	cepts										03	(	CO1,2	2&3	
Essential R	Reading	s					Tota	al Hours	<u>s</u>								50				

1. Wayne Wolf, "Computers as Components: Principles of Embedded Computing System Design", Second Edition, Morgan Kaufmann, 2006.

2. M. A. Mazidi, J. G. Mazidi and R. D. Mckinlay others, "The 8051 Microcontroller and Embedded Systems", Second Edition, Prentice Hall of India, 2008.

3.R. H. Barnett, L. O'Cull, S. Alison Cox, "Embedded C Programming and Microchip PIC", First Edition, Thomson Learning Inc., 2008. Supplementary Readings

# Andrew M Sloss, Dominic Symes, Chris Wright, "ARM System Developers Guide: Designing optimizing System Software" (Online resource) <u>http://eee.guc.edu.eg/Courses/Electronics/ELCT912%20Advanced%20Embedded%20Systems/Lectures/ARM%20System%20Developer%27s%20Guid</u>e.pdf

3. T. Wilmshurst, "An introduction to design of small scale embedded systems", First Edition, Palgrame Macmillan Publishers, 2001.

4. J. B. Peatman, "Design with PIC Microcontroller", Second Edition, Pearson Education, 2002.



Pi	ogramr	ne	Bac	helor of	Technolo	ogy in Cor	mputer Se	cience ar	nd Engir	neering		Y	ear of Re	gulation		2019	-20
D	Department     Computer Science and Engineering       Course     Course Name								1			Seme	ster		۷		
Со	urse				Co	ourse Nam	he				Credit	Structure			Marks D	istribution	
Co	ode									L	T	P	С	INT	MID	2019-20         V         END       To         100       2         nerce and the net         ackground of tand Electronic         work security whith tests.         Tissues, public         in world.         Dping with PSC         PSO2         0         2         0         2         0         2         0         2         0         2         0         2         0         2         0         2         0         2         0         2         0         2         0         2         0         0         0         0         0         0         0         0         2         1         1         1         1         1         1         1         1	Total
CS	315			E	-Commer	ce and C	yber Law	S		3	1	0	4	50	50		200
		To de	velop ti	he student'	s ability to	understand	the conce	pt of e-cor	nmerce.		CO1	Able to a of e-com	cquire know merce	wledge abo	ut e-comm	erce and the	enetwork
		To pro	ovide th	ne students	about elec	ctronic reta	iling				CO2	Able to econom Retailing	acquire <mark>kno</mark> ics of e-co ]	owledge ab mmerce, ar	out the bac nd understa	kground of and Electron	ic
Cou Obje	urse ctives	To de netwo	evelop f orking w	the studen vheree-cor	t's ability nmerce is o	to analyse done.	the secur	ity involve	d in the	Course Outcomes	CO3	Able to is the ba	understand ase of e-co	l and <mark>analys</mark> mmerce.	se the netw	ork security	y which
		To far in e-c	miliarize ommer	e the stude ce.	nt the need	of security	/ in electro	nic paymer	nt done		CO4	Able to system	understand and its priv	l and <mark>analys</mark> acy and so	se the elec cial impact	tronic paym s.	ent
		To far	miliarize	e the stude	nt the legal	issues rela	ated to digit	al world.			CO5	Able to u policies,	nderstand internation	and <mark>analyse</mark> al issues in	e the legal the digital	issues, publ world.	ic
No	COs	Mapping with Program Outcomes (POs)								1	Мар	ping with I	PSOs				
110.	000	P	°O1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1		3	2	0	0	0	0	0	0	0	0	0	0	2	0	3
2	CO2		3	3	1	0	0	0	0	0	2	0	1	0	3	2	2
з Л	CO4		3	3	3	1	2	1	2	0	2	0	0	1	3	3	2
5	CO5		2	3	3	1	2	2	2	0	2	0	3	1	1	2	3
I									SYLLA	BUS							
No.								Content							Hours		COs
I	Introdu The N comm	uction letwor lerce.	to Eleo k Infra	ctronic co astructure	mmerce: for Elect	Defining e tronic Cor	e-commer mmerce:	ce, Histor The Inter	ry of mor net and	ney and elect WWW Tecl	ronic mo nnology,	ney. digital cc	nvergenc	e and	06		CO1
II	Econo Electro the Ne	omics o onic R et: Em	of Elec Retailing erging	etronic Co g: Web E marketing	mmerce: Based Bus g and adv	Transactio siness Mo ertising m	ons and A dels, Puro odels.	ccounting chasing A	l Costs, I Agents, C	Pricing of Goo Dnline Shopp	ods and ing Mark	Services of ceting and	on the Inte I Advertisi	ernet. ng on	10		CO2
III	Netwo Signat	ork Se cures,	curity: Certific	Firewalls cates, Ce	, Encrypt rtificate Au	ion and T uthorities.	Fransactic	n Securit	ty (Secr	et Key and I	<sup>D</sup> ublic K	ey Crypto	graphy),	Digital	10		CO3
IV	Electro Electro Privac	onic F onic C y, Anc	Payme ash ar onymity	nt Syster nd Micro t / and Soc	ms: Toke ransactior cial Impact	nized vs. ns, Smart ts of Elect	Notation Cards, Pr ronic Cas	al systen otocols ar h Topics:	ns, Creo nd Stanc Privacy,	dit Card bas lards. Anonymity, a	sed syst	ems, Elece eable E-m	ctronic C oney.	hecks,	12		CO4
v	Legal Cyberd Public Securi Interna Rights	Issues crime Polic ities a ational s vs. F	s: Elec and M y Issu nd Bro I Issue reedon	ctronic Co oney Lau es: What kerage es/Comm n of Inforr	ontracting ndering. is the G erce, Cop nation, El	and Digit overnmer byright an ectronic p	al Signati it's role? id Online ublishing	ures, Inte Electronic Publishir and digita	llectual c Comm ng Topia l copyrig	Property, Co erce and Fir cs: Commod ghts	pyright, nancial S ification	Trademar Services T of Inform	k, and Pa opics: Ba ation, Pr	atents, anking, operty	10		CO5
I							Total	Hours							48	<u> </u>	
Esse	ntial R	eadin	gs											I		I	
1.	Lynch	n/Lund	lquist,	Digital N	Money: Th	e New Er	a of Intern	et Comm	erce, W	iley Publicatio	ons, 1 <sup>st</sup> I	Edition, 19	96.				
2.	Josep	h Mig	ga Kiz	za, Comp	outer Netv	vork Secu	rity and C	yber Ethic	cs, McFa	arland & Con	npany, 3 <sup>1</sup>	<sup>rd</sup> Edition,	2011.				
3.	Jaynic	ce Rey	ynolds,	The Con	nplete E-c	commerce	Book, CF	RC Press,	2 <sup>nd</sup> Editio	on 2004.							
<u></u>	lomer	tors -	ood:-	00													
Supp 1	Henr			yə IF-Com	nerce En	ndamantal	s and Am	nlication	Wilay	Publications	1 <sup>st</sup> Editio	n 2001					
2	Jvoti	Ratta	n. Viia	y Rattan	Cyber La	ws & Info	mation 7	Fechnolog	v. Bhara	t Law House	. 1 <sup>st</sup> Edit	$\frac{11}{1001}$ ion. 2017					
- 3	. Donr	na L. F	Hoffma	n, Thoma	s P.Nova	k, A New	Marketing	g Paradig	m for Ele	ectronic Com	merce.	The Inform	ation Soc	ziety, Vol.	13, No. 1	, 1997.	
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Pro	gramme		Bachel	orofTe	chnology	in Com	puter Sci	ience a	and Engineeri	ng	Year of R	egulatic	n		2	019-20					
Dep	partment		Compu	ıter Scie	nce and l	Enginee	ring				Seme	ester				V					
Course				Course	e Name					Credit	Structure			Mar	ks Distrib	ution					
Code					<b>T 1</b>				L	T	P	C	INT	MID	END	Total					
CS 317	To Us	e math	ematical	modelin	e Vision	to repre	sent digi	ital	3	1	0	4	50	50	100	200					
	images To app and ter	ply mor mplate 1	rphologic	al opera	tions for	shape	recogniti	ion		CO1 CO2	Represent and i Understand geo	nterpret metric	relationsh	n its nur nip of p	neric and	l graphical form					
Course Objectives	To be vector recogn	able to machir ition an	o use ad nes and a nd classifi	lvanced artificial cation.	algorithn neural 1	ns such networks	as supp for obj	ort ect	Course Outcomes	CO3	Able to understa system for indus	and the strial q	principle uality con	and usentrol.	e of Mac	chine Vision					
	To app to stud	oly stere y motion	eo vision n.	techniqu	les and o	ptical flo	ow metho	ods		CO4	Able to acquire pattern recognition	knowk on in	edge rega industrial	garding shape identification and al robotics application pout Automated Target Recognition           Mapping with PSOs           2         PSO1         PSO2         PSO3           3         0         3         3           2         0         2         2           3         0         3         3           2         3         2         2           3         0         3         3           4         2         3         2           3         3         3         3           4         0         0         0	ntification and tion						
	To giv inspect	ve a cl ion of e	lear idea end produ	of ind Ict.	ustrial q	uality c	ontrol a	Ind		CO5	Able to acquire	knowk	edge abo		arget Recognition						
	60					Марр	oing with	Progra	am Outcomes (	(POs)					Mapping	g with PSOs					
INO.	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	7 PO8	PO9	PO10	PO1	PO12	PSO1	PSO2	PSO3					
1	CO1	1	1	2	1	2	1	0	0	2	0	0	0	3	0	3					
2	CO2	1	1	2	1	3	0	0	0	2	0	0	0	2	0	2					
3	CO3	2	1	3	1	2	0	0	0	0	0	0	0	2	3	2					
4	CO4	2	2	3	0	2	2	3	0	2	0	0	1	2	3	2					
5	CO5	2	2	3	0	2	2	3	0	2	0	0	1	3	3	3					
6	CO6	0	0	0	0	0	0	0		0	0	0	0	0	0	0					
No.	SYLLABUS Content													Hours		COs					
Ι	<b>Revie</b> A brie Model	e <b>w of M</b> f reviev s	<b>lathema</b> w of pro	<b>tical Pri</b> bability,	nciples: A reviev	w of Lin	ear Alge	ebra, l	Introduction to	o Func	tion Minimization	n, Marl	cov	Hours COs 08 CO1							
II	Machi Introdu and al detecti inspec techno imagin	ine vision uction t gorithm ion, im tion o ologies, g, laser	on: to Machi ns, imag nage rec f parts, CCD li c scanner	ine Visio e functio ognition identif ne scan ; data p	on,, defir on and c and de ication, and are	hition, A haracter ccisions, industr a scan	ctive vis istics, se m/c le ial robo sensor,	sion sy egmen earning ot con Tria:	ystem, Machin ntation, data r g, application ntrol, mobile ngulation geo	ne visio eductio of n robo ometry,	on components, h on, feature extrac nachine vision so of application, C , passive and act	ardwar tion, eo uch as Compet ive ste	e's lge in ing reo	12		CO2					
III	Industr Industr Standa Patterr	ial Ma ial Ma urds, In 1 Recog	chine Vi chine Vi terfacing gnition a	sion: sion in j g Machiu nd Synta	productione Vision ctic Patt	n and so n Systen ern Reco	ervices, s n, vision ognition	Structi n syste	ure of Industri em calibration	al Ma n. Shaj	chine Vision, Ger pe Identification,	eric Statist	ical	10		CO1 CO3					
IV	Autom The hi Machi ATR.	ated Ta ierarchy ne Visi	arget Ree y of leve on issue	cognition ls of AT s to AT	i (ATR): TR, ATR R, ATR	System Algorith	n Compo nms, Huj	nents, gh Tra	, and Perform ansform in A	ance E FR, Me	Evaluation of ATI orphological Tecl	R Syste	ms 5 in	10		CO2 CO3					
V	Applic Multisp Intrude	e <b>ations</b> bectral I er identif	of Machi Image An Tication, I	<b>ne Visio</b> alysis, O Robot Vis	<b>n:</b> ptical Cha sion	aracter R	lecognitio	on, Ind	lustrial Inspection	on and	Quality Control, Se	ecurity a	und	08		CO4 CO5					
	4					Tota	al Hours							48							
Essential	Readings	s 		<b>F</b> ~	1 ~	1	<b>.</b>	· -													
1. Ma	achine V	ision B	By Wesley	y E. Sny	der, Car	nbridge	Universit	ty Pre	ess, 2012.	7.4.1		** **	1	<b>TT</b> 7'1 -		2010					
2. Ma	achine V	ision A	Algorithm	s and A	pplication	ns, 2nd	Edition	, By (	Carsten Steger	, Mark	tus Ulrich, Christia $4^{\text{th}}$ Edition	in Wie	demann, $\frac{1}{2010}$	wiley I	ublicatio	on, 2018.					
J. UO	ntor P	anu Ma	chine Vi	sion: 1h	eory, Al	gorithms	, Practic	canties	s, dy e. к. Da	avies, 4	4 Edition, Acade	INC PI	ess, 2012	2.							
	er Vision	aungs n: Princ	ciples A	loorithm	s. Annli	cations	Learning	o, 5 <sup>th</sup>	Edition By F	R Da	vies Academic P	ress 20	)17								
2. Mechati	ronics ar	nd Mac	hine Visi	on, By	John Bill	ingslev,	Researc	s, 5 ch Stu	dies Press, 20	00.			, 1 / .								
. Mechati	ronics ar	nd Mac	hine Visi	on in Pi	actice, E	By John	Billingsk	ey, Ro	obin Bradbeer	, Sprin	nger Science & Bu	isiness	Media, 2	2007.							



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Program		me Bachelor of Technology in Computer Science and Engineering										Year of Regulation					2019-20		
Ľ	epartme	ent Computer Science and Engineering										Semester							
Co	urse	Course Name									Credit	Structure			Marks Distribution				
	210											P	<u> </u>	IN 1 50	MID				
CS	319	Automata and Formal Languages								3	U	U Student	3 will be a	50 ble to de	50 monstrat	100	fundam	200 Jental	
		computability, and complexity with application of mathematical techniques and logical reasoning to important problems,									CO1	understanding of the core concepts in automata theory and formal languages.							
Course Objectives		To dev automa	velop ata ar	a strong b nd formal	background languages	1 in reason	ing about	finite state		CO2	Student will be able to design grammars and automata for different language classes.								
		To introduce students to different ways of parsing a formal language.								Course Outcomes	CO3 CO4	Student will be able to identify formal language classesand prove language membership properties.Student will be able to prove and disprove theoremsestablishing key properties of formal languages and							
											CO5	automata. Student will be able to demonstrate a fundamental understanding of computation and computational models including decidability and intractability.							
																		<u></u>	
No.	COs	Mapping with Program Outcomes (POs)									DOO	<b>DO10</b>	DO1/		$\frac{1}{1}$	Image: Transmission of the second sec			
1	CO1	PO 3	1	PO2	PO5	P04	P05	PO6	PO/	P08	P09	0		1	2 PSC		3	1	
2	CO2	2		2	3	1	0	0	0	0	0	0	0	0	2		2	 1	
3	CO3	2		2	2	1	0	0	0	0	0	0	0	0	2		2	1	
4	CO4	1		2	3	1	0	0	0	0	0	0	0	0	2		2	1	
5	CO5	3		3	1	3	0	0	0	0	0	0	0	1	3		3	1	
									SYLLA	BUS									
No.	<u> </u>	Content											Hours	ours COs		COs			
Ι	Mathe	thematical Objects: Sets Logic, Functions, Relations, Strings, Alphabets, Languages, thematical Induction: Inductive proofs, Principles; Recursive definitions.											02		CO1				
II	Regula and mi Sets: 7 Regula	ar Languages and Finite Automata (FA), Deterministic and Nondeterministic Finite Automata, Equivalence ninimization of Automata, Finite Automata with output- Mealy and Moore Machines, Properties of Regular The Pumping Lemma for Regular sets, Closure properties and Decision properties of regular languages, ar Expressions (RE), Relation Between RE and FA.													14		CO1, CO2		
III	Gramm trees & CFG, I Proper	mmar, Types of Grammar and Languages- Chomsky Hierarchy, Context Free Grammar (CFG), Derivation & & Ambiguity, Inherent ambiguity, Parse tree, Application of CFG, Simplification of CFG, Normal form of G, Relations between classes of languages and Automata, Closure properties and Decision properties of CFG, perties of Context Free Languages: The Pumping Lemma,													13		CO1, CO2, CO3		
IV	Push Down Automata(PDA), Languages of PDA, Equivalence of PDA and CFG, Deterministic PDA														04	CO1, CO2,CO4			
V	Turing Machine(TM) - Standard Model, Variations of TM (Multi-Track TM, Multi-Tape TM, Multi-Dimensional TM, Universal TM), Deterministic and Non deterministic TM, Turing Thesis, Halting Problem, Language of a Turing Machine- Recursively Enumerable Language, Unrestricted Grammar, Linear Bounded Automata(LBA), Computability and Decidability. Time and Space Complexity, Growth Rate, Complexity classes, Tractable and													onal a .), d	6	(	CO1, CO4,CO5		
	Total Hours													39	39				
Esse	ntial R	eadings	5:											L		I			
1	. Peter	Linz, "	An Iı	ntroductio	n To Forn	nal Langua	ges And A	utomata",	3 <sup>rd</sup> ed., 2	2001, Naros	a Publica	ation.							
2	. K.L.]	P.Mishra	a, N.	Chandras	ekaran," T	heory Of	Computer	Science: A	utomata	a, Languages	and Con	nputation"	, 3 <sup>rd</sup> ed., 2	2016, PI	HI.				
3	5. S. Ka	andar, "l	Intro	duction to	Automata	Theory, F	ormal Lar	iguages and	d Compu	utation", 1 <sup>st</sup> e	ed., 2013	, Pearson.							
Supp	olement	tary Re	eadir	ngs:															
1 2 3	. John . Mich . H R	E. Hopc ael Sips Lewis	croft, er, "I C H	Rajeev M Introductio	lotwani, Je on to the T	effrey Ullm Theory of. (	an, "Intro Computati the Theor	duction to on", 3 <sup>rd</sup> ed.	Automa ., 2013, 0 utation"	ta theory, lan Cengage Lea 2 <sup>nd</sup> ed 199	nguages o rning. 8. Prentic	computatio	on ", 2 <sup>nd</sup> e	d., 2005	, Pearson	India,	Indian	Reprint.	
A A A A AND						Nat	tional Ir A	n <b>stitute</b> n Institute	of Te of Natio	<b>chnology</b> onal Importa	<b>/ Megh</b> nce	alaya				CURRI	CULUM		
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Pi	ogramr	ne I	Bachelo	or of T	Fechnolo	ogy in Cor	nputer So	cience and	d Engin	eering		١	ear of Re	gulation		2019-	2020		
D	epartme	ent (	Comput	er Sc	ience an	d Engine	ering						Seme	ster		١	/		
Cou	urse				Co	ourse Nam	ne				Credit	Structure			Marks Di	stribution			
	de			_						L	Т	P	С	INT	MID	END	Total		
CS	321	To under	stand the	For	mal Verit	ncents of fo	ormal verifi	cation		3	0	0 Able to u	3 nderstand t	50 the fundam	50 ental conce	100	200 al		
				runuu							CO1	verificatio	on						
		To dem propertie CTL and	onstrate s, linear model ch	the tempo ecking	modeling oral logic, g LTL	of seque computatio	ential syste on tree logi	ems, linea c, model ch	r time necking		CO2	Able to d time prop	emonstrate perties, line:	the model ar tempora	ing of sequ I logic	ential syste	ems, linear		
Cou Obje	urse ctives	To expla checking	in binary y with SA1	decisi ſ, bour	on diagran nded mode	ns, symboli el checking	c model ch , craig inter	ecking, mod polation	del	Course Outcomes	CO3	Able to CTL and	explain co model cheo	mputation king LTL	tree logic,	model ch	ecking		
		To under industrial	Fo understand decision procedures in model checking, practical ndustrial-scale verification       Able to demonstrate binary decision diagrams, symbolic model checking         CO4       CO4         CO5       Able to demonstrate model checking with SAT, bounded model checking, craig interpolation																
		CO5       Able to demonstrate model checking with SAT, bounded model checking, craig interpolation         CO6       Able to explain decision procedures in model checking,																	
		CO5     Subscription       checking, craig interpolation       CO6       Able to explain decision procedures in model checking, practical industrial-scale verification																	
Na						ſ	Mapping w	vith Progra	am Outc	omes (POs	)				Мар	oing with	PSOs		
INO.	COS	PO1	PC	)2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3		
1	CO1	3	3		0	0	0	0	0	0	2	0	0	0	3	0	3		
2	CO2	3	3		3	1	2	0	0	0	1	0	0	0	2	3	2		
3	CO3	1	2		3	3	2	2	0	0	0	0	0	0	2	3	3		
4	CO4	1	2		3	3	3	2	3 2	0	2	0	0	1	2	3 2	2		
5 6	CO3	1	2		3	3	3	2	2	0	2	0	0	1	2	3	2		
					-	-	-	-	SYLLA	BUS			-	-	_	-			
No.							(	Content							Hours		COs		
I	Introd	uction to	o Forma	l Veri	ification										02	CO1			
II	Model Linear	ling seq tempor	uential s al logic	syste (LTL)	ms as lal ).	belled tra	Insition s	ystems (K	(ripke s	structures),	Linear ti	me prope	erties,		06	CO2	2		
III	Comp	utation t	ree logi	c (CT	L) and C	TL* , Moo	del check	ing CTL ,	Model	checking L <sup>-</sup>	TL				06	CO	3		
IV	Count	erexamp	oles and	witn	esses, B	inary dec	ision dia	grams (BI	DD), Sy	mbolic moc	lel chec	king			06	CO	4		
V	Model interp	checkin olation	g with S	SAT, I	bounded	I model cl	hecking,	Complete	eness th	nresholds a	nd k-ind	uction, C	raig		08	CO	5		
VI	Equiva prese	alences nt challe	and abs nges	tracti	ions, Dec	cision pro	ocedures	in model	checkii	ng, Practica	al, indust	rial-scale	e verificat	ion,	08	CO	6		
							To	tal							36				
Esse	ntial Re	adings																	
1.	Principle	es of Mod	el Checki	ng, by	/C. Baiera	nd JP. Ka	toen, The I	MIT Press, 2	2008 edi	tion.	- nd								
2.	Model C	hecking,	by Edmui	nd M.	Clarke, Jr.	, Orna Gru	mberg, and	d Doron A. I	Peled, T	he MIT Press,	2 <sup>™</sup> editic	on, 2000.		and .					

#### Supplementary Readings

1. Introduction to Formal Hardware Verification, by Thomas Kropf, Springer, 1999 edition.

2. Formal Hardware Verification: Methods and Systems in Comparison, Ed. by Thomas Kropf, Springer, 1997 edition.

3. Advanced Formal Verification, by Rolf Drechsler, Springer, 2004 edition.



P	rogramr	ne	Bacl	helor of T	Technolog	gy in Comj	puter Scie	ence and E	ngineeri	ing		Y	ear of Re	gulation			2019	-20
D	epartme	ent	Con	npute r Sc	ience and	l Engineer	ing						Semes	ster			V	
Co	urse				C	ourse Nam	ne				Credit	Structure			Marks	s Distrib	ution	
										L	T	P	C	INT	MID	END		Total
CS	323	To intr geome	oduce tric p	e techniqu roblems.	ies for des	igning effi	GEOMET	rithms for		3	0 CO1	0 Develop properti	5 efficier es, and	50 nt algorit using ap	50 hms by ppropriate	exploi e data	ting struc	geometri tures an
Со	urse	To dis	cuss	data struc	tures used	l for geome	etric proble	ems		Course	CO2	Apply t diversif graphics compute	echniques echniques ied fields s and i er vision,	ues. s and algo s like dat mage pr motion pla	orithms f tabase se ocessing, anning an	or solvi earching , patter nd robot	ng pr g, dat rn re ics.	oblems i a mining cognitior
Obje	ctives	To intr	oduce	e combina	torial con	nplexity of	geometric	c problems.	•	Outcomes	CO3	Perform	n complex	ity analys	is of algo	rithms		
		To stu	ıdy rig	gorous alg	gorithmic a	analysis of	geometric	c problems.			CO4	Identify lemmas	propertie or theore	es of geor ms, and pr	metric of rove their ithms	ojects, e correc	expres tness	s them a
											CO5	Implem	ent geonk	ettie utgor	<b>KIIII</b>			
						Ν	Mapping v	vith Progra	m Outco	mes (POs)	000				N	lapping	with	PSOs
√o.	COs	PO	1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO	1 PS	SO2	PSO3
1	CO1	3		3	0	1	0	0	0	0	2	0	0	0	3		0	3
2	CO2	3		3	0	1	0	0	0	0	2	0	0	0	2	(	0	2
3	CO3	2		3	3	1	2	0	0	0	0	0	0	0	2		3	2
4	CO4	2		2	3	0	2	2	3	0	2	0	0	1	2	;	3	2
5	CO5	2		2	3	0	2	2	3	0	2	0	0	1	3		3	3
0	006	0		0	0	0	0	0		BUS	0	0	0	0	0		0	0
0.							(	Content	51 LL						Hours		С	Os
I	Graph directe algorith Point	(PSLC ed line. hm, Al	6) Aro Con gorith	ea of a tr vex poly nm for L PSLG –	siangle, angons, pro ine segme Slab me	thod, Cha	olygon, I ad point k action pro	Determina ocation in oblem usin	nt used to convex ng plane	to test posi polygon (i sweep tech y analysis.	tion of a nside-ou nique. Range	point wi utside test	th respect () Plane s g = 1D F	ct to a sweep Range	06		C	01
II	Polygo polygo algorit	, Kd Ir on Trian on – a hm and	rees. ngula lgori l Ran	ation: Re thm and adomized	gularizati comple: algorithn	on of poly xity analy n	ygons, pro ysis. Line	operties o ear Progr	f triangu amming	ilations –Pr 5 – Half f	oofs, tria	angulatio tersection	n of mon n, Incren	otone nental	08		C C C	01 02 03
[V	Art Ga Combi	allery T inatorics	Theor s of	em, Gua: arrangem	rding Art ents, Zor	Gallery, ne Theorem	Fisk's pro m, Algori	oof using thm for C	three co Construct	louring. Ai ing arrange	ements of	ents of Li of lines.	nes – Dı	uality,	06		C C	03 04
v	Conve Conqu	ex Hull her Algo	s- Co orithn	onvex H n.	ull Algo	rithms in	the Plar	ne -Graha	m's Sca	n Algorith	ım, Jarv	i's Marc	h, Divide	e and	06		C C	04 05
VI	Voron vorono	oi Diag oi diagra	grams,	s- Proper Algorith	ties and a m for co	applicatio nstructing	ns in the voronoi	plane. Pr diagram,	oofs of j Delaunay	properties y Triangula	related to tion.	o vertices	and edg	ges of	08		C C	02 05
Esse	ntial R	eading	s:				Total	Hours							40			
. F S	ranco I pringer oseph (	P. Prepa -Verlag D'Rourl	arata g Ber ke, C	and Mich lin Heide Computati	nael Ian S elberg, 19 onal Geo	Shamos, C 985, 1 <sup>st</sup> Ed ometry in (	Computatio lition. C. Cambr	onal Geor	metry an ersity P	Introductio	n. Texts dition, 2	s and Mo	nographs	in Comp	puter Sci	ence, P	ublisł	ner:
S. N	Aark. de pringer	e Berg, -Verlag	Mara Ber	c. van Kı 'lin Heide	reveld, Ma elberg, 3r	ark. Overn d Edition,	mars and 2008.	Otfried C	Cheong, (	Computatio	nal Geo	metry- A	lgorithms	and App	plications	s. Publi	sher:	
•upp . ] 2 3. ]	Herbert Berlin I Joseph De Berg	Edelsb Heidelbo O'Rou g, van H	eadur runne erg, rke, Kreve	er, Algor 1987, 1 <sup>st</sup> Art Galle eld, Over	ithms in Edition. ry Theore mars, and	Combinate ems, Publ I Schwarz	orial Geo lisher: Ox kopf Cor	ometry, Ez kford Univ nputationa	ATCS M rersity P .l, Geom	Ionographs ress, 1987, ætry Algori	on Theo 1 <sup>st</sup> Edition thms ar	oretical C on. Id Applica	computer tions, P	Science, ublisher:	Publishe	r: Spri -Verlag	nger-	Verlag



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	Programm	ie I	Bachelor of	Technolog	y in Com	puter Sciel	nce and E	ngineeri	ng		Ye	ar of Reg	ulation		2	019-2	20
I	Departme	nt	Computer S	cience and	Engineer	ing						Semeste	er			V	
C	ourse			C	ourse Nan	ne				Credit	Structure			Marks	Distrib	ıtion	
0	Code								L	Т	Р	С	INT	MID	END		Total
C	5 325			Modern	Digital A	rithmetic			3	0	0	3	50	50	100		200
		To teacl	n different da	ata represer	ntation use	d in a digit	al comput	er and		CO1	Identify and cod	, understa les.	and and a	pply diff	erent nı	imbe	r systems
		device.								CO2	Underst for mult	tand and u	use the ac	dvanced /subtract	additior	algo	rithms
		To disci	uss different	ways of ha	rdware de	sign for ari	thmetic		G	CO3	Underst	tand the c	oncept o	f advanc	ed multi	pliers	and
Obj	ourse ectives	operatio	ons.	ways of ha	ruware de.	ngn ior arr	unitette		Outcomes	CO4	Underst	tand the c	oncept o	f advanc	ed divid	ers ar	nd their
											Underst	tand the c	oncept o	f advanc	ed pipel	ining	and
		To intro compute	duce different er and proces	nt techniqu ssing unit.	es employ	ed to speed	l up the			CO5	other m an arith	ethods us metic circ	sed to inc uit.	rease th	e total t	nroug	hput of
No.	COs		DO2			DO10	DO11	DO12		lapping	with 1	PSOs					
1	CO1	3	PO2	PO3	PO4 2	P010		PO12			302	1					
2	C01	3	2	0	0	2		3	 1								
3	CO3	3	2	3	2	1	0	0	0	0	0	0	0	2		3	1
4	CO4	3	2	3	2	1	0	0	0	0	0	0	0	2		3	1
5	CO5	3	2	3	2	1	0	0	0	0	0	0	0	2		3	1
No.						C	ontent	SILLAD	505					Hours		C	Os
	Signed	number	s: Signed-N	Agnitude	Represen	tation, Bi	ased Repr	resentati	ons, Comp	lement H	Represent	ations, T	wo's-				
	and 1's-	Comple	ment Numb	ers, Direc	t and Indi	rect Signe	ed Arithm	netic, Us	ing Signed	l Positior	ns or Sign	ed Digits	t Sot				
Ι	Conver	sions, C	Generalized	Signed-E	)igit Nun	ibers, Ca	rry-Free	Addition	n Algorith	imetic, D	versions	and Digi	oport	08		С	01
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	Operati	ons, Red	lundant RN	S Represe	entations,	Limits of	Fast Aritl	hmetic ir	n RNS.	iuii, Dill	licuit Riv	5 Arithi	neuc				
	Fast Ac	ldition a	nd subtracti	on: Simp	le Carry-S	Skip Adde	rs, Multi	level C	arry-Skip	Adders,	Carry-S	elect Ad	ders,				
Π	Conditi Multion	onal-Su perand a	m Adder, H	ybrid Add sing Two	er Desigr -Operand	is, Optimi Adders	zations in Carry-Sa	n Fast Ac ave Add	dders. lers Wall:	ace and	Dadda T	rees Pa	rallel	08		С	02
	Counte	rs, Gene	ralized Para	illel Count	ters, Addi	ng Multip	ole Signed	l Numbe	ers.	ace una	Duudu I	1005, 14	lunor				
	Fast m	ultipliers	: Radix-4 N	Iultiplicati	ion, Modi	fied Boot	h's Recod	ling, Usi	ing Carry-	Save Add	lers, Radi	x-8 and					
	Tree an	d array	multipliers:	: Full-Tree	e Multipli	ers, Alterr	native Rea	duction 7	Trees, Tree	e Multipl	iers for S	ligned		00		C	01
111	Numbe	rs, Partia	al-Tree Mul	tipliers, A	rray Mult	ipliers, Pi	pelined T	ree and	Array M	ultipliers		1'		09		U	03
	Variatio	ons in m ir Multir	ultipliers: I bliers. The S	Jivide-and Special Ca	1-Conquer	t Designs, aring. Cor	, Additive mbined M	e Multipl [ultiply-/	ly Modules Add Units	s, Bit-Se	rial Multi	pliers,					
	Fast Di	viders: H	Basics of Hi	gh-Radix	Division,	Radix-2 S	SRT Divis	sion, Usi	ing Carry-	Save Add	ders, Cho	osing the					
IV	Quotien	nt Digits n by cor	, Radix-4 S	RT Divisio	on, Gener	al High-R	adix Divisi	iders.	opostad M	ultiplicat	ione Div	ision by		07		С	04
	Recipro	ocation,	Speedup of	Converge	nce Divis	ion, Hard	ware Imp	lementat	tion, Analy	sis of Lo	okup Tał	ole Size.					
	High-th	roughpu	it arithmetic	:: Pipelini	ng of Arit	hmetic Fu	inctions, (	Clock Ra	ate and Th	roughput	, Parallel	and Digi	t-			_	
V	Serial F	'ipelines wer ari	, On-Line o thmetic: Th	r Digit-Pij e Need fo	pelined A	rithmetic.	an, Source	es of Po	wer Cons	umption	Reductio	n of Pow	er	07		С	05
	Waste,	Transfor	rmations an	d Trade-C	offs, Some	Emergin	g Method	ls									
						Total F	Iours							39			

**Essential Readings:** 

1. Behrooz Parhami, "Computer Arithmetic: Algorithms and Hardware Designs", 1<sup>st</sup> ed., 2000, Oxford university press.

2. Mi Lu., "Arithmetic and logic in computer systems", 1<sup>st</sup> ed., 2004, John Wiley and Sons.

3. Paul Zimmermann and Richard Brent, "Modern Computer Arithmetic", 1<sup>st</sup> ed. 2010, Cambridge university press.

#### **Supplementary Readings:**

Donald e. Knuth., "The art of computer programming", 2<sup>nd</sup> ed., 1985, Addison-Wesley publishing company.
 M Ercegovac, T Lang, "Digital Arithmetic", Hardware and Programming", 1<sup>st</sup> ed., 2004, Morgan Kaufmann publishers.
 Israel Koren, "Computer Arithmetic Algorithms", 2<sup>nd</sup> ed., 2002, A.K. Peters.



# National Institute of Technology Meghalaya An Institute of National Importance

CURRICULUM

	TO B OF TROUBLES															
Pr	ogramr	ne	Bachelor of	Technolo	ogy in Co	mputer S	cience ar	nd Engin	eering		٢	ear of Re	gulation		2019-:	2020
D	epartme	ent	Computer S	cience ar	nd Engine	ering						Seme	ster		V	
Co	urse			Co	ourse Nan	ne				Credit	Structure			Marks Dis	stribution	
Co	ode								L	Т	Р	С	INT	MID	END	Total
CS	371			Database	System	Concepts	5		2	0	0	2	50	50	100	200
		To under relationa	erstand the fu I data model a	undamental nd its requi	s concept rement in a	s of datab In organizat	base, operation.	ation of		CO1	Able to systems, need tow	describe th Relational ards an org	ne fundam Database anization.	ental comp Managem	onents of ent Syster	database n and its
Co	urse	To unde data mo databas databas	rstand the vari odels to desig e normalizatior e queries using	ious relation gn logical n. And also g Structured	nal data mo database write the si d Query Lar	odels, appli including f mple and o nguage (SQ	cation of re E-R diagra ptimized ac L).	elational ms and dvanced	Course	CO2	Able to d real work solution	emonstrate d problems using the p	the Entity and requir rinciples of	Relationshi rements, to Entity Rela	p Model, au give the au tionship Di	nalyse the opropriate agram.
Obje	ctives	To deve using St	lop and ability ructured Query	to design a / Language	and implen (SQL).	nent a sma	II database	e project	Outcomes	CO3	Able to a Entity re store the	ttain the pr lationship data using	actical und model to i queries.	derstanding relational ta	of SQL, co ables, oper	onvert the rations to
	Ī	To unde	rstand the req	uirement of	database	tuning, con	cept of a d	latabase		CO4	Able to a redundar	apply the p icy and inco	orinciples of onsistency	of normalizato to improve	ation to re the perfori	move the nance.
		transact and role	ion, including of database ad	concurrenc dministrato	cy control, r.	data object	t locking pr	rotocols		CO5	Able to such as f using pro	understand ailures, sol	the conductions to s	current traisolve the co	nsactions,	Problems problems
						Mapping v	vith Progra	am Outc	omes (POs	;)				Mapp	oing with I	SOs
No.	COs	PO	1 PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3	3	0	0	0	0	0	0	2	0	0	0	3	0	3
2	CO2	3	3	3	1	2	0	0	0	1	0	0	0	2	3	2
3	CO3	1	2	3	3	2	2	0	0	0	0	0	0	2	3	3
4	CO4	1	2	3	3	3	2	3	0	2	0	0	1	2	3	2
5	CO5	2	3	3	2	2	3	2	0	2	0	0	1	3	3	3
						•		SYLLA	BUS							
No.							Content							Hours	(	COs
	Introd	uction	to Database	e: Purpo	se of da	tabase s	systems,	data at	ostraction	and mo	delling,	instances	s and		(	CO1
Ι	schen data d	nes, dat ictionar	abase mana y, overall sy	ger, data /stem stru	base use ucture.	rs and th	eir intera	actions, o	data defini	tion and	manipula	tion lang	uage,	02	(	CO2
	Entity	relation	ship model	:			hin aata				diamana		kana		(	CO1
II	strong	g and w gation.	eak entities	, reducing	g E-R dia	agrams to	tables,	trees or	graphs, g	eneraliza	ation and	specializ	ation,	04	(	CO2
	Relati	onal mo	del:	databaa		tion on	rolationa	rolotio	nal algobr	a tunla	and day	noin rolo	tional		(	CO2
Ш	calcul	ure or us, salie	ent feature o	of a query	language	e, Structu	red quer	y langua	ige: Descri	ption an	actual RD	BMS and		07	(	CO3
	SQL.	-					-		_							CO4
Ν/	Norma	alization s in RD	: BMS impor	tance of	normaliz	ation fu	nctional	multi-va	alued and	ioin den	endencie	s 1NF to	5NF	05		CO4
IV	limitat	ions of	RDBMS.				notional,					,	oru ,		(	CO5
V	Concu	irrency	Control in R	DBMS:			. heed a				an and Da			06		CO4
	resu	ig for se		, IOCK Das	ed and th	me-stamp To	b baseu p		s; Deadloci	k delecti		covery		24		CO5
Feed	ntial Dr	adinge														
2336	1. Si	berschat	z, Korth and S	udarshan	Database s	vstem con	cepts. McG	Graw Hill.	7th Edition.2	2019.						
	2. C.	J. Date. A	n Introductio	n to Databa	ise System	s (8th Editi	on), Pears	on, 8th Ed	lition, 2004.	-						
	3. St	even Feu	erstein, Bill Pr	ibyl, "Orac	le PL/SQLF	Programmi	ng,", O'Rei	illy Media	, 6th Edition	, 2014.						
Supp	lement	ary Rea	dings													
	1. Eli	nasri anc	l Navathe, Fur	ndamental	s of databa	se systems	; Pearson,	7th Editic	on, 2016.							
	2. Ra	ghu Ram	akrishnan and	l Gehrke, D	atabase M	anagemen	it System, I	McGraw-H	Hill, 3rd Editi	on, 2014.						

3. C. J. Date, SQL and Relational Theory: How to Write Accurate SQL Code, O'Reilly Media, 3rd Edition, 2015.

A 100 D PRIMA					Nat	ional Ir /	<b>istitute</b> An Institute	of Te	<b>chnology</b> onal Importa	/ Megł	nalaya				CURRIC	CULUM
P	rogramr	ne l	Bachelor o	f Technol	ogy in Cor	nputer S	cience an	d Engir	neering		<u>۱</u>	ear of Re	gulation		2019	-20
D	epartme	ent (	Computer	Science ar	nd Engine	ering			_			Seme	ster		V	1
Co	ursa									Credit	Structure			Marks D	istribution	
C	ode			C	ourse Nam	ne			L	т	Р	С	Continuo	ous La	b Test/	Total
65	351			Operat	ing Syste	ms I ah			0	1	2	2	Evaluati 70	on	Viva 30	100
		To introd	luce the com	ponents of c	perating sv	stem				CO1	Able tole	arn the fun	damentals	of Operatin	a Systems	100
	-	To analys	se the proce	ssschedulin	and execu	ution					Able to a	cquire know	vledgeabou	it different	process sc	heduling
	-	To drange								002	technique Able to s	es. <mark>olve</mark> proces	ss synchror	nization an	d deadlock	handling
Co	urse	To descr	ide the struc	ture of main	memory, vir	tual memo	ory		Course	003	strategie	s cauire know	vladgaabou	it different		anagement
	CIVES	To descr	ibe the funct	ion of file sy	stems				Outcomes	CO4	technique	es and page	e replacem	entalgorith	ms.	anagement
	-															
														1		
No.	COs				N	Mapping v	vith Progra	am Outo	comes (POs	)				Map	ping with F	PSOs
	004	PO1	1 PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	001	2	0	0	0	0	0	0	0	0	0	0	0	2		0
2	CO2	2	1	1	1	0	0	0	1	0	0	1	1	2		1
3	CO3	2	2	2	1	0	0	0	0	1	0	0	1	2	1	1
4	004	2	<b>∠</b>	2	2	0	U	U	U	•	U	•	1	•	+	•
								SYLLA	BUS							
No.							Content	01LL/	200					Hours		COs
1	Basic	Commai	nds of UN	IX, Shell P	ogrammiı	ng,Impler	mentation	of CPU	J scheduling	g algorit	hms, Per	formance	)	12		
	Comp	arison o	of CPU sch	eduling alg	gorithms.	Impleme	ntation of	f IPC.								
II	Impler	nentatio	on of Peter	son's Solu	tion, Sem	aphores,	Monitors	5						06		
																004
III	Classi	cal Pr	ocess C	oordinatio	n & S	Synchron	ization	Problem	ms like, Smokara	Bounde	ed Buffe	er, Proc	ducer-	10		CO1 CO2
	Soluti	on Using	g Monitors	ers, Dinn S	ing philo	sophers	, The C	Jyaretti	e-Smokers	Frobler	m, Dining	g-Fniloso	phers			CO3
IV	Impler	nentatio	on of Dead	lock Avoid	ance Algo	orithms, I	Detection	Algorit	hms					04		CO4
V		nentatio	on of co	ntiguous	memorya	llocation	technic	ques, l	Paging Te	chnique	s, Page	Replace	ement	04		
			isk Scheu													
	To be	done ne	ecessarily	as mini-pro	oject grou	p-wise ir	groups	of at lea	ist two/three	e studen	its.					
_	(1 L D					Total	Hours							36		
Esse		adings					<u>"O !'</u>	0 1			· · · · · · · · · · · · · · · · · · ·			040		
1	. Abrar	am Silbe	erschatz, F	eter Baer (	alvin, Gre	g Gagne,		ig Syster		', 9 <sup></sup> Edit	tion, John	vviiey & S	ons Inc. 2	012.		
2	. Andre	w S I an	enbaum, "	viodern Op	erating Sy	stems, 4	Edition,		Hall. 2014		10					
	. vviilia		igs, Opera	ung Systen		and Des	Ign Fnnoi	JIES , 9		arson, 20	/10.					
Sup	hemeni	arvRea	dinas													
1	Harve	w M De	itel Paul.I	Deitel Day	id R Cho	ffnes "Or	erating Sv	vstem" (	3 <sup>rd</sup> Edition P	earson	2013					
2	. DMI	) Dhamdhe	ere, "Svste	n Program	ming and (	Dperating	Systems"	', 2 <sup>nd</sup> Edi	ition, Tata Mo	Graw H	 ill, 2009.					
3	. Gary	Nutt, " O	perating S	/stems: A N	/odern Pe	rspective'	', 2 <sup>nd</sup> Editio	on, Addis	son Weslev.	2001.	, -					
4	. Achy	ut S God	bole, "Ope	rating Syste	ems", 3 <sup>rd</sup> E	dition, Ta	ta McGrav	v Hill, 20	)10.							



CURRICULUM

	WIN CH TECHNIC															
Pr	ogramm	ne E	Bachelor o	f Technol	ogy in Co	mputer So	cience ar	nd Engir	neering		•	Year of R	egulation		2019	-2020
De	epartme	nt C	Computer	Science ar	nd Engine	ering						Seme	ester			V
Col	Irsa	<u>.</u>								Credit S	Structure			Marks I	Distribution	
Co	bde			Co	ourse Nam	ie			L	Т	Р	С	Continuo Assessme	ents	Quiz / Viva	Total
CS	353		Data	abase Mar	agement	Systems	Lab		0	1	2	2	70		30	100
		To under view and framewor	stand the co software s k.	encept of Da specific too	tabase Mar Is for infor	agement S mation pro	ystem in p ocessing o	oractical oriented		CO1	Able to u the Data software	nderstand base Mana tools.	and demons agement Sys	trate the stems, c	e real time ch components	allenges in of various
		To under implemer model us	stand and ontation of rel na query ar	lemonstrate ational data d procedure	the E-R da model (E-R	ta model i data model	n formal w ) in relation	vay and nal data		CO2	Able to d for the gi	esign, Nor ven proble	malize, and in ms.	mpleme	nt the databa	se schema
Cou Obje	urse ctives	To under developer	rstand the to accomp	real time p ish the giver	roblem, de i task.	sign an a	pplication	as the	Course Outcomes	CO3	DDL/DML developin Managem	construct , declare ng databas nent Syster	and keep the construction of the construction	ising th ne integr concept	e SQL com rity constrai of Relationa	mands I.e. nts on the I Database
		To under the develo	stand and in oping database	nplement JD ase, Concurr	BC/ODBC c ent transac	oncept for tion proces	the operat sing and re	ions for ecovery		CO4	Able to programmers functions	improve f ning SQL	the performa such as sto	ance of pred pro	query and cedure, cur	write the sor, stored
					design a on using f	nd develop fourth gener	the gration la	aphical use nguage to a	r interface access the							
							Ma	apping with	PSOs							
No.	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO	1 PSO2	PSO3
1	CO1	3	3	0	0	0	0	0	0	2	0	0	0	3	0	3
2	CO2	3	3	3	1	2	0	0	0	1	0	0	0	2	3	2
3	CO3	1	2	3	3	2	2	0	0	0	0	0	0	2	3	3
4	CO4	1	2	3	3	3	2	3	0	2	0	0	1	2	3	2
5	CO5	2	3	3	2	2	3	2	0	2	0	0	1	3	3	3
								SYLLA	BUS							
No.							Content							Hour	s	COs
Ι	Assignr	nent on E	ntity Relati	onship mod	eling of rea	l world pro	blems.							02		CO1
I	Assignr	nent on c	reating rela	tional datak	bases with s	imple table	es							02		CO1 CO2
III	Assignr	nent on i	mplementa	tion of inde>	king structu	res								02		CO1 CO2
IV	Assignr	nentonc	reating data	bases with	indexing st	ructures								02		CO3
V	Assignr	nentonii	mplementir	gSQLqueri	es									02		CO3
VI	Assignr	nent on c	reatingviev	vs and queri	es based o	n views								02		CO3
VII	Assignr	nentonv	vrite SQL qu	eriesusingl	ogical oper	rations (=,<	,>,etc)							02		CO4 CO3
						-										CO4
	Assign	nentoni	mplementir	gembedde	d SQL quer	es								02		
	Assignr	nenton i	L/SQL	ng and roco	Von									02		
	Assign	nentoni	mlementir	o multi-use	rdatahase									02		CO5
XII	Mini Pr	piect usir	g the select	ed RDBMS a	and front e	nd tools.								02		CO5
		-,	8			To	otal							24		
Esse	ntial Re	adings														
1.	Silbers	schatz, Ko	orth and Sud	arshan, Dat	abase svste	em concept	ts, McGrav	v Hill, 7th	Edition, 201	9.						
2.	C.J. Da	te, An Int	roductiont	Database S	Systems (8	h Edition)	Pearson.	8th Editic	on, 2004.							
3	Stever	Feuerst	ein. Bill Prih	/l. "Oracle P	L/SOL Prog	ramming."	. O'Reillv M	Media. 6t	h Edition 20	14.						
Supp	lementa	ary Read	dings	,, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,		, , '	,								
1 <b>17 17</b>		,	<b>J</b> -													

1. Elmasri and Navathe, Fundamentals of database systems; Pearson, 7th Edition, 2016.

2. Raghu Ramakrishnan and Gehrke, Database Management System, McGraw-Hill, 3rd Edition, 2014.

3. C. J. Date, SQL and Relational Theory: How to Write Accurate SQL Code, O'Reilly Media, 3rd Edition, 2015.

4 Sta Comment						Na	tional li	<b>nstitute</b> An Institute	e <b>of Te</b> e of Nati	echnology ional Importa	<b>/ Megh</b> ince	nalaya				CURR	ICULUM
Р	rogramn	ne	Bach	helor of	Technolo	ogy in Co	mputer S	cience an	d Engi	neering		Y	ear of Re	egulation		201	9-20
D	epartme	ent	Com	nputer S	cience ar	d Engine	ering						Seme	ester			V
Co	urse				C	ourse Nan	ne				Credit	Structure			Marks	Distribution	<u>ן</u>
C	ode						-			L	Т	P	С	Contir Evalu	nuous lation	Quiz / Viva	Total
CS	355				Comput	er Netwo	rks Lab			0	0	2	1	7	0	30	100
		To deve networ	elop the king, pa	e student acket swi	's ability to itching and	understand circuit swit	I the basic ching etc.	concept of			CO1	Able to un circuit sw	nderstand /itching an	the brief o d packets	of internet switching	t and also the	concept of
		To deve networ	elop the k mode	e student el along w	's ability to vith the abili	understand ty to perfor	l the applic m socket p	ation layer rogramming	of the g.	-	CO2	Able to un various a	nderstand pplication	the purpo layer prot	se of app cocols suc	lication layer ch as DNS, FT	and P, SMTP.
Co	urse	To prov associa	/ide the ated wit	e students th transpo	s with some ort layer pro	knowledge btocols TCF	e and analy and UDP.	sis skills		Course	CO3	Able to un TCP, and	nderstand various m	various tr echanism	ansport la	ayer protocol rol TCP conge	like UDP, estion.
Obje	ctives	To deve model l	elop the like IPv	e student /4 address	's ability to sing NAT et	understand c.	I the netwo	rk layer of r	network	Outcomes	CO4	Able unde mechanis	erstand the	e IPV4 ado ve relevar	dressing a nt problen	and forwardin ns.	g
	-		Computer Science and Engineering         V           Course Name         Credit Structure         Marks Distribution           L         T         P         C         Connuous Connuous         Quiz / Viva         Total           Converting, proceed with charge and incruit with some drout with the basic concept of develop the student's ability to understand the basic concept of working, proceed with the ability to understand the basic concept of working work model along with the ability to understand the application layer of the work model along with the ability to perform socket programming.         COII         Abile to understand the brief of internet and also the concept of vortice witching and packet switching and packet switching and packet switching and packet switching work model along with the ability to perform socket programming.         COII         Abile to understand the procee of application layer and various application layer protocol like UDP.           course bill the IPV4 addressing MAT etc.         Abile to understand various transport layer protocol like UDP.         COII         Abile to understand the IPV4 addressing and forwarding mechanism and solve relevant problems.           PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO1         PO1         PO2         PS01         PS02         PS02         PS02         PS02         PS02         PS03         PS0         PS02         PS02         PS02         PS02         PS02														
							Manning v	with Proor	am Quite	nomes (POs)					N	Anning with	
No.	COs	PC	D1	PO2	PO3	PO4	PO5	PO6	PO7	<sup>'</sup> PO8	PO9	PO10	PO11	PO12	2 PS0	0.1  PSO2	
1	CO1	2	2	0	0	0	0	1	0	2	0	0	0	2	1	1	1
2	CO2	2	2	2	2	1	2	0	0	2	0	2	0	1	2	2	1
3	CO3	3	;	2	2	3	0	0	2	1	0	1	1	1	2	1	1
4	CO4	1		1	0	1	0	0	0	2	1	1	0	2	3	1	3
								Suggeste	dlist	of Experime	nte						
No.								Content							Hours	C	Os
1	Assign	ment o	n Errc	or Detect	tion using	Single Pa	rity Check	κ							02	С	01
	Assian	ment o	n Errc	or Detect	tion usina										02	С	01
III	Assign	ment o	n Errc	or Detect	tion using	Checksur	n								02	С	01
IV	Assign	ment o	n UDF	P Socket	t Program	mina – UI	)P Echo								02	CO2, C	O3, CO4
V	Assign	ment o	n TCF	Socket	t Program	ming – Cli	ent and S	erver both	in sam	e machine					02	CO2, C	03, CO4
VI	Assign	ment o	n TCF	Socket	t Program	ming – Cli	ent and S	erver in di	fferent i	machines					02	CO2, C	03, CO4
VII	Assign	ment o	n TCF	Socket	t Program	ming – Stu	udents' Da	atabase							02	CO2, C	03, CO4
VIII	Assign	ment o	n TCF	Socket	- t Program	– ming – En	glish Dicti	onary							02	CO2, C	O3, CO4
IX	Assign	ment o	n TCF	Socket	t Program	ming – Inv	olving File	es							02	CO2, C	O3, CO4
Х	Assign	ment o	n TCF	Socket	t Program	ming – Up	load and	Download							02	CO2, C	O3, CO4
	-						Total	Hours							20		
Esse	ential Re	eading	S														
1	. J. F. K	urose,	K. W.	Ross, "C	Computer	Networkin	g: A Top-	Down App	roach",	Pearson Pu	blication,	6 <sup>th</sup> Edition	n, 2013.				
2	. B. Ford	ouzan, '	"Data		inication a	nd Networ	ks", McGi	raw-Hill Pu	ublicatio	n, 5 <sup>th</sup> Edition	i, 2012.						
3	. A. J. I		aum, L	ט. ט. vve.		omputer	CIWOIKS,	rearson	FUDIICA		JH, 2011.						

1. W. Stalling, "Data and Computer Communications", Pearson Publication, 8<sup>th</sup> Edition, 2007.

2. L. L. Peterson, B. S. Davie, "Computer Networks: A Systems Approach", Morgan Kaufmann Publishers, 5<sup>th</sup> Edition, 2012.

3. A. L. Garcia and I. Widjaja, "Communication Networks Fundamental Concepts and Key Architectures", Tata McGraw-Hill Publication, 2<sup>nd</sup> Edition, 2004.



D	ogrami	me ent	Bachel	lor of Tec Co	hnology	in Compu Science a	iter Scien	ice and E eering	Ingineerin	g	Y	ear of Re Semes	gulation ster		2019 V	9-20 I
<u> </u>	ILEO				r		3	-3		Credit S	Structure			Marks Dis	stribution	
C	de			Co	ourse Nan	ne			L	T	P	С	INT	MID	END	Tota
CS	302			Softwa	are Engin	eering			3	1	0	4	50	50	100	200
		To introduc	e the Softwa	are Develop	oment life c	vcles Mode	ls		_	CO1	Able to id	entify, form	nulate, and	solve comp	olex engine	ering
		Te enelvee	the cefturer		nto	,				<u> </u>	Able to re	cognize etl	hical and p	rofessional	responsibi	lities in
~		TO analyse	ine sonward	erequireme	1115				0	002	engineeri	ng situation	ns ian verify	validate im	nlement a	nnlv an
Co )bje	urse ctives	To introduc To develop	e various de an ability ar	esign metho	ods for soft	ware Devel e systems	opment		Outcomes	CO3 CO4	Able to w	ork in one o	vstems or more sig	nificant app	plication do	omain
						Manaina	with Droor							Man		
lo.	COs		DOD	<b>DO</b> 2						)	DO10	DO11	DO10			
4	001	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02	PSC
ו ר	<u> </u>	2	0	0	0	0	0	0	0	0	0	0	0	1	1	1
2 2	CO2	Z	1	1	1	0	0	0	1	0	0	0	1	2	1	1
3 4	CO3	1	1	1	1	0	0	0	0	0	0	0	1	1	1	
+	CO4	1		1	1	U	U	U	0	1	U	1	1	1		
								SYLLAE	BUS							
0.							Content							Hours		COs
I	Introd	luction	•.											04		CO1
	Softw	are proces	s - softwa	are develo	opment lif	e cycle n	nodels.							•		
	Softw	are Requir	ement and	d Analysi	c											000
	-	ale Require														1-1-1-2
II	recnn	niques: tea	asibility a	nalysis,	s requirem	ents elic	itation, v	validatior	n, rapid p	orototypi	ng, OO j	baradigm	s vs.	06		CUZ
	struct	iques: fea ured parad	asibility a ligm - OO	inalysis, analysis.	requirem	ents elic	itation, v	validatior	n, rapid p	orototypii	ng, OO j	paradigm	s vs.	06		002
	Struct	ured parad	asibility a ligm - OO	analysis, analysis.	requirem	ents elic	itation, v	validatior	n, rapid p	prototypi	ng, OO j	oaradigm	s vs.	06		
	Softwa	are Specifi	asibility a ligm - OO cations	analysis, analysis.	ation qu	ents elic	itation, N	validation	n, rapid p	context.	ng, OO	oaradigm	s vs.	06		CO2
	Softwa Specific behav	are Specifi fication de	asibility a ligm - OO cations ocument, D, specific	specific cation tec	ation qu	ents elic alities, u using UM	itation, N Ises, sys	validatior stem mo igrams, lo	n, rapid p odelling: o ogic, algel	context,	ng, OO   interaction	oaradigm on, struc s: compa	s vs. ctural, irison	06		CO2 CO2 CO3
	Softwo Specific Speci	are Specifi fication de vioural, DFI	asibility a ligm - OO cations ocument, D, specific iques, for	specific cation tec mal spec	ation qu hniques	ents elic alities, u using UM – model	itation, N Ises, sys IL, ER dia checking	validation stem mo Igrams, lo I, introdu	n, rapid p odelling: o ogic, algel iction to bi	context, praic spe nary dec	ng, OO   interaction cification ision diag	oaradigm on, struc s: compa grams.	s vs. ctural, nrison	06 14		CO2 CO2 CO3
	Softwork Specific Spe	are Specifi fication de vioural, DFI ious techn	asibility a ligm - OO cations ocument, D, specific iques, for Methodol	specific cation tec mal spec	ation qu ifications	ents elic alities, u using UM – model	itation, N Ises, sys IL, ER dia checking	validation stem mo Igrams, la J, introdu	n, rapid p odelling: o ogic, algel iction to bi	context, praic spe nary dec	interaction cification ision diag	on, struc s: compa grams.	s vs. ctural, prison	06 14		CO2 CO3
	Softw. Specific behave of var Objec Introd	are Specifi fication de ioural, DFI ious techn t Oriented luction to	asibility a ligm - OO cations ocument, D, specific iques, for Methodol objects, r rams cla	specific cation tec mal speci ogy relationsh	ation qu hniques ifications	ents elic alities, u using UM – model ied appro	itation, N Ises, sys IL, ER dia checking	validation stem mo grams, lo j, introdu nodelling	n, rapid p odelling: o ogic, algel iction to bi g, use-cas	context, praic spe nary dec	interaction cification ision diag	on, struc s: compa grams. vity, state	s vs.	06		CO2 CO3 CO2
	Softwa Specifi behav of var Objec Introd intera parad	are Specifi fication de ioural, DFI ious techn t Oriented luction to ction diag igm, softw	asibility a ligm - OO cations ocument, D, specific iques, for Methodol objects, r rams, cla are desig	specific cation tec mal speci ogy relationsh assificatio n: archite	ation qu hniques ifications nips, unif on approa	ents elic alities, u using UM – model ied appro	ises, sys L, ER dia checking bach to r ohesion, d - data o	validation stem mo grams, lo j, introdu modelling coupling priented o	n, rapid p odelling: o ogic, algel oction to bi g, use-cas g, reuse, design & o	context, praic spe nary dec se model case stu	interaction cification ision diag ling, activ idies - o ented des	on, struc s: compa grams. vity, state bject ori	s vs.	06		CO2 CO3 CO2 CO2 CO3
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      V	Softwa Specifi behav of var Objec Introd intera parad syster	are Specifi fication de vioural, DFI ious techn t Oriented luction to ction diag igm, softwo ms design	asibility a ligm - OO cations ocument, D, specific iques, for Methodol objects, r rams, cla are desig technique	specific cation tec mal speci ogy relationsh assificatio n: archite	ation qu hniques ifications nips, unif on approa	ents elic alities, u using UM – model ied appro aches, co listributed	itation, N Ises, sys IL, ER dia checking bach to r ohesion, d - data o	validation stem mo igrams, lo j, introdu nodelling coupling priented c	n, rapid p odelling: o ogic, alget iction to bi g, use-cas g, reuse, design & o	context, oraic spe nary dec case stu bject orig	interaction cification ision diag ling, activ idies - o ented des	on, struc s: compa grams. vity, state bject ori- sign - rea	s vs. etural, prison e and ented I-time	06		CO2 CO3 CO2 CO2 CO3
      V 	Softw. Specifi behav of var Objec Introd intera parad system Stepw	are Specifi fication de vioural, DFI ious techn t Oriented luction to ction diag igm, softwo ms design	asibility a ligm - OO cations ocument, D, specific iques, for Methodol objects, r rams, cla are desig technique	specification tec mal specification tec mal specification relationsh assification n: archite	ation qu hniques ifications on appro- ctural - d	ents elic alities, u using UM – model ied appro aches, co listributed	itation, v ises, sys IL, ER dia checking bach to r ohesion, d - data o	validation stem mo grams, la j, introdu nodelling coupling priented c	n, rapid p odelling: o ogic, algel iction to bi g, use-cas g, reuse, design & o	context, oraic spe inary dec se model case stu bject orig	interaction cification ision diag ling, activ idies - o ented des	on, struc s: compa grams. vity, state bject ori sign - rea	s vs. etural, prison e and ented I-time	06 14 12 04		CO2 CO3 CO2 CO2 CO3 CO1 CO1
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F	Programm	ne	Bac	helor of T	Fechnolog	v in Com	puter Scie	nce and E	ngineer	ing		Ye	ar of Regi	ilation		2020-	-21
Ι	Departme	nt	Cor	nputer Sc	cience and	Enginee	ring		-8	8			Semeste	er		VI	
Co	ourse				C	ourse Ner	20				Credit S	Structure			Marks 1	Distribution	
C	lode				t		lle			L	Т	Р	С	INT	MID	END	Total
CS	5 304				Cor	npiler De	sign			3	1	0 Specify	4	50	50	100	200
		The Ob	oject	ives of thi	s course is	to explor	e the princ	iples, algor	rithms,		CO1	structur	and analy es of any	compute	er program	iming langu	age.
		and dat	ta str ers.	uctures in	volved in	the design	and const	ruction of			CO2	Separat	e the lexic	al, synta	ictic and so	emantic ana	Ilysis into
		r I									02	translat	ion.	S 101 a C	omplier to	unuertake	language
0		To disc		context-fr	ee gramm	ars and fr	ont-end ph	ases of a		G	CO3	Write a	scanner, <sub>f</sub>	barser, a like prog	nd semant	ic analyser	for
Obj	ourse ectives	compil	er: le	exical anal	lysis, parsi	ing techni	ques, symb	ol tables, e	error	Outcomes		Convert	source co	ode in sir	nple langu	age into ma	achine
		recover	ry.								CO4	code foi	r a novel c	ompute	r.		
		To disc	2211	back-end i	nhases of a	a comnile	r: code gen	eration an	d		CO5	Describe	e techniqu timisation	ues for in	itermediat	e code and	machine
		differe	nt co	de optimi	zation tech	nniques.	eode gen	eration, an	.u			Design t	he structi	ures and	support re	equired for	compiling
											CO6	advance	ed languag	ge featur	es.		
No	COs					Γ	Mapping v	vith Progra	um Outco	omes (POs)				I	Ma	apping with	PSOs
1		PO	1	PO2	PO3	PO11	PO12	PSOI	PSO2	PSO3							
2	C01	3		2	3	0	0	1	2	2							
3	CO2	2		3	3	0	0	1	1	3							
4	CO4	2		1	1	2	2	0	0	0	1	0	0	0	1	1	3
5	CO5	2		1	2	1	1	0	0	0	0	0	0	0	1	1	3
6	CO6	2		2	2	3	0	0			0	0	0	2	1	1	3
No							C	ontent	SYLLA	BUS					Hours		COs
110.	Introdu	ction to	o Co	mpiler, P	hases and	l passes,		ontent							Hours		
Ι															02	C	201
	Finite s	state ma	achii	nes and r	egular ex	pressions	and their	r applicati	ons to	lexical analy	ysis, Imp	plementat	ion of le	xical			
Π	analyze	ers, lexi	cal-a	analyzer g	generator,	, LEX-co	mpiler: Ll	EX/FLEX	-, -,						06	CO1	, CO2, CO3
	<b>F</b> 1			1 /1	· 1'	·· ·		1 ' F		1	•••,	NACC 1					
	specific	cation o	f pro	ogrammir	ng langua	ges: Con	text free g	rammars, E	derivat	ion and pars	se trees,	capabiliti	es of CFC	G.			
	Basic F	Parsing '	Tecł	nniques: I	Parsers S	hift reduc	e narsing	operator	preced	ence parsing	ton do	wn narsin	σ				
	Duble I		1001	inques. I	uiseis, 5	iiit iedda	e purshig	, operator	preced	ence parsing	, top <b>u</b> o	wii puisii	5,				
	predict	ive pars	sers													COL	
III	Constru	uction o	of eff	ficient Pa	rsers: LR	parsers,	the canon	ical Colle	ction of	LR(0) item	s,				16		l, CO3
	Constru	ucting S	SLR	parsing ta	ables, cor	structing	Canonica	al LR pars	ing tabl	les,							
	Constru	ucting I	AL	R parsing	tables.												
	TT.:			F2	,,				4 - 4	· · · · · · · · · · · · · · · · · · ·		1.1					
	LALR	sets of i	item	grannnars s.	s, an auto	matic par	ser genera	aor, imple	ementat	ion of LR pa	arsing ta	dies, cons	structing				
	Syntax	-directe	d Tr	anslation	: Syntax-	directed '	Translatio	n schemes	s,								
	Implem	nentatio	n of	Syntax d	lirected T	ranslators	8,										
	Interme	ediate c	ode,	postfix n	notation, I	Parse tree	s & synta	x trees, th	ree add	ress code, qu	uadruple	& triples	,				
IV	Transla	tion of	assi	gnment s	tatements	, Boolear	n expressi	ons, stater	nents tł	hat alter the	flow of a	control,			13	СО	4,CO5
	Postfix	transla	tion,	, translati	on with a	top down	n parser.										
	More a	bout tra	nsla	tion: Arr	ay referer	nces in ar	ithmetic e	xpression	s, proce	edures call, c	leclarati	ons, case	statemen	ts.			
	Symbo	l Tables	s: Da	ata structu	ure for sy	mbols tal	oles, repre	senting sc	ope inf	ormation.							
	Run-Ti	me Adr	nini	stration:	Implemer	ntation of	simple st	ack alloca	tion sch	neme,							
v	Storage	e allocat	tion	in block :	structured	l languag	e. Error D	etection &	& Recov	very:					11	CO	l, CO6
	Lexical	l Phase	erro	rs, syntac	ctic phase	errors se	mantic err	rors.									

Introduction to code optimization: Loop optimization,		
DAG representation of basic blocks,		
Value numbers and algebraic laws,		
Global Data-Flow analysis.		
Total Hours	48	
Essential Readings:		
1. A.V. Aho, M. S. Lam, R. Sethi and J. D. Ullman, "Compilers-Principles, Techniques and Tools", 2 <sup>nd</sup> ed., 2006, Pea	rson Education	1.
2. K. Muneeswaran, "Compiler Design", 1st ed., 2013, Oxford Publication.		
3. P.H. Dave, H.B. Dave, "Compilers: Principles and Practice", 1 <sup>st</sup> ed. 2012, Pearson Education.		
Supplementary Readings:		
1. Allen I. Holub, "Compiler Design in C", 1 <sup>st</sup> ed.(Indian print), 2012, PHI.		
2. John Levine, "Flex & Bison ", 1 <sup>st</sup> ed., 2009, O'reilly.		
3. Torben Ægidius Mogensen, "Basics of Compiler Design", 1 <sup>st</sup> ed., 2007, DIKU, University of Copenhagen		



An Institute of National Importance

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CU	KK	ICU	LU	IVI

Dr	ogromr	Bachelor of Technology in Computer Science and Engineering     Year of Regulation     2019-20														
		ne B	omputer S			Aring	cience an	ia Engin	eening			Somo	guiation		2019	-20 I
			omputer 3	CITILE di		einig				Credit	Structure	Seme	รเษา	Marke D	istribution	•
Col	ode			Co	ourse Nan	ne			L	T	P	С	INT	MID	END	Total
CS 3'	12			Comp	outer Gra	phics			3	0	0	3	50	50	100	200
		1. To int becom compo	roduce the period of the perio	use of the with buil gorithms re	component ding appr lated with	s of a gra coach of them.	phics syste graphics	em and system	I	CO1	Able to a computer	cquire kno graphics	wledge a	oout the ba	asic concep	ts used in
	-	2. To intr the bas	oduce the n	hathematica of 2D and	al foundation 3D concept	on of comp ot of compu	outer graph tter graphic	iics like s.		CO2	Able to in like 2D an	nterpret the nd 3D geor	mathema netrical co	tical found incepts of c	ation of the computer gr	aphics.
Car		3. To int transfo	roduce Colo ormations.	r perceptio	on, color r	nodels (RC	jB model)	), color	Course	CO3	Able to the basic geo clipping.	ometrical p	various a primitives,	lgorithms transform	to scan, contractions, Are	ea filling,
Obje	urse ctives	4. To pro	ovide an ur	derstandin	g of how	to scan of	convert the	e basic	Outcomes	CO4	Able to de	escribe the	importanc	e of viewir	ng and proje	ections.
5		the pic	ture definitio	n.		the shapes		n as per		CO5	Students rasterizati	will be ion: line polygonal i	able to drawing fill etc.	o acquire via Bre	knowledg senham's	ge about algorithm,
	-	5. Provid device	e an unders coordinates,	tanding of clipping, a	mapping f and projecti	Students and 3D m	will be able odelling.	e to under	stand a typ	ical graphic	s pipeline					
		6. To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.       CO6														
Nia	00-	and business applications.       Mapping with Program Outcomes (POs)												Map	ping with I	PSOs
INO.	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	2	1	0	1	0	0	0	0	2	0	0	0	3	0	3
2	CO2	1	1	0	1	0	0	0	0	2	0	0	0	2	0	2
3	CO3	1	2	3	1	2	0	0	0	0	0	0	0	2	3	2
4	CO4	0	2	3	0	2	2	3	0	2	0	0	1	2	3	2
5	CO5	0	2	3	0	2	2	0	0	2	0	0	1	3	3	3
6	CO6	0	0	1	2	0	0	0	0	1	0	2	1	2	2	0
No							Contont	SYLLA	802					Houre		<u> </u>
INO.	Introdu	untion					Content							TIOUIS		$\frac{000}{001}$
Ι	Graphi	c areas, N	lajor Applic	ations, G	raphic AP	Is, 3D Geo	ometric M	lodels, G	raphics Pir	eline, Nu	merical Iss	sues, Effici	ency	08		$\frac{CO1}{CO2}$
	Miscel	aneous N	Iath	· · ·	1			, -				,				CO2
Π	Sets ar and Pa Transfe	nd Mappir arametric	igs, Solving Curves, Li Matrices	Quadratic near Inter	e Equatior polation,	ns, Trigono Determina	ometry, V ants and	ectors, 2 Matrices	D Implicit s, Basic 2	and Para D and 31	metric Cur D transform	ves, 3D Ir ms, Invers	nplicit ses of	08		CO3
	Rastor	Algorithm														CO2
III	Raster Algorit	Displays,	Monitor Ir	tensities, 1	RGB colo	r, Line Dr	awing, Si	imple Ar	nti-aliasing,	Image C	apture and	Storage,	Graph	05		CO3
	Ray Ti	racing														CO4
IV	The ba	sic Ray T	racing Algo	orithm, Co	mputing V	/iewing R	ays, Ray-	Object In	ntersection	A Ray T	Tracing Pro	gram, Sha	dows,	03		CO3
	specul	ar Kellect	on, Kerract	lon, Instat	icing, Coi	isutictive	Solid Geo	metry, I		Kay Ira	ung.					<u>CO4</u>
V	Data S	tructures : e Meshes	tor Graphics Winced F	doe Data '	Structure	Scene Gra	onhs Scen	e Granha	s Tiling M	ultidimen	sional Arr	avs		04		$\frac{004}{005}$
	Some 1		, ,, шесц E	MEC Data	suuciuit,		чрив, БССП		5, 1mitg 1V	.uuu 11117 11		uy5.				$\frac{005}{005}$
VI	Integra	ng tion, Con	tinuous Pro	bability, N	Ionte Carl	o Integrati	on, Choo	sing Ran	ndom Points	5.				08		CO6
VII	Reflect Real V Lavere	ion Mode Vorld Ma d Model	els erials, Imp	lementing	Reflectio	n Models.	. Specular	r Reflect	ion Materi	al, Smoo	th Layered	l Model, 1	Rough	04		CO6
1		- •				Total	Hours							40		

#### Essential Readings

- 1. Computer Graphics: Principles and Practice in C (3rd Edition), by James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes, 2014.
- 2. Fundamentals of Computer Graphics, by Peter Shirley, Michael Ashikhmin, Steve Marschner, A K Peters/CRC Press; 3 edition, 2009.
- 3. Computer Graphics, C Version (2nd Edition) by Donald Hearn, M. Pauline Baker, Prentice Hall; 1996.

- 1. Introduction to Computer Graphics, David J. Eck, Hobart and William Smith Colleges, Copyright Year: 2016, Publisher: David J. Eck.
- 2. Computer Graphics: using OpenGL / F.S. Hill, Jr., Prentice Hall ; 2001.
- 3. Interactive computer graphics: data structures, algorithms, languages, By W. K. Giloi, Prentice-Hall, 1989.



لون.	C OF TECHNOLOG																	
Prog	grammo	e Bach	elor of T	echnolog	yin Comp	uter Scier	ce and	Enginee	ering					Year of	Regulation	2	2019-2	0
Dep	artmen	it <b>Com</b>	outer Sci	ence and	Engineer	ing								Sen	nester		VI	
Co	urse			Course N	lame			Pre-	Requ	isite		Cr	edit Stru	cture	M	arks Disti	ributio	<u>n</u> 
CS	314		Sh		amming				None			L 3			IN 1 50	50	END 100	1 otal 200
00	514	To intro	oduce ba	asic conce	epts and 1	orinciples	of		NONE	Able	e to dis	scuss the	basic o	concepts	and princi	oles of c	ommai	nd line
		comman	d line	program	ning, the	commar	d		<b>CO1</b>	prog	gramming	g, the c	ommand	structure	, the type	s of con	nmand	s, and
		structure	, the t	types of	commands	s, and the difference of the second sec	ie at	_		the c	categoriz	zations o	f comma	nds for d	lifferent op	erating sy	/stems.	andling
		operating	g systems	. com	nands io	or differe	n		<b>GO</b> •	com	mands,	process	handling	comman	ds, netwoi	k comm	ny n	on and
		To dev	elop the	skills for	shell pro	gramming	in		CO2	user	comm	unication	/ interac	ction rela	ated com	mands, s	ome	system
0.5		different	operating	g systems.				-		adm	inistration	on related	d comma with	unds, and	some spec	r differen	ands.	erating
Obje	ectives	To intro	oduce se	veral com	mands for	working	in Outo	comes	CO3	syste	ems, di	fferent t	ext edit	ors availa	able in U	nix - lil	ke op	verating
		different	shells of	fdifferent	operating s	ystems.			005	syste	ems for	shell pr	ogrammii	ng, worki	ng on the	vi editor	, and	writing
								-	<u> </u>	Able	e to use	e decisio	n contro	ol. looping	<u>e.</u> different	data tvp	es. fu	ons. Inctions
									CO4	and	other pr	ogrammi	ng featu	res in she	l program	ming.	,	
									CO5	Able	to to	use filte	ers, pip	ing and	regular	expressio	ns in	shell
								_		prog	çı amınını	<u>g</u> .						
					Map	oping with	Program	n Outcon	nes (F	POs)					Map	ping with	PSO	S
NO.	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P	08	PO9	PO10	PO11	PO12	PSO1	PSO2	2 F	PSO3
1	CO1	3	1	1	0	0	0	0		0	0	1	0	1	1	1		1
2	CO2	3	1	2	1	1	0	0		0	1	1	1	0	2	2		0
3	CO3	3	2	3	1	2	0	0		0	1	1	1	0	3	2		0
4	CO4	3	2	2	1	2	0	0		0	1	1	1	0	3	2		0
5	005	3	1	2	1	2	0	0		0	1	1	1	0	3	2		0
								SYLL										
No.							Conte	ent	1200							Hours		COs
	Comp	and strue	cture for	Univ – lik	e and Wi	ndows one	rating s	veteme (		Com	mand Li	ine Interf	ace (CI	D vs Gr	anhical			
I	User	Interface	(GUI); C	CLIs in di	fferent OSs	: popular s	shells for	r Unix -	like (	OSs, 1	MS-DO	S comm	and.com	shell, W	indows	03		CO1
	Comn	nand Prom	npt, Wind	lows Powe	ershell; Typ	bes of CLI	comman	ds: inter	nal an	nd exte	rnal cor	mmands	for differ	ent OSs				
	Differe	ent comm	nands in	Unix/ Linu	ıx and Wi	ndows OS	s: Simp	le Unix/	Linux	com	nands, S	Simple V	Vindows	comman	ds; file			
II	and c	lirectory	handling	utilities; p	rocess han	dling com	nands;	network	comm	nunicati	ion and	user co	ommunica	tion/ inte	raction	12		CO1, CO2
	related	l commar	nds; syste	m administ	tration con	nmands; sp	ecial co	mmands										
	Introd	uction to	shells	in differer	nt operatin	g systems:	Korn	shell, E	Bash s	shell,	C shell	, Windo	ws Cor	nmand P	rompt,			004
Ш	Power	rshell; tex	t editors	in Unix	- like oper	rating syste	ms; wo	rking on	the v	vi edito	or; crea	ting shell	scripts	in Unix/	Linux,	08		CO1, CO3
	creatin	ng bat file	s in Wind	dows OSs;	examples	of shell sci	ipts, bat	scripts a	and po	wershe	ell scrip	ts						
	Differe	ent progra	amming fe	eatures for	shell prog	gramming in	n Unix/	Linux ar	nd Wi	ndows	OSs:-	decision	control:	looping:	use of	40		004
IV	differe	nt data t	ypes: varia	ables, arra	ys, files; us	se of function	ons; exa	imples of	f shell	scripts	s, bat sc	cripts and	powersh	nell script	s	12		CO4
V	Other	importan	t concept	s in shell	programmir	ng in Unix/	Linux a	and Wind	dows	OSs:-	use of	filters; us	e of pip	ing (redire	ection);	05		CO5
	use of	regular e	expression	s; exampte	es of shell	scripts, dat	scripts a	and powe	ersnen	script	.5							
						То	tal Hour	S								40		
Esse	ential F	Readings																
1. Be	ehrouz	A. Forouz	zan, Rich	ard F. Gilb	erg, "Unix	and Shell F	Program	ming: A	Textbo	ook", C	Cengage	e Learnir	ng, first e	dition, 20	03.			
2. St	umitabh	וa Das, "ו	our UNIX	VLinux: Th	ne Ultimate	Guide", M	cGraw-H	Hill Educ	ation,	third e	edition, 2	2012.						
3. Br	uce Pa	iyette, Rid	chard Side	daway, "W	indows Po	werShell ir	Action,	Manning	g publ	ication	ns, third	edition, 2	2017.					
0	<b></b>	10 P																
oup 1 C	piemer	Glass Kin	ng Ahlee	"LINIX for	Programm	here and lie		arson E	ducati	ion Ind	lia third	l edition	2003					
2. Ya	ashavar	nt Kanetk	ar. "Unix	Shell Proc	rammina"	BPB public	cations	first editi	ion. 20				_000.					
3. Le	e Holm	nes, "Win	dows Pov	werShell C	ookbook".	O'reilly Me	dia, thiro	d edition.	2013									

4 Sta Daverage						Nat	ional Ir /	<b>istitute</b> An Institute	of Teo	<b>chnology</b> onal Importa	nce	nalaya				CURRIC	CULUM
Р	rogramr	ne		Bachel	or of Tec	hnology i	n Compu	ter Scien	ce and	Engineering	g	γ	ear of Re	gulation		2019	9-20
D	epartme	ent			Co	mputer S	cience a	nd Engine	eering				Seme	ster		V	1
Co	urse				Cc	ourse Nam	ne				Credit	Structure			Marks Di	stribution	
C	ode									L	Т	P	C	INT	MID	END	Total
CS	316	To undo	roton	AL	igmented	and Virt		ty		3	0		3	50	50	100	200
	·	To unde	rstand		concepts	of augment						Able to a				of Virtual F	Poplity
6	Iroo		ore the	e applicati	on area of	augmented	y. and virtual	reality		Course	CO2	Able to d	esign appli	cation of V	irtual Realit		Meanly
Obje	ctives			o applicati				literation		Outcomes						,	
Na						1	Mapping v	vith Progra	am Outc	omes (POs)	)				Mapp	oing with	PSOs
INO.	COs	PO	1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	1		0	0	0	0	0	0	0	0	0	0	0	1	1	0
2	CO2	1		1	2	1	0	0	0	1	0	0	1	1	1	1	1
3	CO3	1		1	1	1	0	1	0	0	0	0	0	1	1	1	1
									SYLLA	BUS							
No.								Content							Hours		COs
	Introd	uction															
1	The h	istorica	l dev	velopme	nt of Virt	ual Reali	ty, Funda	amental c	oncept	and compo	nents of	f Virtual R	leality, Pr	imary	08		CO1
	featur	es and	pres	ent dev	elopment	on Virtua	al Reality	, Virtual e	environr	nent, Requi	rements	s of Virtua	I Reality				
	3D US	er inter Device	Tace Char	acterist	ics, Desk	aware top Input	Devices	, Tracking	g Device	s, 3D Mice,	Special	Purpose	Input Dev	vices,	10		CO1
11	Direct	Human	n Inj	put, Ch	oosing Ir	iput Dev	vices for	3D Inter	faces,	Visual Disp	lays, Au	iditory Di	splays, I	laptic	10		
	Dispid	iys, chi	J0511	ig Outpt	IL DEVICE	5 10130 0	Ser inter	laces									
	3D Int	eractior	n Teo	chnique	5												
Ш	Repre	sentati	on of on	f the Virt Manipul	ual World lating a	and Ren Virtual	dering Sy World	/stems-V lavigating	isual Re n in a	epresentatio Virtual Wo	on, Aura orld Wa	l Represe avfinding	ntation, I	laptic etical	10		CO2
	Found	lations,	Use	r-Center	edWayfir	iding Sur	oport, En	vironmen	t-Cente	redWayfind	ing Sup	port, Des	ign Guide	elines			
n /	Applic	ations		liaatio			a fan Vin				ft			diaal	00		CO3
IV	what Educa	maκes a ition, Ρι	an ap ublic	Safety a	n a good Ind Milita	ry, Enter	tainment	tual Reali	ity, Busi	ness and m	anuract	uring, Sci	ence, Me	dical,	08		
		,															
							Total	Hours							36		
Esse	ntial R	eadings	<b>.</b>	Ernoat V	uiiff loog			d Luca Day	10) (FO) ( <sup>44</sup>	2D Llaar Into	rfagga		Draatiaa	" 1 <sup>st</sup> ⊏ditia	n Addia a		
1	. Doug 2005.	A DOWI	nan,	Emestr	uijii, Jose	ph J Lavid	Jia, Ji and	a wan Pou	ipyrev,		naces,	ineory and	Plactice		on, Addisol	ivvesley,	USA,
2	. Willia Franc	m R She	erma	n and Ala	an B Craiç	j, "Unders	tanding V	/irtual Rea	ality: Inter	face, Applica	ation and	d Design",	1 <sup>st</sup> Edition	, Morgan	Kaufmanr	n Publishe	rs, San
3	Alan	B Craig,	<u>-, 200</u> Willi 109	am R Sh	erman an	d Jeffrey I	D Will, "D	eveloping	Virtual R	Reality Applic	ations: F	oundatior	is of Effec	tive Desi	gn", 2 <sup>nd</sup> Ec	lition Morg	jan
	itauli	11aiiii, 20	509.														
Supr	lemen	ary Rea	ading	15													

4 Durdee Origense O and Dhillings O offet "Virtual Deality Technology" 4<sup>st</sup> Edition Wiley Interacionae India 2002

1. Burdea, Grigore C and Philippe Coiffet, "Virtual Reality Technology",1" Edition, Wiley Interscience, India, 2003.

2. John Vince, "Virtual Reality Systems", 1<sup>st</sup> Edition, Addison Wesley, 1995.

3. Oliver Bimber, Ramesh Raskar, "Spatial Augmented Reality Merging Real and Virtual Worlds", 1<sup>st</sup> Edition, CRC Press, 2005.



An Institute of National Importance

CURRICULUM

	OF TROUGHT																
Ρ	rogramı	me	Bac	chelor of	Technol	ogy in Cor	nputer So	cience an	nd Engin	neering			ear of Re	gulation		2019	9-20
D	epartm	ent	Cor	nputer S	cience ar	nd Engine	ering			Π			Seme	ster		V	1
Co	urse				C	ourse Nam	ne				Credit	Structure			Marks D	stribution	
Co	ode				-					L	T	P	C	INT	MID	END	Total
CS	5318			In	formation	Theory	and Codir	ng		3	0	0	3	50	50	100	200
		To deve theory.	elop t	he studen	t's ability t	o understar	nd the conc	ept of info	ormation		CO1	Able to a informati	cquire <mark>know</mark> on and entr	wledge abo ropy in info	ut concept rmation the	of mutual ∋ory.	
		To prov	vide tl	he student	s about var	ious codes	used for da	ita compre	ssion.		CO2	Able to codes	acquire <mark>kno</mark>	owledge ab	out various	data comp	pression
Co Obje	urse ctives	To deve for relia	elop t able tr	he student ransfer of c	i's ability to data.	analyse the	e error corr	recting cod	es used	Course Outcomes	CO3	Able to codes u	understand Ised for reli	I and <mark>analys</mark> able transfe	se the vario er of data.	ous error co	orrecting
		To fami	iliarizo	e the stude	ent with the	various de	coding tech	nniques.			CO4	Able to	understand	l and <mark>analy</mark> s	se the deco	ding techn	iques.
		To fami theory.	iliarizo	e the stude	ent the cryp	tographic a	lgorithms ι	used in info	ormation		CO5	Able to u algorithm	nderstand a ns used in in	and analyse nformation	e some of t theory.	he cryptogr	aphic
No	COs					1	Mapping w	vith Progra	am Outo	omes (POs	)				Мар	ping with	PSOs
140.	003	PC	)1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3	5	2	0	0	0	0	0	0	0	0	0	0	2	0	3
2	CO2	3	\$	3	1	0	0	0	0	0	2	0	1	0	3	2	2
3	CO3	3	5	3	3	1	2	0	2	0	2	0	0	0	3	3	2
4	CO4	2	2	3	3	1	2	2	2	0	2	0	1	1	2	2	3
Э	005	2		3	3	1	2	2		BUS	2	U	3	1	1	2	3
No								Content	OTLLA						Hours		COs
	Uncer	tainty Ir	oform	nation C	Concept of	mutual inf	ormation	Entropy	and their	properties	Channel	Capacity	Shannon'	s	Tiedre		
Ι	Theore	ems, Ga	aussi	ian Chan	nel		orritation,			properties,		e apaeny,			06		CO1
II	Noisel Arithm	less coo netic coo	ding, ding a	Huffman and unive	coding ar ersal codir	id its optim ig.	ality, Kraf	t and McN	Villan's i	nequality, S	hannon-F	ano code	, Elias coc	de,	10		CO2
III	Algebr Hadar memc	raic cod nard co ories, tap	es-L des, bes a	inear Blo Maximal and disc, f	ck codes, distance s fault tolera	Cyclic coo separable ant compu	des-BCH c codes, sp tation with	codes, per here pack arithmeti	rfect cod king and ic codes	le, galley coo singleton bo and redunda	des, Finito bunds. Co ant numb	e geometr odes for ra er system	y codes, Indom acc Is.	cess	10		CO3
IV	Exact algebr	techniq aic cod	ues d ing.	of decodii	ng, relatio	nship betw	veen com	plexity of a	algorithm	ns in poly-di	gital circu	uits and VL	SI with		07		CO4
V	Crypto syster	ographic ns.	cod	les-Rando	om numbe	er generati	on, DES s	scheme, F	RSAsche	eme and Dif	fie & Hell	man's Pul	olic Key C	rypto	07		CO5
	L						Total	Hours							40		
Esse	ential R	eading	s											I		I	
1	. Blahu	ıt. R.E.	Theo	orv and p	ractice of	error contr	ol codes.	Addison V	Wesley.	1 <sup>st</sup> Edition.	1983, rep	rint 1992.					

2. Blahut, R.E, Principles of transmission of digital information, Addison Wesley, 1<sup>st</sup> Edition, 1990.

3. Behrouz A. Forouzan, "Cryptography and Network Security", McGraw-Hill publication, 2<sup>nd</sup> Edition, 2010.

#### **Supplementary Readings**

- 1. James V Stone, Information Theory: A Tutorial introduction, Sebtel Press, 1<sup>st</sup> Edition, 2015.
- 2. Thomas M Cover and Joy A Thomas, Elements of Information Theory, Wiley India, 2<sup>nd</sup> Edition, 2006.

3. Jorge Castiñeira Moreira, Patrick Guy Farrell, Essentials of Error-Control Coding, Wiley, 1st Edition, 2006.

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Prog	gramme		Bachel	orofTec	hnology	in Comp	uter Scie	ence an	d Engine eri	ng	Year of I	Regulatio	n		2	2019-20
Dep	artment		Compu	ter Scier	ice and E	Ingineeri	ng				Sem	lester				VI
Course				Course	Name					Credit	Structure			Mar	ks Distrib	oution
Code									L	Т	Р	C	NT	MID	END	Total
CS 320	T	· · · 1	N		Learning	<b>g</b>		•	3	0	0	3	50	50	100	200
	To und comput	lerstand er visio	the diffe n and da	ta analyti	ning moc cs.	le is and i	ts usage	ın		CO1	Able to identify	y potent	al appli	cations	of machi	ne learning in
	To und applica	lerstand tion in	the diffe	erent clas derstandi	sificatior	n algorith lata cluste	ims and ering	its		CO2	Able to Descri	be the d classifica	ifference tion, ar	s in app nd cluster	oroaches ring	and applicability
	To un applied	derstand l for	d forecas predictio	sting and n of de	l differe esired c	nt learn onclusio	ing theo 1 in da	ry ita		CO3	Able to use for learning theory	ecasting	and pro	ediction	models 1	using different
Course Objectives	Apply learnin image	differen g mode classifie	nt unsup els in ap cation, d	ervised oplication lata clust	learning areas l ering an	and rein ike imag d decisi	nforceme ge forger on maki	ent Ty, ng	Course Outcomes	CO4	Able to select making proces	the suita s	ble mac	hine lear	rning mo	odels for decision
	To ur handlin	s nderstan g of big	d the g data usi	dimensio ng mach	n reduc ine learni	ction pro ng mode	ocess an Is	nd		CO5	Able to apply process and us	the dime e of mac	nsion re chine lea	duction rning m	process, odels for	, feature selection r big data
														1		
No.	COs	DO 1	DO2	<b>DO</b> 2	DO 4	Mappu	ng with P	rogran	n Outcomes (	POs)	DO10	DO11	DO 12	DCO1	Mapping	g with PSOs
1	CO1	2	PO2	PO3	PO4	P05	P06	PO/	PO8	P09	POIO	POII	PO12	PSOI	PSO2	PS03
2	$CO^2$	3	3	0	1	0	0	0	0	2	0	0	0	2	0	3
3	CO3	2	3	3	1	2	0	0	0	0	0	0	0	2	3	2
4	CO4	2	2	3	0	2	2	3	0	2	0	0	1	2	3	2
5	CO5	2	2	3	0	2	2	3	0	2	0	0	1	3	3	3
									SYLLABUS		1					1
No.							Conte	nt						Hours		COs
Ι	Introdu Neares classifi	uction, 2 st Neig er, Bag	Machine hbour cl gging, Bo	learning assifier, oosting, l	basics, Support mproving	Supervis vector g classifi	sed Learn machine cation v	ning: A class: vith the	Artificial Ne ifier, Decisi e AdaBoost	ural Ne on Tre meta a	etwork, classifyi e classifier, Na lgorithm.	ng with ive Bay	k- es	10		CO1
Π	Foreca regress Chervo	sting a sion, Tr onenkis	nd Lear ree-based (VC) di	ning Th l regressi mension,	eory: Pr on. Bias Worst c	edicting /varianco case (onli	numeria e tradeof ne) learn	c valu ff, Uni ning.	es: regression and Che	on, Lii moff/H	near Regression oeffding bounds	, Logis s, Vapni	tic k–	10		CO2
III	Unsup Aprior	ervised i algorit	Learnin hm, effic	g: Group ciently fi	ing unla nding fr	beled ite equent it	ems using em sets	gk-mo with F	eans cluster P-growth.	ng, As	sociation analys	is with t	he	8		CO1 CO3
IV	Reinfo iteratic approx	orcemen on, Lin cimation	nt learnin near qu , Policy	ng: Mark adratic search, l	ov decis regulati Reinforce	ion proc on, Lin , POMI	ess (ME ear Qu DPs.	DP), Bo adratio	ellman equa c Gaussiar	tions, ' , Q-le	Value iteration a earning, Value	and poli functi	cy on	6		CO2 CO3
V	Dimens decom method	sionalit position ls. Mac	y reducti . Feature hine Lea	ion: Feat e selectio urning for	ure extra n – feati r Big dat	uction - I ure ranki a: Big D	Principal ing and s pata and 1	composubset MapRe	onent analys selection, fil educe.	is, Sing ter, wr	gular value apper and embed	lded		06		CO4 CO5
	1					Total	Hours							40		
Essential F	Readings	6											• 			
1. Title O'F	e: Hand Reilly M	ls-On N ledia, In	fachine I ic, 2 <sup>nd</sup> E	Learning dition, 2	with Sci 019.	ikit-Learr	n, Keras	, and 7	FensorFlow:	Conce	pts, Tools, and T	Fechniqu	es to B	uild Inte	lligent S	ystems, Publisher:

2. Title: Introduction to Machine Learning, Author E. Alpaydin, Publisher: MIT Press Edition, 2<sup>nd</sup> Edition, 2009.

3. Title: Machine Learning, Author: T. M. Mitchell, Publisher: McGraw-Hill, Edition 1997.

- 1. Title: Machine learning in action, Author: P. Harrington, Publisher: Manning Publications, 2012 Edition.
- 2. Title: Pattern recognition and Machine Learning, Author C. M. Bishop, Publisher: Springer, 2007 Edition.
- 3. Title: Machine Learning for Big Data, Author: J. Bell, Publisher: Wiley, 2014 Edition.



P	rogramr	ne	Bac	helor of <sup>·</sup>	Technolo	gy in Cor	nputer So	cience an	nd Engir	neering		<u> </u>	/ear of Re	gulation		2019	9-20
D	epartme	ent	Con	nputer So	cience an	d Engine	ering		-				Seme	ster		V	1
Co	urse				Co	ourse Nam	e				Credit	Structure		T	Marks Di	stribution	
	ode			Cram	tography	and Not	work coo				T	P	C 2	INT 50	MID	END	Total
63	522			Сгур	lography	and new	NOTK SEC	unity		S	U	0	З	50	50	100	200
		To deve goals in	lop t vario	he studer ous applica	nt's ability ntions.	to underst	and the co	oncept of s	security		CO1	Able to a cryptogra	cquire know aphic mathe	vledge abou ematics and	ut security I <mark>identificat</mark>	goals, bacl ion of its a	kground of pplication
		To pro mathem cryptogr	vide atics aphy	the stu used i	dents wit in various	h some s symmet	fundamen ric and	tal crypto asymmetr	ographic ric key		CO2	Able to mathem underst algorith	acquire kno latics of syr and, analys m.	wledge abo nmetric key e and imple	out the bac / cryptogra ement – the	kground ohy and symmetric	c key
Co Obje	urse ctives	To devel	lop th	ne student'	's ability to	analyse the	cryptogra	phic algorit	thms.	Course Outcomes	CO3	Able to mathem underst algorith	acquire kno latics of asy and and an ms, digital	owledge abo /mmetric ke alyse – asy signatures	out the bac ey cryptogra mmetric ke	kground aphy and y encryptio	'n
		To famil	iarize	the stude	nt the need	of security	in comput	er network	(S.		CO4	Able to integrity data.	understand and the all	and analys gorithms fo	e the conc r checking	ept of mes the integrit	sage y of
											CO5	used in n	etworking				Jotom
						Ν	<i>l</i> apping v	vith Progra	am Outo	comes (POs	;)				Mapr	oina with	PSOs
No.	COs	PO	1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3		3	0	0	0	0	0	0	0	0	0	0	2	0	3
2	CO2	3		3	0	0	0	1	0	0	2	0	0	0	3	3	2
3	CO3	3		3	3	1	2	1	0	0	2	0	0	0	3	3	2
4 5	CO4	2		3 3	3	1	2	2	3	0	2	0	0	1	3	2	2
0	000	<b>Z</b>		5	3	•	L	-	SYLLA	ABUS	2	Ŭ	Ū	•	5	5	5
No.								Content							Hours		COs
I	Introdu Securi Euclid Polyal	uction ity goals ean algo phabetic	, cryp orithn cipł	ptographi n. Traditio ners: Vige	c attacks. onal symr enere's cip	Mathema netric key ohers, Hill	tics of cry ciphers; N ciphers, p	/ptography /lonolithic blayfair cip	y: modu ciphers ohers.	lar arithmeti : addition an	c, Euclide d multipli	an and ex cation cipł	tended ners,		08		CO1
II	Symm Mathe extenc	netric key matics of led Eucl	v cryp of sy idear	otography mmetric n algorith	/ key crypt m. Moderi	ography: n Block ci	Groups, phers and	Rings, Fie Lits comp	elds, GF oonents,	<sup>-</sup> , Inverse c DES, AES	f a numt	per and p	olynomial	using	08		CO2
III	Asymr Mathe remair	metric ke matics c nder theo	of as	yptograpr ymmetric . Diffie-H	ny : key crypt ellman, D	tography: igital signa	Euler's P ature: RS	hi-Functic A, Elgama	on, Ferm al, Entity	nat's Little T authenticati	heorem, on	Euler's the	eorem, Cl	ninese	08		CO3
IV	Messa	ige Integ	rity a	and authe	entication:	MAC, HM	IAC. Cryp	otographic	: Hash F	unction: Me	rkle-Dam	gard, MD5	5, SHA512		06		CO4
V	Netwo Key M Netwo	rk Secur anagem rk.	rity ent,	PGP, IPS	Sec, SSL,	Firewalls,	Intrusion	Detectior	n, Passw	vord manage	ement, Vir	us. Virtua	Private		10		CO5
							Total	Hours							40		
Esse	ential Re	eadings	;											1		I	
1	. Behro	ouz A. F	orou	zan, "Cry	ptography	and Netw	vork Secu	rity", Mc	Graw-H	ill publicatio	n, $2^{nd}$ Ed	ition, 201	0.	2017			
2 3	. Willia John	m Stalli R. Vacci	ngs a. "C	, Cryptog	and Inform	a Network	Security:	Principles	s and Si	Kaufmann	rentice Ha Publishers	all India, /	Edition, on. 2017	2017.			
5	. 501111	11. V alla	и, С	omputor	unu 111011		cuny 11al	MOUNT,	171015411			, 5 LAIR	, 2017.				
Sup	olement	tary Rea	ading	gs													
1	. Rich	ard H. B	aker	, Network	c Security,	McGraw	Hill Intern	ational 3 <sup>rc</sup>	<sup>d</sup> Edition	,1996.							
2	2. B. So	chneier,	Appl	lied Cryp	tography,	John Wile	y New Y	ork, $2^{nd} E$	dition, $\overline{1}$	996.							
2	6. C. K	aufman (	et. al	, Networl	k Security,	Prentice	Hall Inter	national,	2 <sup>nd</sup> Edition	on, 2002.							



**Supplementary Readings** 

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CURRICULUM

	E OF TECHNON	·															
P	rogrami	me		Bachel	or of Tec	hnology	in Compւ	iter Scier	nce and	Engineerin	g	١	ear of Re	gulation		2019	9-20
D	epartme	ent			Co	omputer S	Science a	nd Engin	eering				Seme	ster		V	1
Со	urse				C	ourse Nar	no				Credit	Structure			Marks D	istribution	
C	ode						lie			L	Т	P	С	INT	MID	END	Total
CS	324			Da	ta Analys	sis and V	isualizati	on		3	0	0	3	50	50	100	200
		To unde	rstand	the need	l of data an	alysis and	visualizatio	on techniqu	es		CO1	Able to a	nalyse the o	different da	ita represei	ntation and	data pre-
		To learn	the dif	fferent ty	pes of data	analysis a	nd visualiza	ation tools	and	-	CO2	Able to a	ssess and o	compare di	fferent data	a analysis a	nd
Co		techniqu To apply	ues / the co	oncept of	data analy	sis and vis	ualization t	o real life		Course	002	Able to ir	nplement d	iues ata analysi	s and visua	lization bas	sed
Obje	ctives	problem	S							Outcomes	003	solutions	for real life	e problems			
-																	
										_							
							Monning	with Drogr	am Out		<u> </u>				Man	ning with	
No.	COs		4	DOD	DO2	<b>DO</b> 4							D011	<b>DO10</b>			PSUS
4	001	P0	1	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	P501	P502	P503
1	C01	1		0	0	0	0	0	0	0	0	0	0	0	2	1	0
2	CO2	1		1	0	1	0	0	0	0	0	0	0	0	2	1	0
3	003	1		1	2	1	1	1	U	<u> </u>	0	U	0	U	2	1	1
									SVILA								
No								Content							Hours		COs
110.	Introd	uction						Ooment							Tiours		003
	Conce	epts and	l Need	d of dat	a analysi	s and vis	ualizatio	n in the e	ra of da	ta abundan	се						CO1
Ι	Data F	Represe	ntatio	on - Non	ninal, Bin al Graph	ary, Ordi	nal, Num	eric, Disc d Somi st	crete an	d Continuo	us, Type	s of data	- Record,		04		
	remp	orai, Sp	allar i	empor	ai, Graph	, onstruc	lureu and	u Senni St	lucture	u uala							
	Data S	Statistica	al Pro	perties	and Data	a Pre-Pro	cessing										
	Basic	Statisti	cal De	escriptio	ons of Da	ata (mean	, median	, standaro	d deviat	tion, maxim	um, mini	imum, tes	ts of	-			CO1
П	Data r	icance), pre-proc	essin	ability a la- Attri	and Rand bute tran	sformation	on. Samp	lina. Dim	n to esti ensiona	mation the ality reducti	ory , Cori on. Feati	relation, F ure subse	kegressio It	n	08		_
	select	ion, Dis	tance	and Si	milarity o	alculatio	n						-				
	Data	Analysis	Toch	niquos													
	Super	vised ar	nd un	supervi	ised learn	ning, grad	dient des	cent, ove	r fitting,	, regulariza	tion						<u> </u>
Ш	Unsup	pervised	l tech	niques	- K-mean	is, Gauss	ian mixtu	ire mode	Is and e	expectation	maximiz	ation, eva	luation o	f	12		C02
	Super	ring vised te	chnic	ues - K	(-nearest	neiahbo	r. naive B	aves. log	listic red	aression ar	d Regula	arization.	support				
	vecto	r machir	ne, art	tificial r	neural ne	tworks (A	NNs)										
	Visua	lization	and A	Applicat	ions												
IV	Tradit	ional Vi	sualiz	zation, M	Multivaria	ite Data V	/isualizati	ion, Princ	ciples of	f Perceptio	n, Color,	Design, a	nd Evalua	ation,	12	CO	2 & CO3
	Text Data V	)ata Visi /isualiza	ualiza	ition, Ne in Pythe	etwork Da	ata Visua	lization, 1	femporal	Data Vi	isualization	and visu	ualization	Case Stu	dies			
	Dutu	15001120		in i yuu													
							Total	Hours							36		
Esse	ntial R	eadings										rd					
1	. Han,	Jiawei, J	Jian P	Pei, and	Micheline	Kamber.	"Data min	ning: conc	epts and	d techniques	". Elsevie	er, 3 <sup>rd</sup> edit	on, 2011	00 0md -	radiatia"	Coringer	Palance
2	. Hasti & Bu	e, Trevo siness M	r, Rob ledia	2 <sup>nd</sup> editi	ion, 2009.	a Jerome	rieamar	i. <i>i ne ele</i>	ements (	oi statistical	iearning:	uata minir	ıg, interen	ce, and p	realction".	Springer	Science
3	. Emba	arak, Os	sama.	. "Data A	Analysis a	nd Visual	ization Us	ing Pytho	n: Analy	ze Data to (	Create Vis	sualization	s for BI S	ystems". A	Apress, 1 <sup>s</sup>	<sup>t</sup> edition, 2	2018.

1. Bishop, Christopher M. "*Pattern recognition and machine learning*". springer, 1<sup>st</sup> edition, 2006.

2. Tan, Pang-Ning, Michael Steinbach, and Vipin Kumar. "*Introduction to data mining*". Pearson Education India, 2<sup>nd</sup> edition, 2016.

3. Knaflic, Cole Nussbaumer. "Storytelling with data: A data visualization guide for business professionals". John Wiley & Sons, 1<sup>st</sup> edition, 2015.



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	"NOTE OF TROMPLOY																
F	Programm	ne	Bac	helor of	Technolo	ogy in Co	mputer S	cience ar	าd Engi	ineering		Υ	ear of Re	gulation		2019·	·2020
[	Departme	ent	Con	nputer S	cience ar	nd Engine	ering						Seme	ster		V	1
C	ourse				Co	ourse Nan	ne				Credit	Structure			Marks Di	stribution	
C	Code									L	Т	Р	С	INT	MID	END	Total
C	S 326				N	lultimedia	а			3	0	0	3	50	50	100	200
		To unde multime	erstar edia ir	nd the fund Information	amentals of collection,	oncepts of processin	g and rende	a systems s ering.	such as		CO1	Able to o multimed	describe th lia systems	e fundame and multir	ental conce nedia tools	⊧pts, comp	onents of
		To un networl compre	dersta king, s ession	and vario signal pro and its ap	us technic cessing, co plications.	al aspect: ommunicat	s in term ion, file fo	ns of mul rmat, audic	ltimedia > video,		CO2	Able to application compres	do the crit ons, file fe sion technie	tical analy ormat suo ques.	sis and ev h as text	<i>i</i> aluation ( , audio,	of internet video and
Co Obj	ourse ectives	To des applica	ign a tions.	nd develo	p multime	dia based	web desig	n and netw	working	Course Outcomes	CO3	Able to systems	design a for realtime	nd develo e requirem	p the int ents.	eractive r	nultimedia
		To und	dersta	and the	real time	requireme	nt of mu	ltimedia s <u>'</u>	ystems,		CO4	Able to multimed technique	apply the lia inform es, standar	principles nation tra ds.	to unders	tand the various	protocols, storage
		develop	ment	mutimeu				19313.			CO5	Able to d protocols optimal p	esign and o and also performance	develop the able to eve e.	e applicatio /aluate app	ns using r dications	etworking to achieve
No	$C \cap e$					Ν	Mapping w	vith Progra	am Out	comes (POs)	)				Мар	oing with	PSOs
1 10.		PC	)1	PO2	PO3	PO4	PO5	PO6	PO7	7 PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3		3	0	0	0	0	0	0	1	0	0	0	3	0	3
2	CO2	3		3	3	3	1	2	0	0	1	0	0	0	1	3	3
3	CO3	1		2	3	3	3	2	0	2	0	0	0	0	2	3	3
4	CO4	3		3	3	3	3	2	3	0	2	0	0	1	2	3	3
5	CO5	3		3	3	2	2	3	2	2	2	2	0	1	3	3	3
									SYLLA	BUS							
No.							C	Content							Hours		COs
	Introdu	ction, L	Jses	of multi	media, A	nalog & c	ligital Pro	esentatio	n, Digi	tization, Ny	quist Sa	mpling T	heorem \	/isual	04		CO1
Ι	Display	system	ı, Ov	verviewo	of Multime	edia Tool	S		-	-	-				04		CO2
Ш	Introduo Huffmai	ction to n Codir	o Da <sup>:</sup> na. D	ta comp Dictionar	ression, v based (	Huffman Compres	Coding, sion. LZ7	Shannon '8. LZW c	i Fano compre	Algorithm, ssion.comp	Huffma	n Algorit ratio los	hms, Ada s less &	aptive Iossv	06		CO2
	compre	ssion	.9, -		<i>,</i>			•, •	•p. •						•••		CO3
ш	Introduc	ction to	) Tex	t Using t	textin mu vrmats	ultimedia,	, Hyperm	edia and	Hypert	text, Introduo	ction to	image, G	raphics, l Rastor	Image Scan	06		CO2
	principl	les, colo	or pa	llets, Dit	hering		normor 5,	bitinaps,	, vecil	or urawing,		mcipies		Scan	00		CO3
N /	Introdu	ction to	o vid	eo, Broa	adcast te	levision,	HDTV, A	nalog dis	play s	tandards, di	gital dis	splay sta	ndards, D	Digital	00		CO3
IV	Video, V Video C	apture	orma	ats, soul	na ,midi,	Digital A	udio, aud	no me tor	mats,	midi under	windows	s enviror	iment Au		00		CO4
V	Introduc	ction to	<b>Ani</b> r	mation, /	Animation	ı file forn	nats, Bas	ic Softwa	re Too	ls, Multimed	ia Autho	ring tool	6.				CO2
															04		
VI	Introdu	ction to	o mu	Itimedia	network	s. Quality	of Multi	media Da	ata Tra	nsmission. N	Aultimed	dia over l	P. RTP. F	RTSP	04		$\frac{CO4}{CO4}$
VI	RTCP,	Voice o	over l	IP,	notwork	s, quanty	or main				nantiniov		.,,.		04		CO5
VII	Introdu	ction to	o Ima	age & Vi	deo Com	pression	, J.P.EG,	H.261, H	.263, N	IPEG, Stand	lards ( N	MPEG1, N	IPEG 2, I	MPEG	06		CO3
	4),GIF,T	<b>IFF</b>															<u>CO4</u>
	L						To	tal							36		005
Fsed	ential Re-	adinge															
1	. Li & S.I	Drew "Fi	undar	nental of	Multimedi	a "Pearsor	Prentice I	- Hall, Volum	ne 1 <sup>st</sup> Edi	tion, 2004.							
2	. Raniar	n Paarel	kh "Fi	undament	als of Mult	timedia" TI	MH, 2nd E	dition. 201	7.	,							
3	. K.R. Ra	ao, Zoran	S. Bo	ojkovic, Dr	ragorad A.	Milovanov	ic, "Multin	nediaCom	municat	ion Systems Te	chniques	s, Standard	s and Netw	vorks", PH	, 1st Editio	n, 2002.	
				- '	-									•			

Supplementary Readings

1 Tay Vaughan "Multimodia Making IT Mark" TMU Oth Edition 2017

- 1. Tay vaugnah "Multimedia, Making II Work" TMH, 9th Edition, 2017.
- 2. Fred Halsal "Multimedia Communication" Pearson Education, 1<sup>st</sup> Edition, 2007.

3. K.R. Rao, Zoran S. Bojkovic, Bojan M. Bakmaz," Wireless Multimedia Communication Systems: Design, Analysis, and Implementation", CRC Press, 1<sup>st</sup> Edition, 2017.

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WITTUTE OF TECHNOLOGY W

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CURRICULUM

D	OF TECHNO				• •		15	• •				60	1			000	
	rogramm	e I	Bachelor	of Technolo	$\frac{1}{1}$ $\frac{1}$	puter Scie	nce and E	ngineeri	ng		Ye	ar of Reg	ulation		2	020-2	21
L	epartmer	nt (	Computer	Science ai	a Engineei	ng				Credit		Semest	er	Marles	Distribu	<b>VI</b>	
Co	ode				Course Nan	ne					Biruciure	C	INT	MID	END	tion	Total
	378			S	stom Softu	vo ro			2 2	1	r O	3	50	50	100		200
	520	To intro	duce the d	lifferent sys	tem softwar	e for a gen	eral and si	mple	5	U	Student	will be at	ole to ide	ntify and	distingu	sh ar	mong
		compute	er architec	ture.		U		1		CO1	differen	t system a	and appli	cation so	ftware.		- 0
		To impl	ement dif	erent assen	blers for a g	general and	l simple			001							
	F	comput		luie.						602	Student	will be at	ole to des	ign differ	ent type	s of	
		To impl	ement sin	ple linker/l	paders and r	nacro for a	general ar	nd		02	assemb	lers for a s	simple mi	croproce	ssor.		
Co	ourse	simple o	computer a	irchitecture					Course	CO3	Student	will be at	ole to exp	lain the r	equirem	ents	of
Obje	ectives								Outcomes	003	system.					1 51111	hie
										CO4	Student	will be at	ole to exp	lain the r	equirem	ents	of
											Macros	and also i	mplemer	nt them for	or a syste	em.	,t
										CO5	differen	t software	e like con	ierstand ipiler, tex	t editor	and	1
											debugg	ers.		, ,			
		1												1			
No.	COs					Mapping v	vith Progra	am Outco	omes (POs)		1	1		M	lapping v	vith l	<b>PSOs</b>
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO	1 PS	D2	PSO3
1	COl	3	1	1	1	0	0	0	0	0	0	0	1	1	2		2
2	CO2	3	1	1	0	1	0	0	0	0	0	0	0	1	1		3
3	CO3	3	3	3	2	3	0	0	0	0	0	0	0	1			3
4	C04	3	1	3	2	2	0	0	0	0	0	0	0	1			3
3	COS	5	2	3	-	1	U	U	U	U	U	U	U	1			3
								SYLLA	BUS								
No.						0	Content	5 T LL/ I	000					Hours		C	Os
	System	and Ap	plication	software, '	The Simpli	fied Instru	iction Co	mputer-	SIC and S	IC/XE,							01
I	2	1	1		Ĩ			1						02		C	01
	Elemen	ts of As	sembly I	Language I	rogrammi	ng, Assem	bly Scher	me, Mac	chine-deper	ndent Ass	sembler	Features,	Pass				
п	Algorit	re of A hm. Ta	ssembler	, Design ( essing: Se	arching at	ler -2 pas	s assemt	ne-Inder	SIC, Data bendent A	structure ssembler	, Format Featur	of Data es. Mult	base,	15		CO1	. CO2
	Assemt	oler, A S	Single Pa	ss Assemb	er for SIC.		,						-P	10			, 002
	וו ת	<i></i>	1 7 . 1 .	0 1		<u>1'1 0</u>	16 0 11	(' D	T	1 4	1 1 4 1	1 4					
ш	Simple	ation ar Bootstr	an Loade	g Concept, r. Realloca	Design of ting Loade	Linker, So r. Linking	Loader.	Cation P Design (	rograms, 1 of a Loade	Loader, A	Absolute	Loader, A	Δ	12		C <b>O</b> 1	, CO3
	Simpio	20000	-p	.,		-,	,,	2 001811		•				12			
	Macro	Instruct	ions, Feat	ures of Ma	cro facility	, Macro I	nstruction	n argume	ents, Gener	ation of U	Unique la	bels,				~~ ~ ~	~~.
IV	Conditi	onal Ma ion Ma	acro Expa cro Proce	insion, Key	word Mac ithm and F	ro parame	eters, Mac	ro Instru	ictions def	ining Ma	cros, Rec	ursive M	acro	05		201	, CO4
	плраня	1011, 1 <b>VI</b> a		asor Aigu	itinii allu L		ures.										
	Aspects	s of Cor	npilation,	Various p	hases of a c	compiler,	Introducti	ion to La	anguage Pr	ocessing	Activity,	Fundam	ental				
	of Lang	guage Pi	ocessing	Fundame	ntal of Lan	guage Spe	cification	i, Langua r interfac	age Proces	sor Deve	lopment	tool. vt Editor					
v	Editor of	design a	nd evalua	tion, Edito	ors function	in compu	iting envi	ronment	s, Interacti	ve Debug	gging Sys	stem,	,	05		C <b>O</b> 1	, CO5
	Debugg	ging Fur	nctions ar	d Capabili	ties, Type o	of bugs, D	ebugging	techniq	ues, Debug	gging Too	ol, Comm	and line					
	Debugg	ger, Typ	es of ana	ysis tool, l	Difficulties	in Design	ing an In	teractive	e Debuggir	ig System	1.						
						Total I	Hours							39			
						i otur i								.,			

**Essential Readings:** 

1. Leland L. Beck, D. Manjula, "System Software - An Introduction to System Programming", 3rd ed., 1997, Addison Wesley.

2. M. Dhamdhere, "System Software and Operating System", 2<sup>nd</sup> ed. 1999, Tata McGraw-Hill.

3. Santanu chattopadhyay, "System software", 1<sup>st</sup> ed., 2007, PHI.

- 1. John J. Donovan, "System Programming", 1<sup>st</sup> ed., 2017, McGraw-Hill Education.
- A.V. Aho, R. Sethi and J D. Ullman, "Compilers-Principles, Techniques and Tools", 2<sup>nd</sup> ed., 2006, Pearson Education.
   J. Nithyashri, "System Software", 2<sup>nd</sup> ed., 2010, Tata McGraw Hill.

					Nati	ional I	<b>nstitu</b> An Instit	<b>te of</b> ute of	<b>Technol</b> National Imp	<b>ogy</b>   portanc	<b>Meghalaya</b> <sup>Se</sup>				CUR	RICULUM
Prog	gramme		Bachel	orofTee	chnology	in Comp	uter Scie	ence an	d Engineeri	ng	Year of F	Regulatio	n		2	2019-20
Dep	artment		Compu	iter Scie	nce and E	Ingineeri	ng				Sem	ester				VI
Course				Course	Name					Credit	Structure			Ma	rks Distrib	pution
Code									L	T	P	C		MID	END	Total
CS 372	Tour	lorstand	Introduc	tion to N	Tachine	Learning	te usogo	in	2	0	0 Able to identify	2	50	50	100	200
	comput	ter visio	on and da	ita analyt	ics.		ns usage	ш		CO1	practice	poten	uai app	ications	01 macm	
	To una applica	derstand tion in	l the diff image ur	èrent cla iderstand	ssification	n algorith lata cluste	ims and ering	its		CO2	Able to Describ of regression, of	be the c classific	lifferenc ation, a	es in ap nd cluste	proaches ering	and applicability
	To ur applied	derstan for	d foreca predictio	nsting ar n of c	nd differe lesired c	ent learr conclusion	ning theo n in da	ory ata		CO3	Able to use for learning theory	recasting	g and pi	ediction	models u	using different
Course Objectives	Apply learning image process	differe g mode classifi	ent unsuj els in a ication, c	pervised pplication lata clus	learning areas stering an	and re like imag nd decis	inforcem ge forge ion mak	ent ery, ing	Course Outcomes	CO4	Able to select making proces	the suita s	ible mad	chine lea	arning mo	odels for decision
	To u handlin	nderstar g of big	nd the g data us	dimension ing mach	on reduc ine learni	ction pr ing mode	ocess a Is	und		CO5	Able to apply to process and use	the dima e of ma	ension r chine le	eduction arning n	process, nodels for	, feature selection r big data
		1				<b>.</b> -										
No.	COs	DOI	DOG	DOG	DOL	Mappi	ng with F	Program	n Outcomes (	POs)	<b>DO10</b>	DOI	DO1	DC01	Mapping	g with PSOs
1	CO1	POI	PO2	PO3	PO4	PO5	PO6	PO/	PO8	PO9	POIO	POI	POI2	PSOI	PSO2	PSO3
1	C01	3	3	0	1	0	0	0	0	2	0	0	0	3	0	3
3	CO2	2	3	3	1	2	0	0	0	2	0	0	0	2	3	2
4	CO4	2	2	3	0	2	2	3	0	2	0	0	1	2	3	2
5	CO5	2	2	3	0	2	2	3	0	2	0	0	1	3	3	3
				1	I		1		SYLLABUS		1					
No.							Conte	nt						Hours		COs
Ι	Introdu Neares	uction, st Neigł	Machine nbour cla	learning ssifier, S	basics, Support v	Supervis vector ma	ed Leari achine cl	ning: A lassifie	Artificial Ne r, Decision	ural Ne Tree cl	etwork, classifyin assifier.	g with	k-	06		C01
Π	Foreca regress Vapnik	asting a sion, T x—Cherv	and Lea Tree-base vonenkis	rning T d regres (VC) d	heory: P ssion. Bi imension,	redicting ias/varian Worst	numeri ice trad case (onl	c valu e-off, line) le	es: regressi Union and earning.	on, Li Cherr	near Regression noff / Hoeffdin	n, Logi g boun	stic ds,	08		CO2
III	Unsup Aprior	ervised i algori	Learning thm, effi	g: Group ciently f	ing unlat inding fr	peled ite equent i	ms usinį tem sets	g k-m with F	eans clusteri P-growth.	ng, As	sociation analysi	s with	the	05		CO1 CO3
IV	Reinfor iteratio approx	rcement n, Li kimatior	t learning near qu 1, Policy	g: Marko uadratic search,	ov decisi regulati Reinforce	on proce on, Lir e, POMI	ess (ME hear Q DPs.	OP), B uadrati	ellman equa c Gaussian	tions, , Q-	Value iteration a learning, Value	and po funct	icy ion	06		CO2 CO3
V	Dimens decom method	sionalit positior ls. Mac	ty reduct n. Featur chine Lea	ion: Fea e selectio arning fo	ture extra on – feat r Big dat	action - 1 ure rank ta: Big D	Principal ing and Data and	comp subset Map F	onent analys selection, fil Reduce.	is, Siną ter, wr	gular value apper and embed	dded		05		CO4 CO5
Essential F	Readings	5				Total	Hours							30		
1. Titl	e: Hand	ls-On N	Aachine	Learning	with Sc	ikit-Lear	n, Keras	s, and 7	TensorFlow:	Conce	pts, Tools, and	Fechniq	ues to E	Build Inte	elligent S	ystems, 2nd
Edi	tion, 20 e: Intro	19, O'H	to Mach	edia, Inc.	minσ Δι	ithor F	Alnavdin	Puhl	isher MIT	Press	2nd Edition 200	)9				
3. Titl	e: Macl	hine Le	arning, A	Author: 7	. M. Mit	chell, Pi	ablisher:	McGr	aw-Hill, 199	97 Editi	0n.					
Supplemen	ntary Re	adings	, 1			, •		_, 01	, _//							
1. Title: M	[achine ]	earning	in actio	n, Autho	r: P. Har	rington,	Publishe	r: Ma	nning Public	ations,	2012 Edition.					
2. Title: Pa	attern rec	cognitio	on and M	lachine l	Learning,	Author	C. M. B	ishop, and Te	Publisher: S chnical Pro-	pringer fession	, 2007 Edition.	ell Pu	olisher	Wilev	2014 Edi	tion



Programme Department

Course

Code

HS 392

Course

Objectives

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Identity

#### National Institute of Technology Meghalaya An Institute of National Importance

CURRICULUM

Total

200

PSO3

COs

CO2

CO3

CO4

CO2

CO3 CO4

CO1

CO2

CO4

CO1

CO<sub>2</sub>

CO4 CO5

**Bachelor of Technology** Year of Regulation 2018-19 **Humanities and Social Sciences** Semester VI Credit Structure Marks Distribution Course Name MID Р С INT **END** L Т **Corporate Communication** 2 0 0 2 50 50 100 Able to explain the key concepts and roles of corporate This course introduces the concepts of corporate communication CO1 communication This course explains the application of corporate communication to Able to apply the concepts of corporate communication CO2 real-life corporations to real-life corporations Course This course familiarizes corporate communication strategies CO3 Able to create corporate communication strategies Outcomes This course illustrates the way corporations and organizations Able to explain the way corporations and organizations CO4 communicate, externally and internally communicate Able to analyse the role of Corporate Social CO5 This course explains the concept of Corporate Social Responsibility Responsibility in Image Management Mapping with Program Outcomes (POs) Mapping with PSOs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PSO1 PSO2 0 0 0 0 0 0 2 2 3 3 3 2 2 2 3 3 2 0 0 0 0 0 3 0 0 0 0 0 0 2 0 2 3 3 3 2 0 0 2 0 2 3 3 3 2 0 0 0 0 0 0 0 0 2 0 2 3 3 3 2 **SYLLABUS** Content Hours Definitions and Concept of Corporate Communication; Role, Scope and Objectives of Corporate Communication; Kinds of communication in an organisation; Areas of strategic thinking in Corporate Communication; Ethics and Laws in Corporate 05 All COs Communication; Present state of Corporate Communication; Corporate Social Responsibility Corporate Communication Tools; Lobbying; Sponsorship; Financial Communication; Corporate Reputation; Corporate 03 Strategy in Corporate Communication; Defining Strategy and its Role; Campaign Planning; Areas of Strategic Consideration; Case studies in Corporate Communication Campaigns 06 Internal Communication; Role and Scope of Internal Communication; Tools of Internal Communication; Kinds of writing for media; Understanding requirements of media writing; Crisis Communication; Defining Conflict; Defining Disasters; 06 Kinds of disasters; Corporate Communication and damage salvage; Use of media in times of crisis Corporate Social Responsibility; Defining Corporate Social Responsibility; Role, Scope and Need for Corporate Social Responsibility; Corporate Social Responsibility and Image Management; Case studies in Corporate Social Responsibility 04 **Total Hours** 24 **Essential Readings** 

I. Richard R Dolphin, "The Fundamentals of Corporate Communication", Routledge, 2011.

2. Paul Argenti & Janis Forman, "The Power of Corporate Communication: Crafting the Voice and Image of your Business", McGraw-Hill Education, 1st edition, 2002

#### **Supplementary Readings**

1. Pitman Jackson, "Corporate Communication for Managers", Pitman Publishing, 1987.

#### 2. David Chandler, "Corporate Social Responsibility: A Strategic Perspective", Business Expert Press, 2014.

A RA C MANAGEMENT						Nati	ional Ir /	<b>istitute</b> An Institute	of Teo	<b>chnology</b> onal Importa	<b>Megh</b> nce	alaya				CURRIC	CULUM
Ρ	rogramn	ne	Ba	chelo	or of Tecl	nnology i	n Compu	iter Scien	nce and	Engineering	g	Υ	/ear of Re	gulation		2019	9-20
D	epartme	nt			Co	mputer S	cience a	nd Engin	eering				Seme	ster		V	1
Со	urse				0	N					Credit S	Structure			Marks D	istribution	
Co	ode				Co	urse Nam	ie			L	Т	Р	С	Continuo Evaluatio	ous La on	lb Test/ Viva	Total
CS	352				Software	Enginee	ring Lab			0	1	2	2	70		30	100
		To introdu	uce the S	Softwa	are Develop	ment life cy	ycles Mode	els			CO1	Able to ic	lentify, forn	nulate, and	solve com	plex engine	ering
	-	To analys	e the sof	ftware	erequireme	nts					CO2	Able to re	ecognize et	hical and pi	rofessiona	l responsib	ilities in
Со	urse	To introdu	uce vario	ous de	sign metho	ds for soft	ware Devel	opment		Course	CO3	Able to a	nalyze, des	ign, verify,	validate, i	mplement, a	pply, and
Obje	ctives -	To develo	p an abil	lity an	d skill to te	st software	esystems	-		Outcomes	CO4	Able to w	ork in one	or more sig	nificant a	oplication de	omain
	-			-			-							_		-	
	-																
No	COs					Ν	Mapping v	vith Progra	am Outc	omes (POs)	)				Map	ping with	PSOs
140.	003	PO1	PC	02	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	2	0	)	0	0	0	0	0	0	0	0	0	0	1	1	0
2	CO2	2	1		1	1	0	0	0	1	0	0	1	1	2	1	1
3	CO3	1	1		1	1	0	0	0	0	0	0	0	1	1	1	1
4	004			•	-	1	U	0	U	0	1	0	1	I		•	•
									SYLLA	BUS							
No.								Content	-						Hours		COs
I	Softwa	are Deve	lopmer	nt life	e cycles N	lodels, A	gile Proc	ess Mode	els Softv	ware					06		
			121														
II	Static Object	program Oriente	d Analy	catio /sis,	n tool (SL Flow-Orie	AM) for v ented Mo	delling,	critical pr	ogram b	behaviour, l	Data Moo	delling Co	oncepts,		06		
III	Forma	l verifica	ation of	con	current sy	/stems u	sing SPII	N model c	checker.						06		CO1
N /			Develo		nt for the										00		CO2
IV	DFD a		Develo	pme	nt for the	requirem	ients								00		CO3 CO4
V	Desig	n and co	ding us	sing s	software	developn	nent lang	juages							06		
			-			-	-										
VI	Taxon and au	omy of C tomatec	Quality I testing	Attrik g too	outes, Pe ols.	rspective	es of Qua	llity, Quali	ity Syste	em, Softwar	e Quality	y Assurar	nce, Man	ual	06		
	To be	done ne	cessari	ly as	mini-pro	ject grou	p-wise in	n groups o	of at lea	st two/three	e studen <sup>.</sup>	ts.					
							Total	Hours							36		
Esse	ntial Re	adings														<b>.</b>	
1	. Rogei	S Press	man: "S	Softw	are Engine	eering – A	A Practitio	ner's Appr	roach", 7	<sup>rh</sup> Edition, Mo	:Graw-Hi	II, 2009.					
2	. Rajib	Mall, "Fu	ndamer	ntals	of Softwar		ering", 5 <sup>m</sup>	Edition, P	HI, 2018	6. 0011							
3	. ian So	mmervil	ie: Soft	ware	rengineer	iiig . 9"E(	ullion, Pe	arson Edu	ication, 2	2011.							
Supr	olement	ary Read	lings														
1	. SLAM	Referen	ce- http	o://res	search.mi	crosoft.co	m/en-us/j	projects/sl	lam/								
2	. SPIN	Model C	hecker l	Refe	rence: http	://spinroo	t.com/spi	in/whatispi	in.html								
3	. Paul A	Ammann	and Je	ff Of	futt, "Introc	duction to	Software	Testing",	1 <sup>st</sup> Editic	on, Cambrido	ge Univer	sity Press	, 2008.				

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An Institute of National Importance

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Р	rogran	mme	Ba	chelor of	Technolog	gy in Com	<u>iputer Sci</u>	ience and	Enginee	ering			Year of R	egulation			2020-	-21
	eparti	ment	Co	omputer S	cience an	d Enginee	ering				~	~	Sem	ester		<u> </u>		
Co	ourse				C	'ourse Nor	ma				Credit	Structure			Marks	Distri	oution	
C	ode				C		lic			L	Т	Р	С	Evaluatio	is La	b Test Viva	:/	Total
CS	354				Com	oiler Desig	gn Lab			0	1	2	2	70		<u>30</u>		100
						C	5		I		CO1	Specify	and analy	/se the lexi	al, synta	ctic ar	ıd semar	ntic
		Т	The Obje	ctives of th	nis course	is to explo	ore the prir	iciples,			01	structu	res of any	computer	programı	ming l	anguage	•
		a	lgorithm	s, and data	1 structures	s involved	in the des	ign and				Separat	e the lexi	cal, syntact	ic and ser	manti	c analysi	s into
			onstruct		piters.						CO2	meanin	gful phas	es for a con	ipiler to i	under	take lang	suage
												translat	1011.					
	ourse	T	Fo imple	nent some	phases of	the front-	end of a g	eneral con	npiler.	Course	CO3	Write a	scanner,	parser, and	semanti	c anal	yser for	limited
Obje		5								Outcomes		form of	C like pro	ogramming	language	:S.	to machi	no codo
											CO4	for a no	vel comp	uter.	le langua	ige int	.0 macm	ne coue
		Т	Fo imple	nent some	phases of	the backt-	-end of a g	e techniq	ues for inte	rmediate	e code	and ma	chine					
			-		-		-		-		005	code op	otimisatio	n.				
No	CC						Mapping	g with Pro	gram Ou	tcomes (POs	s)					Mapp	ing with	PSOs
NO.	CC	5	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS	01	PSO2	PSO3
1	CC	<b>)</b> 1	3	2	3	1	0	0	0	0	0	0	0	0		1	2	2
2	CC	02	3	3	3	3	0	0	2	-	1	1	3					
3	CC	)3	2	3	3	1	0	0	-	1	1	3						
4	CC	)4	2	1	1	2	0		1	1	3							
5	CC	)5	2	1	2	1	0	0		1	1	3						
							.1		SYLL	ABUS			1					
No.								Content							Hour	s	C	COs
-	1)	Using	g Lex/Flex	, write a pr	ogram to a	ppend line	number be	fore each										
		Interface         Venue of Technology in Computer Science and Toghnering         Venue of Teghtation         2028-21           Interface         Computer Science and Toghnering         Credit Stitucture         Interface         Inte																
T		Input	t/output s	Bachelor of Technology in Computer Science and Engineering         Your of Regulation         2009-21           Computer Science and Engineering         Samcher         VI           Computer Science and Engineering         Samcher         VI           Counce Name         L         T         P         C         Councinve         Lab Test/1         Total           Dipersives of this course is to explore the principles, infines, and that antruse involved in the design and number of compilers.         Separation the level, syntatic and agementic analysis into antruse involved in the design and number of compilers.         Cool         Separation the level, syntatic and semantic analysis into another to undertake language.         Cool         Separation the level, syntatic and semantic analysis into another code from of the programming language.         Cool         Cool </td														
1	2)	Using	g Lex/Flex	Bachchor of Technology in Computer Science and Engineering         Year of Regulation         2020-21           Computer Science and Engineering         Sciences r         VI           Counce Name         Credit Structure         Marks Distribution           Objectives of this counce is to explore the principles, erithms, and dual structures involved in the design and structures involved in the design and structures of any computer programming language.         Science View of the front-end of a general couplier.         Course Counce Couplier Technology in Computer Science and Science View of the front-end of a general couplier.         Course Course Couplier technology in Computer Science and markine coupling into markine coupling principles.         Course Couplier Coupl														
		be file	es.	Backelor of Technology in Computer Science and Engineering         Year of Regulation         2009-21           Computer Science and Bugineering         Senvestor         Vit         Senvestor         Nit           Counce Name         1         T         P         C         Continuous         Laboration         Total           e Objectives of this counse is to explore the principles, origina, and task structures involved in the design and structure involved in the design and involved into the desin design and into the design and involved in the des														
	3)	Hsing	Bachelor of Technology in Computer Science and Engineering         Year of Regulation         2020-21           Computer Science and Engineering         Senester         View         View         View         View         Total         Data															
	5)	In	nput/outp	ut streams	may be file	S.	ie keyword	s, identifie	is, intege		unibers		ie e progr					
				C:I				<b>6</b> 1 1	•••								001	000
II	4)	Lex p	orogram to one " \n"	> copy a file => " \n"].	by replaci	ng multiple	sequences	of white sp	paces with	n a single whi	te space	. [ blanks/ta	ab => blan	k, more	2			, CO2, 'O3
																	C	05
	5)	Also a	add remo	2331300010001132112200010001132121100000011321211000000113212110000001132110000000113312110000001132ContentSYLLABUSContentHoursCOscontentKeytex write a program to append line number before each (empty/non-empty).HoursCOsContentHoursCOscontentContentex/Flex, write a program to count number of lines, words, visible characters, total characters. Input/output streams may4CO1, CO2, CO3contentIdentifiers, integers and real numbers from a simple C program.content2CO1, CO2, CO3content2CO1, CO2, CO3contentIdentifiers, integers and real numbers from a simple C program.co														
	6)	Lex p	orogram to	о сору а С р	rogram by	replacing e	ach instand	ce of the ke	yword <i>flc</i>	oat by double								
	7)	\ <b>A</b> /				file te ((Die	Latin" Car	-: <b>f</b> :		£1		-1:-1	(	l = ++ = )				
Ш	/)	separ	rated by v	vhite space.	. Every time	e a word is	encounter	ed:	sume the	me is sequen	ice of En	giish words	(group of	letters)	2		CO1, (	202,
		1. lf t	he first le	tter is cons	onant, mov	ve it to the e	end of the	word and t	hen add a	iy.					-		CO3	
		2. If t	the first le	etter is a vo	wel, just ac	ld ay to the	end of the	word.										
	8)	Using	g Lex/Flex	, write a pr	ogram to e	ncode and	decode.										CO1, (	202,
IV															2		CO3	,
V	9)	Using	g Lex/Flex	, write a pr	ogram to (	(i) identify t	he Roman	numbers (i	ii) add 2 R	Roman numbe	ers.				2		CO1	, CO2,
v															2		C	03
		_															CO1	. CO2
VI	10)	Creat	te a recur	sive predict	ive parser f	for a gramm	nar(as givei	n in lab clas	;s).						2		C	, co2, 203
	11)	Creat	Bachelor of Technology in Computer Science and Engineering         Year of Regulation         Q20-21           Computer Science and Engineering         Semistry         Vit         Weak Distribution           Computer Science and Engineering         I         P         C         Continue Name         Lot Technology in Computer Science and Engineering         Lot Technology in Computer Science is in explore the principles, algorithm. and anon returnes of this course is in explore the principles, dispersion of the course is on explore the principles.         Separate the feedel, synated and anony in the course is in explore the principles.         Separate the feedel, synated and analysis into course is insple intermite analysis into course code in simple intermite analysis into course is insple intermite analysis into course is insple intermite analysis into course code in simple intermite analysis into course is insple intermite analysis intocourse is insple intermite analysis i															
VII	11)	creat	Bachabor of Technolog in Computer Science and Engineering         Year of Regulation         2020-21           Computer Science and Engineering         Sensator         VT           Consister Design Lab         0         1         2         2         3         100           Consister Design Lab         0         1         2         2         3         100           Constructions in the darge and sense the regulatering to the darge and sense the sense in wheth in the darge and sense the sense in wheth in the darge and sense the sense in wheth in the darge and sense the sense in wheth in the darge and sense the sense in wheth in the darge and sense the sense in wheth in the darge and sense the sense in wheth in the darge and sense the sense in wheth in the darge and sense the sense in wheth in the darge and sense the sense in wheth in the darge and sense the sense in wheth in the darge and sense the sense in wheth in the darge and sense the sense in wheth in the darge and sense the sense in the darge and in a general compiler.         Construction of a sense in wheth in the darge and in a general compiler.           In implement some phases of the back-lead of a general compiler.         Constructions in the sense in wheth in the darge and in a general compiler.         Constructions in the sense in wheth in the darge and in a general compiler.           In implement some phases of the back-lead of a general compiler.         Constructions in the sense in t															
			Rachelor of Technology in Computer Science and Rogineering         Year of Regulation         2020-21           Computer Science and Rogineering         Senestc         VI           Course Name         L         T         P         C         Controls Name         Interview         Total           In Computer Science and Rogineering         0         1         2         2         70         30         Total           In Computer Science and Rogineering         0         1         2         2         70         30         Total           In Computer Science and Rogineering         0         1         2         2         70         30         Total           In Computer Science and Rogineering         0         1         2         2         70         30         Total           In Computer Science and Rogineering         0         0         1         2         2         70         30         Total           In Computer Science and Rogineering         Computer Science and Rogineering         Sc															
<b>1</b> /111	12)	Usin	g Flex and	Bachelor of Technology in Computer Science and Engineering         Vour of Regulation         2020-21           Computer Science and Engineering         Senester         V           Counce Name         1         T         P         Continuous         Marks Distribution           Objectives of this course is to explore the principles, infiltms, and dual structures involved in the design and structure of any computer programming language.         Security and anyse the isola, structure and serantic analyse for infinity.           mplement some phases of the from end of a general compiler.         Course Tower Science and Engineering.         Course Tower and Structure of any computer programming language.         Security and the solar, structure and serantic analyse for for minde the form of the local, structure of a compiler to undertake language.           mplement some phases of the backstend of a general compiler.         Course Tower Science and Engineering.         Course Tower Science and machine code from of cities of the solar structure of any computer programming language.         Science techniques for intermediate code and machine code from of cities of the solar structure of and analyse for intermediate code and machine code from of cities of the solar structure of any computer programming language.         Science techniques for intermediate code and machine code from of cities of the solar structure of any computer programming language.           11         1         2         1         1         2         2         2         1         1         2         2														, CO2,
VIII		opera	ations on	numbers ar	nd variable:	5.									4		C	.03
	401			<b>D</b>									•			-+		
IV	13)	Using	g ⊦Iex and Jage	Bison tools	, create a t	ranslator to	כ convert a	simple pro	gram writ	tten in arbitra	ary langu	age to a pro	ogram in C		n			
		ungu	~~.												2			1,004
	14)	Using	g Flex and	Bison tools	, create a p	program to	convert a s	imple assig	ınment ex	pression into	interme	ediate code.						
v		Ex:-	input: z	= -(a+b-c)											r		CO	
		t1 = a	a + b												4			
		t2 = t	1 – c															

t3 = - t2			
z = t3			
	Total Hours	24	
<b>Essential Readin</b>	zs:		
1. A.V. Aho,	M. S. Lam, R. Sethi and J. D. Ullman, "Compilers-Principles, Techniques and Tools", 2 <sup>nd</sup> ed., 2006, Pear	son Education	1.
2. K. Munee	waran, "Compiler Design", 1st ed., 2013, Oxford Publication.		
3. P.H. Dave	H.B. Dave, "Compilers: Principles and Practice", 1 <sup>st</sup> ed. 2012, Pearson Education.		
Supplementary I	leadings:		
1. Allen I. H	olub, "Compiler Design in C", 1 <sup>st</sup> ed.(Indian print), 2012, PHI.		
2. John Levi	e, "Flex & Bison", 1 <sup>st</sup> ed., 2009, O'reilly.		
3. Torben Æ	dius Mogensen, "Basics of Compiler Design", 1 <sup>st</sup> ed., 2007, DIKU, University of Copenhagen		



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CURRICULUM

	OF TECHNO																
P	rogramr	ne	Bac	helor of	Technolo	gy in Co	mputer Se	cience an	nd Engino	eering		Acade	mic Year	of Regula	ation	2018	8-19
D	epartme	ent	Con	nputer So	cience an	d Engine	ering						Seme	ster		V	1
Co	urse				C	Nureo Non					Credit	Structure			Marks D	istribution	
Co	ode									L	Т	Р	С	INT	MID	END	Total
CS	411				Sof	t Comput	ing			3	0	0	3	50	50	100	200
		This C	ourse	introduces	the soft co	omputing to	echniques				CO1	Able to a	<mark>ppraise</mark> Sof	t Computi	ng applicat	ions	
		This co	ourse i	illustrates t	o design th	e fuzzy log	ic controlle	er			CO2	Able to a	<mark>ppraise</mark> Fuz	zy Logic a	nd choose	application	s
Co	urse	This co technio	ourse o aues	develop an	ability and	skill to im	plement opt	timization		Course	CO3	Able to E	xamine the ion problen	single-obj ns	ective and	multi-object	ive
Obje	ctives	This co	ourse i	illustrates t	o design th	e various i	neural netw	orks		Outcomes	CO4	Able to e	xamine Neu	Iral Networ	k and <mark>dem</mark>	onstrate the	•
		This co	ourse	familiarize	s the applic	ation area	of soft com	nouting tech	hniques		C:O5	Able to s	olve various	s real time	problems i	n different a	application
								iputing tool	iniquee		000	domains					
							Monning	with Drogr		omos (BOs)					Mor		DSO:
No.	COs		21	PO2	DO2						POO	<b>PO10</b>	PO11	<b>DO1</b> 2			
1	CO1		51	FU2	PU3	F04	FU5	FUO	FUI	FUo	FU9	POIU	FUT	PUIZ	F301	F302	F303
2	CO2		2	-	-	- 1	2		-								
2	CO2         2         2         1         1         -																1
<u>з</u>	CO3       2       1       1       1       -																1
5	CO4         2         2         2         2         -															_	1
	Image: Solution of the second seco																
No.	5     CO5     2     2     1     2     -     -     -     -     -       SYLLABUS																COs
	Introd	uction															CO1
I	Chara	cterist	ics of	f Soft Co	mputing,	Applicat	ions of Se	oft Comp	uting.						02		
	Eugay	Logic															
	Fuzzy	Sets	And	Members	hip Fund	tion, Set	Operatio	ons on Fi	uzzy Set	s, Fuzzy If	-Then R	ules, Fuz	zy Reaso	oning,	10		CO2
- 11	Fuzzif	icatior	n and	l Defuzzi	fication,	Mamdan	i Fuzzy I	Models, S	Sugeno	Fuzzy Mod	lels, Tsı	ukamoto	Fuzzy Mo	odels,	12		CO5
	Fuzzy	Logic	Cont	roller, Ap	oplication	IS OF FUZZ	zy Logic,	Fuzzy–C-	-means C	Justering							
	Genet	ic Algo	orithn orithr	n and Op	timizatio ling Sole	n Technic	ques	Mutation	n Fitnes	s Function	Conve	argence l	Multi Ohia	active	08		CO3
	Genet	ic Algo	orithn	n, Particle	e Swarm	Optimiza	tion, Ant	Colony C	Optimizat	tion	, 001176	i genee, i		SCIVE	00		CO5
	Neura	l Netw	orks														
IV	The M	cCullo	ock-Pi	itts Neura	al Model,	Perceptr	on, Neura	al Networ	rk Archit	ectures, Ac	tivation	Function	s, Learni	ng by	11		CO4
	Neura Backn	I Netv	works ation	s, Hebb Algorith	Net, B m	ackprop	agation:	Multi-lay	er Feed	dforward	Net, Ge	eneralized	I Delta	Rule,			CO5
	Baonp	lopug		/ igeniii													
	Hybrid	d Syste	ems	oural Na	tworks	F1177\/ 1	ogic and	L Gonotia		thme Con	otic Ala	orithme	Bacod N				<u> </u>
V	Netwo	orks, F	uzzy	Neural Ne	etworks,	Fuzzy Lo	gic Contr	olled Ger	netic Alg	orithms.	elic Alç	jonunns	Daseu N	eurai	03		CO5
	٨١	-41				klans -	-		U								
	Applic	ations	5 to 5	oive Real	LITE Pro	piems.	<b>-</b>	11									
<b>F</b>	ntial P						Iotal	Hours							36		
ESSe		eading	S . O T		A:					st Cal:4:2-2			tion 0041	-			
1	. J-S.I	<. Jano	J, C−1	ວun, ⊨. №	viizutani, "	ivenuo-Fi	uzzy and S	Son Comp	uung", 1°	∽ ⊨aition, Pe	earson Ir	iula Educa	auon, 2015	<b>)</b> .			

2. S. N. Deepa and S. N. Sivanandam," Principles of Soft Computing", 2<sup>nd</sup> Edition, Wiley, 2011.

 S. Rajasekaran, G. A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications", 1<sup>st</sup> Edition, Prentice Hall of India, 2003

- 1. Samir Roy, Udit Chakraborty, "Introduction to Soft Computing: Neuro-Fuzzy and Genetic Algorithms", 1<sup>st</sup> Edition, Pearson India Education, 2013.
- 2. Kwang H Lee, "First Course on Fuzzy Theory and Applications", 1<sup>st</sup> Edition, Springer-Verlag Berlin Heidelberg, 2005.
- 3. Andries P Engelbrecht, "Computational Intelligence An Introduction", 2<sup>nd</sup> Edition, Wiley, 2018.
- 4. Goldberg, David E." Genetic Algorithms in Search, Optimization & Machine Learning", 1<sup>st</sup> Edition, Pearson Education, 1989.



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						ening				Credit	Structure	Ocific	3101	Marks Di	stribution	•
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CS	413			Pattern I	Recognitic	n			3	0	0	3	50	50	100	200
		To intro	oduce the	fundament	als of pa	ttern reco	ognition a	and its			Able to	explain	and com	ipare a v	variety of	f pattern
		relevanc	e to classica	al and mod	lern proble	ems				CO1	classifica	tion, stru	ctural patt	ern recog	nition, an	d patterr
		To intro	duce the kr	owledge a	hout state	-of-the-art	t algorithn	ns used			Able to	<u>combinat</u>	10n techni	ques.	ate resear	h in the
		in patter	n recognitic	on research		-01-110-211	i aigoittiin	lis uscu		CO2	pattern r	ecognitio	i area alo	ong with	various p	aramete
		1	0								optimiza	tion techn	ique.	0	1	
Co	urse	To intro	oduce Unde	erstand pa	ttern reco	gnition tl	heories, s	uch as	Course	CO3	Apply p	performan	ce evalua	ation met	thods for	patteri
Obje	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $															
	Course bjectives       To introduce Understand pattern recognition theories, such as bayes classifier, linear discriminant analysis.       Course outcomes       Course Outcomes       Course Outcomes       CO3       Apply performance evaluation methods for pattern recognition, and critique comparisons of techniques made in the research literature.         To provide an understanding of pattern recognition techniques in practical problems and a main objective is to be able to identify where, when and how pattern recognition can be applied.       Able to apply pattern recognition techniques to real- world problems such as document analysis and recognition.         To provide knowledge regarding various application of pattern recognition using machine learning model.       Mapping with Program Outcomes (POs)       Able to Implement simple pattern classifiers, classifier combinations, and structural pattern recognizers.         o.       CO3       PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02       PS03         1       CO1       0       1       0															
	practical problems and a main objective is to be able to identify where, when and how pattern recognition can be applied.       CO4       world problems such as document analysis and recognition.         To provide knowledge regarding various application of pattern recognition using machine learning model.       Able to Implement simple pattern classifiers, classifier combinations, and structural pattern recognizers.         Mapping with Program Outcomes (POs)       Mapping with PSOs															
	To provide an understanding of pattern recognition techniques in practical problems and a main objective is to be able to identify where, when and how pattern recognition can be applied.       Able to apply pattern recognition techniques to real-world problems such as document analysis and recognition.         To provide knowledge regarding various application of pattern recognition using machine learning model.       Able to Implement simple pattern classifiers, classifier combinations, and structural pattern recognizers.         Io.       COs       Mapping with Program Outcomes (POs)       Mapping with PSOs         PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02       PS03															
	in the contraction of provide knowledge regarding various application of pattern recognition using machine learning model.       in the contraction of pattern recognition.         o.       COs       Mapping with Program Outcomes (POs)       Mapping with PSOs         o.       COs       PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PSO1       PSO2       PSO3															
		recognit	ion using m	achine lea	rning mod	el.										
No.	COs		<b>D</b> 00	<b>D</b> 000			with Progr	am Out	comes (PO:	S)			DO10	Map	ping with I	
4	004	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02	PS03
1	CO1	0	1	0	1	0	0	0	0	2	0	0	0	1	2	3
2	CO2	1	1	0	1	0	0	0	2	0	0	0	1	3	2	
3 4	CO4	0	0	1	0	2	2	0	0	1	2	1	2			
5	CO5	0	0	1	0	2	2	0	2	0	0	1	1	1	3	
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No.	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$															
	To introduce Understand pattern recognition theories, such as bjectives       Apply performance evaluation methods for pattern recognition, and critique comparisons of techniques in practical problems and a main objective is to be able to identify where, when and how pattern recognition can be applied.         To provide an understanding of pattern recognition techniques in practical problems and a main objective is to be able to identify where, when and how pattern recognition can be applied.         To provide knowledge regarding various application of pattern recognition.         To provide knowledge regarding various application of pattern recognition.         Cost         Mapping with Program Outcomes (POs)         Cost       Mapping with Program Outcomes (POs)         Cost															
T	Dourse jectives     Dourse Bayes classifier, linear discriminant analysis.     Course outcomes     Coarse Outcomes     Coarse Outcomes     Coarse course made in the research literature.     Coarse made in the research literature.     Coarse made in the research literature.       To provide an understanding of pattern recognition can be applied.     To provide knowledge regarding various application of pattern recognition using machine learning model.     Coarse Outcomes     Coarse Coarse world problems such as document analysis and recognition.       Able to apply pattern recognition using machine learning model.     To provide knowledge regarding various application of pattern recognition using machine learning model.     Coarse Coarse world problems such as document analysis and recognition.       Able to implement simple pattern classifiers, classifier combinations, and structural pattern recognizers.     Mapping with PSOs       Able to apply pattern classifiers, classifier combinations, and structural pattern recognizers.     Mapping with PSOs       Able to apply pattern classifiers, classifier constructural pattern recognizers.     Mapping with PSOs       Co1     0     1     0     0     0     2     0     0     1     2       Co2     1     1     0     0     0     2     0     0     1     2       Co3     1     0     1     2     2     0     0     1     2     2       Co3     1     0															
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	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$															
	Outse jectives         Bayes classifier, linear discriminant analysis.         Course Outcomes         CO3         recognition, and critique comparisons of techniques made in the research literature.           To provide an understanding of pattern recognition techniques in practical problems and a main objective is to be able to identify where, when and how pattern recognition can be applied.         CO3         recognition, and critique comparisons of techniques to made in the research literature.           To provide knowledge regarding various application of pattern recognition using machine learning model.         Mapping with Program Outcomes (POs)         Mapping with PSOs           CO3         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS02         PS03           CO1         0         1         0         0         0         0         0         1         2         3           CO2         1         1         0         1         0         0         0         0         0         1         3         2           CO3         1         0         1         0         0         0         0         0         0         1         3         2           CO3         0         0															
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	Para	meter E	stimation	Method	s: Maxin	num-Lik	elihood	estima	tion: Gaus	sian cas	e; Maxin	num a				
	Poste	riori esti	imation; B	ayesian e	estimatio	n: Gauss	sian case									
	Clust	ering														$CO^{2}$
III	Diffe	rent dist	tance func	tions and	d similar	ity meas	sures, Cr	iterion	for clust	ering, N	Iethods c	of cluster	ring -	05		CO2
	partit	ional, hi	erarchical	, graph th	eoretic,	density t	based., C	luster	validity							
	Un-su	ipervise	d learning	g and clu	istering:	Introdu	ction, m	ixture	densities	and ide	entifiabili	ty, maxi	mum	0.7		CO3
IV	likeli	hood est	imates, ap	plication	to norm	al mixtu	res, K-m	eans c	lustering.	Date des	scription a	and clust	ering	05		CO4
	- SIII	manty n	leasures, c	interna ru		of cluster	mg									
	Patter	n recog	nition usir	ng discre	te hidder	n Markov	w models	s: Disc	rete-time	Markov	process,	Extensio	ons to			CO4
V	hidde	n Mark	ov model	s, three	basic p	roblems	of HM	Ms, ty	pes of H	MM, c	ontinuous	s observ	ation	10		CO5
	densi	ties, mul	ltiple mixt	ures per	state, spe	ech reco	gnition a	applica	tions.							
	I					Total	Hours							36		
Esse	ntial R	eadings														
1.	. Patter	n Recogni	tion: An Alg	orithmic A	pproach, B	y M. Naras	imha Murt	y and V.	Susheela De	vi, Spring	ger; 2011 ed	ition				
2.	. Funda	mentals o	tion Rv S T	beodoridis	and K Kor	utroumbas	Бу Braga- 4th Ed A	cademic	Press 2009	auonal Pu	onsning, 20	20				
Supp	lemento	ry Readin	105			Junious,	.ш. <b>Д</b> а, Л									
1	. Patter	n Recogni	tion and Ma	chine Learn	ing, Bv Ch	ristopher F	Bishop. Spr	inger-Ve	erlag New Yo	ork, 2006						
2	. Comb	oining Patt	ern Classifier	rs: Methods	and Algor	ithms, By	Ludmila I.	Kuncher	va, 2nd Editi	on, John V	Viley, 2014					
3	. Patter	n Classific	cation, By R.	O.Duda, P.	E.Hart and	D.G.Stork	, John Wile	ey, 2001								

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Р	rogrami	me	Bac	helor of	Technolo	gyin Com	nputer Sc	ience and	d Engine	eering		Acade	mic Year o	of Regula	tion	2018	J-19
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		To deve measur	elop tł es an	he student' d their imp	s ability to ortance.	understand	l the variou	s centrality	,	Course	CO2	Able to e based on centrality	xplain the c the degree , and α-cen	entrality m , such as d trality.	easures of legree cent	network no rality, eigen	des vector
Co Obie	urse ctives	To prov graphs multiple	vide th and g e com	ne students generalised plex netwo	s with some random gr orks.	knowledge aphs and th	e about vari neir importa	ous randor ance to con	n nect	Outcomes	CO3	Able to ic graph, de random g	lentify vario gree of dist graph chang	ous random tributions, jes with the	n graphs an how averag e number o	d generaliz je propertie f links etc.	ed random s of a
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NO.	COs	PC	D1	PO2	PO3	PO4	PO11	PO12	PSO1	PSO2	PSO3						
1	CO1	2		0	0	0	0	0	2	1	1						
2	CO2	2		3	1	1	0	2	1	0	3	2	1	2	1	2	2
3	CO3	3		2	1	0	2	3	0	1	0	1	3	1	3	2	2
4	CO4	1		0	3	2	0	2	1	0	3	2	1	0	1	2	2
5	CO5	2		0	1	0	2	3	1	0	1	2	1	0	3	2	3
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II	Centra The in Measu	ality Me nportar ures ba	easur nce o sed (	res: of being c on Shorte	entral, Co est Paths	onnected , Group C	Graphs a Centrality;	and Irredu	ucible N	latrices, De	egree and	d Eigenve	ctor Cent	rality,	6		CO2
111	Rando Erdos Comp Gener The W Degre	om Gra and R oonent, ralised Vorld W ee Distri	phs: enyi Scie Ranc 'ide V ibutio	i (ER) Mo Intific Col dom Grap Web, Pov on, Scale	odels, De llaboratio ohs: ver-Law E e-Free Rai	gree Dist n Networ Degree Di ndom Gra	ribution, ks, Chara stributior aphs, Pro	Trees, C acteristic ns, The C bability G	ycles a Path Le onfigura enerati	nd Comple ength; ation Mode ng Functio	ete Subg I, Rando ns;	raphs, Gi om Graphs	ant Conn s with Arb	ected bitrary	9		CO3
IV	Small Six D Variat	-World )egree tions to	netw of S the	vorks: Separatio Theme, N	n, The E lavigating	Brain of g Small-W	a Worm, /orld Netv	Clusteri works;	ing Coe	efficient, T	he Watt	s-Strogat	z (WS) N	lodel,	6		CO4
V	Mode Citatio being Mode	l of Gro on Netw Prefere ls;	wing vorks entia	g Graphs s and the I and Lin	: Linear P ear, Varia	referentia tions of t	I Attachn he Them	nent, The e, Can lat	Baraba ecomer	isi-Albert (E 's Make it?	BA) Mode The Fitn	el, The im ess Mode	portance I, Optimis	of ation	6		CO5
VI	Degre The Ir Netwo	e Correnternet	elatio and ( ewma	ons: Other Co an's Corr	rrelation elation C	Networks oefficient	, Dealing . Models	with Cor of Netwo	related	Networks, 1 Dearee-D	Assortat egree Co	tive and D	isassorta s:	tive	5		CO6

Total Hours	36	
Essential Readings		
1. Latora V, Nicosia V, Russo G. Complex networks: principles, methods and applications. Cambridge University Press; 2017.		
2. Cohen R, Havlin S. Complex networks: structure, robustness and function. Cambridge university press; 2010.		
3. Estrada E. The structure of complex networks: theory and applications. Oxford University Press; 2012.		
Supplementary Readings		
1. Boccaletti S, Latora V, Moreno Y, Chavez M, Hwang DU. Complex networks: Structure and dynamics. Physics reports. 2006 Feb 1;424	4(4-5):175-308.	
2. Meyn S, Meyn SP. Control techniques for complex networks. Cambridge University Press; 2008.		
3. Ganguly N, Deutsch A, Mukherjee A. Dynamics on and of complex networks: Applications to biology. Computer Science, and the Social	al Sciences. Birkhäu	user. 2009.



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CURRICULUM

	OF TECHNOR																
Pi	rogramr	ne	Bac	helor of	Technolo	gy in Cor	nputer Se	cience an	d Engin	eering		Acade	mic Year	of Regula	tion	2018	-2019
D	epartme	ent	Con	nputer So	cience an	d Engine	ering						Seme	ster		V	11
Co	urse				Co	urco Nor					Credit S	Structure			Marks Di	stribution	
Co	ode				0	uise maii	IE			L	Т	Р	С	INT	MID	END	Total
CS	417				Blockcha	ain Techr	ologies			3	0	0	3	50	50	100	200
		This co systems	ourse s, cry	explains ptocurrenc	the need y, cryptogra	and work aphic primi	ing princi tives.	ple of blo	ckchain		CO1	Able to demonstr cryptogra	explain ate the phic primi	the need fundam tives.	of Block entals o	chain sy of crypt	stem and ocurrency,
Cou	ırse	This co technolo	ourse ogies	describes , tools, and	the in-de implement	oth knowle tation strate	edge and egies.	concept of	recent	Course	CO2	Able to demonstr protocol	demonstra ate the w	ite the too orking prir	ols, Nakam ncipals of	oto conse payment	ensus and verification
Obje	ctives	This co transact	ourse tion tl	provides hrough mir	the valid ners and Co	lation and Insensus A	verification Igorithms.	on techniq	ues of	Outcomes	CO3	Able to d as per the	escribe and application	d analyse t on requirem	he various ents.	consensus	s algorithm
		This co	ourse	provides	the mech	anism for r distribute	the deve	lopment of	f smart		CO4	Able to	design an	d develop	the comm	nunication	model for
		contract	u sin	ig soluty i	anguage io			0113.			CO5	Able to d real time	lesign, dev application	velop and a is.	nalyse the	real time	distributed
							Mapping	with Progra	am Outc	omes (POs)	)	•			Мар	ping with	PSOs
NO.	COs	PO	)1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1         3         3         -         -         -         -         -         -         2         -         -         -         -         -         2         -         -         -         -         -         -         2         -         -         -         -         -         -         2         -															-	3
2	CO2     3     3     1     2     -     -     -     2       CO2     3     3     3     1     2     -     -     1     -     -       CO3     1     2     3     3     2     2     -     -     -     -														2	3	2
3	CO2       3       3       3       1       2       -       -       1       -       -         CO3       1       2       3       3       2       2       -       -       1       -       -       -         CO3       1       2       3       3       2       2       - <td< td=""><td>2</td><td>3</td><td>3</td></td<>														2	3	3
4	CO3         1         2         3         3         2         2         -															3	2
5	CO4         1         2         3         3         2         3         -         2         -															3	3
									SYLLA	BUS							
No.								Content							Hours		COs
I	Block Ledge Permi	chain In er: DLT ssion	trod con	luction ar cept, feat	nd Overvi tures, ber	ew: Back nefits and	ground a I relevand	nd evolut ce in appl	ion of to lication,	echnology, Security a	Distribu nd Priva	ted syste cy: Crypt	ms, Distr ography,	ibuted Hash,	03		CO1
	Crypt	ographi	ic pr	imitives:	Symmet	ric crypto	ography,	A Symm	etric cry	ptography	, DES, H	ash func	tions, P	atricia	04		CO1
П	trees, Digita encrv	Distrib I signat ption. S	utec ture Sianc	d hash ta algorithn cryption.	ables (DH n (ECDSA Zero kno	Ts), Digi (), How to wledge p	tal signa o generat roofs. Bli	tures, Sig e a digita ind signal	gn then I signat tures. Ei	encrypt, E ure, ECDSA ncoding scl	incrypt t A using ( hemes	hen sign: OpenSSL	Elliptic Homomo	Curve orphic			CO2
111	Bitcoi units,	n, Bitco Base58	oin d BChe	lefinition	, Keys an ding, Van	d addres	ses, Pub	lic keys i	n bitcoi	n, Private k	keys in b	oitcoin, Bi	tcoin cui	rrency	04		CO2
IV	Trans Opco	actions des, Typ	, Th pes o	ne transa of transa	ction life	e cycle, insaction	The tran fee, Con	saction stracts, Tracts	structur ansactic	e, The scr on malleabi	ipt lang lity, Trar	uage, Consaction p	ommonly ools	used	04		CO3
	Block	chain ,1	The s	structure	of a bloc	k, The st	ructure o	f a block	header,	The genesi	is block	Mining, T	ask of mi	iners	05		CO3
V I	CPU,	GPU, FI	PGA	, ASICs, I	Mining po	pols	, me mi	iing aigoi	, i	ne nasning	rate, will	iing syste	:115				CO4
VII	The b	itcoin n	etwo	ork: Wall	ets, Payn	nents: Bit	coin inve	estment a	nd buyi	ng and sell	ing bitco	oins,Bitco	oin instal	lation,	04		CO3
• 11	Altern	native C	oins	: Theore	tical foun	dations,	Alternativ	es to Pro	of of W	ork, Non-ou	utsource	able puzz	les Diffic	ulty	05		CO4
	adjus altcoi	tment a ns, Con	nd ro sens	etargetin sus algor	g algorith ithms, Co	ims, Bitc bin, Minir	oin limita 1g guide,	tions, Ext Zcash	tended p	protocols o	n top of	bitcoin D	evelopme	ent of			
VIII	Smart Trans Ethere mecha	t Contr actions eum vir anism	racts , Co tual	s: Defin ontract cr machine	ition, Ri reation tr e (EVM),	cardian ansactio Precomp	contract n, Messa iled cont	ts, Ether ge call tr racts, Ac	reum 1 ansactio counts,	01 Introdu on, Elemen Blocks, Tr	uction: its of the ransaction	Ethereur e Ethereu on and B	n block Im block lock vali	chain, chain, dation	04		CO5
IX	Ether the cu	eum De Irrencie	velo s.	pment: T	ools and	Client, I	ntroducti	on to Sol	idity, Hy	/perledger,	Protoco	ls, Applic	ations o	utside	03		CO5
							Te	otal							36		
Esse	ntial Re	eadings	;											· ·			
1.	Imran	Bashir, N	Maste	ering Block	chain,1/E,		7.				-			_	-		

2. Melanie Swan, Blockchain: Blueprint for New Economy, 1/E, O'Reilly Media, 2015.

- 3. Sam Goundar, Blockchain Technologies, Applications And Cryptocurrencies: Current Practice And Future Trends, 1/E Word Scientific, 2020

- 1. Alan T. Norman, Blockchain Technology Explained: The Ultimate Beginner's Guide About Blockchain Wallet, Mining, Bitcoin, Ethereum, Litecoin, Zcash, Monero, Ripple, Dash, IOTA and Smart Contracts, 1/E, [United States?] : Alan T. Norman, 2017
- 2. Jan Veuger, Blockchain Technology and Applications, 1/E, Nova Publisher, 2019
- 3. Andreas Bolfing, Cryptographic Primitives in Blockchain Technology : A Mathematical Introduction, 1/E, Oxford University Press, 2020.

A HOUNE OF TECHNOL	A L I I I I I I I I I I I I I I I I I I				Natior	n <b>al Inst</b> An Ir	<b>itute o</b> istitute o	<b>f Tech</b> f Nationa	<b>nology M</b> o I Importance	eghal	aya				CUR	RICULU	м
Pr	ogramme	Bache	lor of T	echnolog	gy in Co	mputer S	Science	& Engin	eering		Ac	ademic Regula	Year of ation	:	2	018-19	
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Course			Co	urso Nan					Cre	edit Stru	ucture			Mark	s Distrib	ution	
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CS 419		High	Perfor	mance A	rchitect	ure			3	0	0	3	50	50	100	200	)
	COB1: To develop and complex instruc COB2: To develop	the stud tion set the student	dent's a archite udent's	bility to u cture and ability to	inderstan its perfo underst	nd the con rmance.	ncept of	ntals of		CO1	Able to princip	b undersoles and	stand the perform	e compu nance e	ter archit nhancen evolutio	ectural c nent stra	lesign tegies ferent
	pipelining, identify possible hazard free	the cau solutio	ise of h	azards a	nd apply	different	t approad	ches for			compo archite	onents octure an	of of d distril	compu	ter, 1 emory ar	nultiproc chitectur	cessor re and
	<b>COB3:</b> To provide	e the st	udents	with som	e know.	ledge and	d analysi	is skills			distrib	uted sys	tems.				
Course Objectives	execution. COB4: To develop	the stu	dent's a	bility to	understa	nd the co	ncept of	shared-	Course Outcomes	CO2	Able to pipelin	o <mark>solve</mark> ie stru	the per ctures,	formanc interco	e related	d problen etworks	ms of and
	memory, distributed architecture.	d-memo	ory, cac	he cohere	ence pro	blem and	ł multipi	rocessor			memor	ry.					
	<b>COB5:</b> To provide system with its designation of the system with its designation.	the stugn princ	idents v viples.	with som	e basic 1	knowledg	ge of dis	tributed		CO3	Able to compu interco memor	to anal ting e onnect ry archit	yze the evolution network tecture	n on as, men	mance o pipelin nory an	lifferenc e struc d distri	es of ctures, ibuted
	No	COs		-		Ма	apping w	ith Progr	am Outcome	s (POs)	)		1	-	Марр	ing with	PSOs
	110.	003	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	1	CO1	3	1	1	-	-	-	-	1	1	-	-	2	-	1	-
	2	CO2	3	3	2	2	2	-	-	1	1	-	-	2	1	1	-
	3	CO3	3	3	3	2	2	-	-	2	2	-	-	2	2	2	-
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	INO.	DIGG		CI		CDIC			a araa	<u> </u>		<u>.</u>		Hours		COS	
Module 1: 1 Organizatio	Review of Basic	set are	process	sors, Chai res.	acteristi	cs of RIS	C proces	sors, RIS	C vs. CISC,	Classifi	cation o	t instruc	ction	02		CO1	
Architectur	cal Techniques	Revie thread	w of pe I level a	rformanc ind proces	e measui ss level.	ements, l	Basic par	allel pro	cessing techn	iques: i	nstructio	on level	,	03	(	CO1, 2 8	. 3
course Objectives       COB3: To provide the students with some knowledge and analysis skills associated with the principles of superscalar technique and speculative execution.       Co Co Co Co Co Co Co Co Co Co Co Co Co C							uction pipeli	nes, Ha	azards ir	n a pipe	line:	04		C01			
Module 2: 1 Parallelism	Instruction Level	Overv techni	view of iques a	hazard r nd soluti	esolutior on of it	techniq s related	ues, Dyr problen	namic ins ns. Instru	struction sche uction-level	eduling, parallel	, Branch ism usi	n predic ng soft	tion, ware	04		CO2	
		Job sc	hedulir	ng using r	eservatio	n tables								04	СО	1, CO2,	CO3
		Super	scalar t	echniques	, Specul	ative exec	cution, C	ase study	: Intel family	y of pro	cessors.			02		C01	
		Under	rstand a	nd design	of Cent	ralized vs	s. distribu	uted share	ed memory, I	ntercon	nection	topolog	ies.	03		CO1,2 8	.3
Module 3: I	Programme         Bachelor of Technology in Co           Department         Computer Science & Engineer           3e         Course Name           19         High Performance Architecti           COB1: To develop the student's ability to understar and complex instruction set architecture and its perfor         COB2: To develop the student's ability to understar and complex instruction set architecture and its perfor           COB2: To develop the student's ability to understar and complex instruction set architecture and its perfor         COB2: To develop the student's ability to understar and complex instructions.           COB3: To provide the students with some knowl associated with the principles of superscalar tect execution.         COB4: To develop the student's ability to understar memory, distributed-memory, cache coherence proarchitecture.           COB5: To provide the students with some basic I system with its design principles.         Intervention           No.         COS         PO1         PO2         PO3           1         COI 3         1         1         2         CO2         3         3         3         3           No.         COB a         RISC processors, Characteristic set architectures.         Review of performance measur thread level and process level.         Basic concepts of pipelining. Structural, data and control hazz         Overview of hazard resolution of it approaches.         Job scheduling using reservatio Superscalar techniques, Specula				mmetric	Multipro	cessors.						03		CO1		
		Cache	e cohere	ence probl	em, mer	nory cons	sistency.							02		CO2&3	}
		National Institute of Technology Meghalay. An Institute of National Importance         ramme       Eclence & Engineering         Computer Science & Engineering         Credit Struct         Credit Struct         Credit Struct         Credit Struct         Credit Struct         Credit Struct         Course Name       Credit Struct         Credit Struct         Course Name       Credit Struct         Course Name       Credit Struct         Course Name       Credit Struct         Credit Struct         Course of hazards and apply different approaches for ossible hazard free solutions.       Course Outcomes         OBE: To provide the student's ability to understand the concept of shared- memory, distributed-memory, cache coherence problem and multiprocessor- chitecture.       Superscalar technique and speciality with Program Outcomes (POS)         No.       Cool PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8         SYLLABUS         No.       Cool PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8         SYLLABUS         No.       <					02		CO1								
Module 4: l	Process Level	Distri	buted C	computers	, Cluster	Ś								05		CO1	
Parallelism		Grid (	Comput	ing: unde	rstand fe	atures of	grid con	nputing a	nd implemen	t of it.				02		CO1&2	2
		<u> </u>			Total	Hours								36			

#### **Essential Readings**

- 1. Hamacher, Carl, Zvonko Vranesic, and Safwat Zaky. *Computer organization*. McGraw-Hill, 2002 edition.
- 2. Hennessy, John L., and David A. Patterson. Computer architecture: a quantitative approach. Elsevier, 2011 edition.
- 3. Hwang, Kai, and Naresh Jotwani. Advanced computer architecture, 3e. McGraw-Hill Education, 2016 edition.

#### **Supplementary Readings**

- 1. Hwang, Kai. Advanced Computer Architecture with Parallel Programming. McGraw-Hill, 1993 edition.
- 2. "Intel® 64 and IA-32 Architectures Optimization Reference Manual",

http://www.intel.com/content/www/us/en/architecture-and-technology/64-ia-32-architectures-optimizationmanual.html

- 3. "Intel® 64 and IA-32 Architectures Software Developer Manuals", http://www.intel.com/content/www/us/en/processors/architectures-software-developermanuals.html
- 4. Nvidia Kepler Compute Architecture White Paper", <u>http://www.nvidia.com/object/nvidia-kepler.html</u>

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Pr	ogram	me	Bac	helor of	lechno	logy in C	compute	r Scienc	e and E	ngineerir	g	Acadei	nic Year	of Regula	ation	2018	3-19 
De	epartmo	ent	Con	nputer S	cience a	and Engi	neering						Seme	ster		V	<u>  </u>
Col	lrse				Co	urse Nar	ne				Credit	Structure			Marks Di	stribution	<u> </u>
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		process	sing f	undamen	tals	ne comp	onents of	i digitai	mage		CO1	Able to a in Image	cquire kno processin	owledge a g.	bout the b	basic conc	epts used
		To intro	oduce	e the math	nematical	foundatio	on related	in this dor	main.		CO2	Able to hardware	interpret , software	the imag , digitizat	e procession	sing fund	amentals:
		To intro the spat	oduce tial a	e ability to nd freque	o apply in ncy (Four	nage proc rier) doma	essing tech	hniques ir	n both		CO3	Able to detection	implemen , feature d	t various letection.	algorithm	is for vari	ous edge
Co Obie	urse ctives	To pro digital	vide ima	an under	standing represe	of descrip	ption and	analysis o	of how d_and	Course Outcomes	CO4	Able to and resto	describe the the the the describe the description described by the description descripti d	he import	ance of in	mage segi	nentation
0.010		process	sed.	iges ure	represer	need, ma	impulated,	, encode	u unu	0	CO5	Students	will be ab	ble to acqu	ire knowl	ledge abou	ıt various
		Provide implem	e an nentat	understa tion and p	nding wi performan	th empha	usis on al tion.	lgorithm	design,		CO6	Students various C	will be a	ble to un	derstand 1 ls.	the Comp	arison of
		To be a	able t	to discuss	the real	life applic	ation of i	mage proo	cessing				<b>F</b>				
		in vario	ous pi	roblems.											1		
No.	COs						Mapping v	with Progr	am Outo	comes (POs	5)		1	1	Мар	ping with	PSOs
		PO	1	PO2	PO11	PO12	PSO1	PSO2	PSO3								
1	CO1	2		1	0	0	3	0	3								
2	CO2	1		1	0	0	2	0	2								
3	CO4	0		2	0	0	2	3	2								
+ 5	CO5	0		2	0	1	2	3	3								
6	CO6	0		0	2	1	2	2	0								
U				-			-	-	SYLLA	BUS	-		_	-		_	
No.							(	Content							Hours		COs
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	Metri Quali Segm	c and ty, imag <b>entatic</b>	topc ge si on:	noothin	properti g, Edge	es of D detector	s and qu	nages, F antificati	listogra	am, entro asures	py, V1s	ual Perce	eption, I	mage			CO2
Π	Thresh thresh Splitt	hold o olding	dete , Ed littir	ction n ge relax	nethods, ation, B lerging	Optim order tra Watersh	al Throacing, H	esholdin ough Tr	g, Edg ansforn	ge basec ns, Regio	n based	segment	Edge in ation: Re	mage egion	07		CO3
	Imag Decis	e Enha	ince	ment in	the spa	tial don	nain:		I. Inhonor		na anith	matic/lag	ia anara	iona			CO2
III	Basic Basic Imag 1D Fo	s of spa e Enha	atial ance trans	filtering ment in form-2E	the free Fourie	rison bet <b>quency</b> r transfo	ween sm domain: orm and	its Inver	and shares	arpening soothing &	spatial fi	ilters.	iency do	main	10		CO3
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V	Image	e Forge	ery,	Types of	of image	e forgery	v, differe	ent tamp	ering n	nethods,	letection	n and cla	ssificatio	on of	06		CO5
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	Bachelor of Technology in Computer Science and Engineering         Academic Year of Regulation         2018-19           epartment         Computer Science and Engineering         Semestor         VI           rsec Code         Course Name         Pro-Requisite         Credit Structure         Marks Distribution           23423         Artificial Intelligence         None         3         0         0         3         56         50         100         200           3423         Artificial Intelligence (A)         None         3         0         0         3         56         100         200           This course familiations of Artificial Intelligence (A)         This course plants into place and a functional mediance, planning machine teaming machine team																
P	rogramme	e Ba	chelor of	Technol	logy in C	omputer	Science	and Engine	ering			Acade	mic Year	of Regul	ation	2018	8-19
D	epartment	t Co	mputer S	Science a	nd Engir	eering		-					Seme	ster		V	11
Cou	rea Cada			Cours	no Nomo			Bro Bo	quicito		Credit	Structure	<b>;</b>		Marks D	istributio	n
000				Cours				FIG-NG	yuioit <del>e</del>	L	Т	Р	С	INT	MID	END	Total
C	CS423			Artificial	Intelliger	ice		No	ne	3	0	0	3	50	50	100	200
		This co	ourse famil	iarizes the	basic princ	iples, tech	niques		CO1	Able to a	nalyze co	ncepts an	d principle	s of Artifi	cial Intelli	gence (Al	) for their
		This co	ourse expla	ins the bas	sic principl	es to solve	)	-	CO2	Able to a	ppraise /	l techniqu	les based	on their s	trengths a	and limita	tions and
		This co	ms using A ourse intro	duces logio	elligence. c based Al 1	technique,	planning	-		decide th	eir applic	ability to h	iuman-ceni	tered prob	lems.		different
C	Course	algorit	hms, proba	bility base	d Al techni	que and so	ome	Course	CO3	algorithm	s of Al te	chniques t	to solve the	ons of p ose proble	ems.	w. r. t.	amerent
Ob	jectives	macrim	le learning	Inducis Idi		orving.		Outcomes	CO4	Able to	solve p	roblems	using log	ic based	algorith	ms and	planning
								_	001	algorithm	s.						
								_	CO5	Able to se	olve prob	lems using	g probabilit	y based a	and uns	unervised	machine
	, ,								CO6	learning r	nodels.	olenia usi	ig basic s	uper viseu			machine
No	COs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO1         PO12         PS01         PS02         PS03           CO1         3         2         1         1         0         0         0         0         0         1         1         1         1           CO2         3         2         1         1         0         0         0         0         0         1         1         1         1           CO2         3         2         1         1         0         0         0         0         0         1         1         1         1           CO3         3         3         3         2         0         0         0         1         1         1         1																
	000	COS         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS02         PS03           CO1         3         2         1         1         1         0         0         0         0         0         1         1         1         1           CO2         3         2         1         1         0         0         0         0         0         1         1         1         1           CO2         3         2         1         1         0         0         0         0         0         1         1         1         1         1           CO3         3         3         3         2         0         0         0         1         1         0         3         2         0															
1	CO1	CO1       3       2       1       1       0       0       0       0       0       1       1       1       1         CO2       3       2       1       1       1       0       0       0       0       0       1       1       1       1         CO2       3       2       1       1       0       0       0       0       0       1       1       1       1         CO3       3       3       3       2       0       0       0       1       1       0       3       2       0															
2	CO1       3       2       1       1       1       0       0       0       0       0       1       1       1       1         CO2       3       2       1       1       1       0       0       0       0       0       1       1       1       1         CO2       3       2       1       1       1       0       0       0       0       0       1       1       1       1         CO3       3       3       3       2       0       0       0       1       1       1       0       3       2         CO4       3       3       3       2       0       0       0       1       1       1       0       3       2															1	
3	CO2       3       2       1       1       1       0       0       0       0       0       1       1       1         CO3       3       3       3       3       2       0       0       0       1       1       1       0       3       3         CO4       3       3       3       2       0       0       0       1       1       1       0       3       3         CO5       3       3       3       2       0       0       0       1       1       0       3       3															2	0
4	CO4	CO3       3       3       3       2       0       0       0       1       1       1         CO4       3       3       3       3       2       0       0       0       1       1       1         CO4       3       3       3       3       2       0       0       0       1       1       1         CO5       3       3       3       2       0       0       0       1       1       1															0
5	CO5	CO4     3     3     3     2     0     0     1     1       CO5     3     3     3     2     0     0     0     1     1       CO6     3     3     3     3     2     0     0     0     1     1															0
6	CO6	CO4       3       3       3       3       2       0       0       0       1       1       1       0         CO5       3       3       3       3       2       0       0       0       1       1       1       0         CO5       3       3       3       3       2       0       0       0       1       1       0         CO6       3       3       3       2       0       0       0       1       1       0															0
	1							SYLLA	BUS								
No.							Cor	itent							Hours		COs
I	3       CO6       3       3       3       3       2       0       0       1       1       1       0       3       2       0         SYLLABUS         0.       Content       Hours       COs         Overview; Types of AI; Turing test; Intelligent agents; Knowledge representation; AI technique Solving Problems by Searching: AND/OR Graphs; Uninformed search - Depth First Search, Breadth First Search, DFID; Heuristic search - Generate and Test, Hill Climbing, stochastic heuristic search :- Simulated Annealing, Best Constraint satisfaction problems - constraint satisfaction search; Means-ends analysis       20       CO1, CO2, CO3         1       First Search methods - Particle Swarm Optimization Game Playing - Minimax algorithm, Alpha-beta pruning       Means-ends analysis       20       CO1, CO2, CO3																
Ξ	Building logic; R Plannin	g a knov esolutio g; goal	wledge b on - refut stack pla	ase: Prop ation pro inning; p	oositiona oofs strate artial ord	l logic, fi egies in l er plann	rst order FOPL; Th ing	r predicate lo neorem Prov	ogic (FO ing in Fi	PL); Infer irst Order	ence in Logic	first ord	er predic	ate	06		CO4
III	Uncerta	in knov	vledge ar	nd reasor	ning; Kno	wledge i	represen	tation using	probabi	ilities; Ba	yesian I	Networks	5		03		CO5
IV	Overvie algorith	w of dif m; Dec	iferent fo	rms of le es; Naive	arning: u e Bayes' (	nsuperv Classifie	ised, sup r; Artifici	ervised, ser al Neural Ne	ni-super tworks	vised; K-	means	clusterin	ıg		05		CO6
V	Introduc	ction to	Expert S	systems											02	CO CC	1, CO2, 3, CO6
	·						Total Ho	urs							36		
Ess	ential Rea	adings												· · ·			
	I.S.Rus	sell and	I P. Norvig	g, "Artificia	al Intellige	nce: A M	odern Ap	proach," Pea	rson, 4 <sup>th</sup>	edition, 2	020.						
-					" A	linte III er e in	" \				047			· · ·	-		

2. E. Rich, K. Knight and S. B. Nair, "Artificial Intelligence," McGraw Hill Education, 3<sup>rd</sup> edition, 2017.

3. C. Bishop, "Pattern Recognition and Machine Learning," Springer, 1<sup>st</sup> ed. 2006. Corr. 2<sup>nd</sup> printing 2011 edition.

- 1. D. W. Patterson, "Introduction to artificial intelligence and expert systems," Pearson Education India, 1<sup>st</sup> edition, 2015.
- 2. I. Bratko, "Prolog Programming for Artificial Intelligence," Addison Wesley, 4<sup>th</sup> edition, 2011.
- 3. S. O. Haykin, "Neural Networks and Learning Machines," Pearson Education India, 3<sup>rd</sup> edition, 2016.
- 4. D. Jurafsky and J. H. Martin, "Speech and Language Processing," Pearson Education India, 2<sup>nd</sup> edition, 2013.



An Institute of National Importance

	OF TECHNOLO	•															
Pr	rogramr	ne	Ba	chelor of	Technolo	gy in Cor	nputer Se	cience an	d Engiı	neering		Acade	mic Year	of Regula	ation	2018	3-19
De	epartme	ent	Co	mputer So	cience an	d Engine	ering						Seme	ster		V	11
Со	urse				Co	ourse Nam	ne.				Credit	Structure			Marks D	istribution	
Co	ode									L	Т	Р	С	INT	MID	END	Total
CS	425	This		/	Advanced	Web Teo	chnology	,		3	0	0	3	50	50	100	200
		techno	cours nt gro plogie	e familiariz owth stages <u>s for web ar</u>	s of world	wide web	and softw - web 2.0 t.	and web	ectures, 3.0 and	-	CO1	Able to software developn Able to c	analyze the architectu	he underl ires for ployment. ferent dist	ying comp suitability ributed obje	of web	application
			ourse	introduces	different di	stributed o	bject mode	els.	alovant	-	CO2	selection	as per nee	d.	wah nagaa		
Со	urse	protoc	ols.		es unieren	it e-comm	erce mou	iers and r	elevalit	Course	CO3	elements	, CSS, XML	, XSL and	XQuery.	using van	
Obje	ctives	This c client JSP ar	ourse side nd Sei	e familiarize and server rvlets.	s the use of side progr	of HTML, C amming u	SS, XML, sing JavaS	XSL, XQue Script, AJAX	ry, and K, PHP,	Outcomes	CO4	Able to scripting	construct J	JavaScript	and AJAX	code for	client side
											CO5	Able to	construct ( and Servie	code for a	server side	programn	ning using
										-	CO6	Able to	propose v	web appli	cation desi	igns for d	ifferent e-
							Mapping	with Proor	am Out	L comes (POs)		DUSINESS	models.		Man	pina with	PSOs
No.	COs	P	01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	-	3	2	1	1	1	0	0	0	0	0	1	0	1	1	0
2	CO2		3	3	2	1	2	1	0	0	0	0	1	0	3	2	1
3	CO3		3	3	3	2	2	1	0	0	1	0	1	0	3	2	1
4	CO4		3	3	3	2	2	1	0	0	1	0	1	0	3	2	1
5	CO5		3	3	3	2	2	1	0	0	1	0	1	1	3	2	1
6	CO6		3	2	2	2	2	1	0	0	1	0	1	1	2	1	1
					I		I		SYLLA	ABUS				1			
No.								Content							Hours		COs
I	Introd Comp	uction uting:	; Ba C/S	sics of Int Computin	ernet; Re ig, Fat clie	cent Web ent VS Fa	technol t Servers	ogies: A c s, Middlev	ase stu vare, N·	udy on WWV -tiered Softw	V, web 2 vare Arc	.0; Client hitecture	Server		03		CO1
II	Protoc	cols: H	ITTP	, FTP, SM	TP, POP										01		CO1
111	Web E	Browse	er: Bi	rowser Ar	chitectur	e, Config	uration o	f Netscap	e and I	E					01		CO1
IV	Apach	ne Tom	ncat <sup>v</sup>	Web Serv	er Archite	ecture: Ai	chitectu	re, Server	Featur	es, Configu	ation of	Apache <sup>-</sup>	Tomcat		02		CO1
V	Sema	ntic we	eb ar	nd suppor	ting tech	nologies									02		CO1
VI	Computer Science and Engineering         Deduction         Computer Science and Engineering         VII           rise         Courter Science and Engineering         Image: Courter Science and Engineering         VII           rise         Courter Science and Engineering         Image: Courter Science and Engineering         VII           rise         Advanced Web Technology         3         0         0         3         50         90         90         200         20         20         Science and Sc																
VII	Marku XML	ıp Lan	guaç	ges and tl	heir gram	mars: SC	GML, DTI	D Resour	ces, H1	ſML, CSS, X	ML, XSI	L, Query	Language	es for	15		CO3

VIII	Introduction to responsive web design	01	CO3
іх	Client side scripting: JAVASCRIPT, AJAX; Server side programming using PHP, JSP and Servlets	06	CO4, CO5
x	E-business models; E-commerce and WWW; secure electronic payment protocols; e-commerce payment systems; web based marketing Search engine and directory registration; e-commerce site designing tools	03	CO6
	Total Hours	36	
Esse	ential Readings		
1	. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson Education India, 1 <sup>st</sup> edition, 2008.		
2	. Luke Welling, Laura Thomson, "PHP and MySQL Web Development", Pearson Education India, 5 <sup>th</sup> edition, 2016.		

- 3. Joel Murach, Michael Urban, "Murach's Java Servlets and JSP", Mike Murach & Associates, 3<sup>rd</sup> edition, 2014.
- 4. David Whiteley, "e-Commerce: Strategy, Technologies and Applications", McGraw Hill Education, 1st edition, 2017.
- 5. w3schools Tutorials, http://www.w3schools.com/

- 1. P. Deitel, H. Deitel, A. Deitel, "Internet and World Wide Web: How to Program", Pearson Education, 5<sup>th</sup> edition, 2018.
- 2. Dino Esposito, "Modern Web Development: Understanding Domains, Technologies, And User Experience", 1st edition, PHI Learning, 2016.
- 3. Budi Kurniawan, "Servlet & JSP: A Beginner's Tutorial", Brainy Software, 1<sup>st</sup> edition, 2016.
- 4. Uttam K. Roy, "Web Technologies", Oxford University Press, 1<sup>st</sup> edition, 2010.

A THE REPORT OF TECHNOLOGY				National Institute of Technology Meghalaya An Institute of National Importance												CURRICULUM					
Programme			Ba	Bachelor of Technology in Computer Science & Engineering         Academic Year of Regulation									1	2018-19							
De	epartmer	nt	Co	mputer	Science	& Eng	ineerin	g						Sem	ester			VII			
Course Code				Cou	ırse Nan	ne				T	Cred	it Struc	cture	C	INIT		Marks I	Distributio	n	Total	
CS 427			Softw	vare De	fined N	letwor	king			<u>L</u> 3		1 0	P 0	3	50		50	100 END		200	
	<ul> <li>COB1: To develop students' ability to understand the concepts of traditional networks with its limitations and the need to move to Software Defined Networks.</li> <li>COB2: To develop the students' ability to understand the</li> </ul>											CO1	Able	e to	Understand the			esign pr	incip	es and	
	fundar flexibi	ndamentals of SDN, its planar architecture and to understand the xibility of multilevel pipeline processing.performance enhancement performance evolution of di <b>DB3:</b> To provide the students with knowledge of the working ofImage: Comparison of the student of the												differen	it strategies that adopted in different network components.						
Course Objectives	SDN table r COB4 adding the pao	betweer natching t: To cr g/deletin ckets.	n the con g. reate swit ng flow e	troller a tches an ntries in	and data ad desig side the	n plane ning ne table a	and em tworks nd learr	by ma	on the inually dissect	Course Outcomes	urse omes		Able SDN engi	e to <mark>So</mark> I, inclu neering	e perf nose :	formance in routi	rmance related problems routing, optimizing traff				
	COB4 adding the pac	COB4: To create switches and designing networks by manually adding/deleting flow entries inside the table and learning to dissect the packets.       CO3       Able to Analyze the performance of the table and learning to dissect the packets.											ormance of routing, optimizin								
N.	·	Mapping								ram Outcom	es (PC	Ds)	I					/lapping v	vith PS	SOs	
INO.		COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	7 PO8	PO	9	PO10	PO	11 P	012	PSO	D1	PSO2	PSO3	
1		CO1	3	1	1	-	-	-	-	1	1		-	-		2	-		1	-	
2		$CO_2$	3	3	2	2	2	-	-	1	1		-			2	1		1	-	
5		005	3	3	3	2	2	-	- SY		2		-			2	2	,	2	-	
No.									Conter	nt							Ho	ırs	C	Os	
I		Introd Mana Lowe Desti	luction agement ering oj nation b	to Trac Plane perating based fo	ditional , Flov g cost prwardi	netwo w tabl s ,Sin ing. ,Fo	orks: 7 e, Lim gle fl orCES	Fraditic nitatior low ta	onal n ns of t ıble, H	etworks, traditional Flexibility	Con netw issu	ntrol 1 vorks- es, P	Plane, Need ropriet	Data for sin ary pro	Plane nplifica otocols	and ation, and	8		CO 1, 2 & 3		
п	II Introduction to SDN: Software defined networks, SDN Planes-Dataplane, Control Plane, Application Plane, OpenFlow, Open Network Foundation, Protocol-Encryption, Northbound & Southbound API, Multi-level flow table and pipeline processing, Group table, Meter table-Meter bands OpenFlow version- 1.0.1.1.1.2.1.3								ation ound- ands,	8	8 CO 1 & 2		1 & 2								
III		SDN Messages and Table matching: Messages-Controller-Switch, Symmetric & Asynchronous messages Counters, OpenFlow Ports, Table matching in SDN, Network Automation and Virtualization.											8		CO 1, 2 & 3						
IV		Mininet Emulator: Introduction to Mininet, Custom topologies of OpenFlow and Legacy Networks, Flow table manipulation-Adding & Deleting Flow entries, Packet Dissection via Wireshark										8	;	CO 1 & 2							
V		SDN Applications and UseCases: SDN Controllers-Ryu, POX, Floodlight, SDN Applications, SDN-UseCases, SDN in the DataCenter and WAN, SDN-OpenSource and its Features										4		CO 1	, 2 & 3						
Total Hours									30	6											
Essential Re 1. Nadeau, Inc.", 20 2. Chuck B 3. Coker, O Supplement	eadings Thoma 13. Black an Oswald, tary Rea	s D., and Paul and Sia	nd Ken ( Goransso amak Az	Gray. Si on, " Sc odolmo	DN: Soj oftware Iky. Soj	ftware . Define ftware-	Defined d Netw defined	d Netwo vorks: A l Netwo	orks: ar Comp orking w	n authoritat prehensive A with OpenFl	ive re Appro	eview o ach", l Deliver	of netwo Morgan r Innovo	Kaufm Kaufm	rammal an. siness So	bility i	technolo ns. Pack	gies. " O t Publish	Reill	y Media, d, 2017.	
1. <u>nttp:</u> 2. <u>http:</u> 3.     Krei       surv       4.	x://www //mining utz, D., /ey. Pro	Ramos	Mininet N s, F. M., gs of the	Network Verissi <i>IEEE</i> ,	Emulate imo, P. 103(1),	or). E., Ro 14-76.	thenber	rg, C. E	E., Azoo	dolmolky, S	. <u></u>	Uhlig,	, S. (20)	4). Sof	ware-de	efined	l networl	cing: A c	ompr	ehensive	

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Programme		ne Bachelor of Technology in Computer Science and Engineering											nic Year	ation	2018-19			
Departm		ent	Со	mputer S	Science a	and Engi	neering		Seme		VII							
Course Code					Co	urse Nan	ne				Credit	Structure			Marks D	istributior	า	
Code											Т	Р	С	INT	MID	END	Total	
CS	429				Robotics	and Aut	omation			3	0	0	3	50	50	100	200	
		To in works	trodu pace	ice the kn	owledge	in basic n	nodels of	robot an	d their		CO1	Able to explain the	acquire ne fundan	knowledge nentals of	e about robotics a	the basic and its con	concepts nponents	
		To int instru	trodu ment	ce the con ation and c	cepts of l control rel	Robotic sy lated to rol	stem, its botics.	compone	nts and		CO2	Able to mechanic machine	identif al comp elements	y the e onents ar and transr	nics and lesign or			
Co Obje	urse ctives	To be mecha	able anica	to demons l structures	strate kno s of indus	wledge of trial robots	the relations and their	onship bet r workspa	tween ice.	Course Outcomes	CO3	Able to a robot.	design th	e workspa	ce of con	itrol mechanism of		
		To pr compu	ovide uters/	e and illu microcont	strate the rollers.	moveme	nt of rob	ootic joint	ts with		CO4	Able to understand the features and operation of automation.					of robotic	
		To be roboti	able	to discus	s and exp	olain senso	ors and in	strumenta	ation in		CO5	Students will able to use and implement the robo programming software.						
						]	Mapping	with Prog	ram Out	comes (POs)	)	L			Mar	ping with	PSOs	
No.	COs	PC	D1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
1	CO1	2	2	1	0	1	0	0	0	0	2	0	0	0	3	0	3	
2	CO2	1	1	1	0	1	0	0	0	0	2	0	0	0	2	0	2	
3	CO3	1	1	2	3	1	2	0	0	0	0	0	0	0	2	3	2	
4	CO4	(	)	2	3	0	2	2	3	0	2	0	0	1	2	3	2	
5	CO5	(	)	2	3	0	2	2	0	0	2	0	0	1	3	3	3	
									SYLLA	ABUS								
No.								Content							Hours	Hours COs		
	Intro	ductio	on to	) Roboti	cs and A	utomati	ion _				_					CO1		
Ι	Automation and robotics, Robot anatomy, Basic structure of robots, Resolution, Accuracy and repeatability, and Classification and Structure of robots, Point to point and continuous path systems.												and	07		CO2		
	Robo	tic Sy	sten	n and Co	ontrol Sy	ystems:											CO2	
II	Comp and m sensor	oonent odels rs, act	s of , Co uato	robotic ntrol syst rs. Powe	system, tem anal r transm	Hydraul ysis, Rol ission sy	ic syste oot activ stems,	ms, d.c. ation an	servo d feedb	motors, Ba back compo	asic cor onents. ]	ntrol syste Positional	ems con l and vei	locity	08		CO3	
	Robo	t arm	Kir	nematics	and Dv	namics:										CO2		
III	Robot Gener	t joint ralized	s, Tł ł D'A	ne direct Alembert	kinemat equation	ics probl	em, The tion, De	inverse navit Ha	kinema rtenber	atics solution g conventi	on, Lag	range-Eul its applica	ler form ations.	ation,	tion, 08		CO3	
	Senso	ors an	d In	strumen	tation i	n robotio	cs:									CO4		
	Tactil	e sens	sors,	proxim	ity and	range se	nsors, F	force and	d torqu	e sensors,	Uses of	of sensors	s in rob	otics.			CO3	
IV	Vision equipment, Image processing, Concept of low level and high level vision. Computer based Robotics: Method of robots programming, GUI based robotic arm control, Interfacing with computer, communication and data processing, Introduction to Artificial Intelligence.												based puter,	06	CO4			
	Com	puter	base	ed Robot	tics:												CO4	
V	Method of robots programming, GUI based robotic arm control, Interfacing with computer communication and data processing, Introduction to Artificial Intelligence.											puter,	07	07 C0				
	Total Hours												36	36				
Essen	tial Rea	dings														· · · ·		

1. Robotics & Control, By R.K. Mittal & I.J. Nagrath, TMH, 2007

- 2. Introduction to Robotics Analysis, Systems and Application, By Saeed B. Niku, PHI 2006
- 3. Fundamentals of Robotics: Analysis and Control, By Criag, J., Prentice-Hall of India Private Limited 2006.

- 1. Automation, Production Systems and Computer Integrated Manufacturing, By M.P.Grover, Pearson Education
- 2. Robotics Engg-an Integrated Approach, By Richard D, Klafter, Thomason A Chmiel Owski, Michel Nagin, PHI 2005
- 3. Fundamentals of Robotics: Analysis and Control, By Schilling. R. J., Prentice Hall of India Private Limited 2006.



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	OF TECHNOLS																	
Programme		Bachelor of Technology in Computer Science and Engineering         Academic Year of											of Regul	ation	2018-19			
Departmo		ent		Co	omputer S	Science a	nd Engin	neering				Seme	ster	VII				
Co	urse			C	Nurso Nam					Credit	Structure			Marks Di				
C	ode								L	Т	Р	С	INT	MID	END	Total		
CS	471	Data Analytics using Python20										2	50	50	100	200		
		This course introduces understand the importance of data analytics CO1										n <mark>alyse</mark> the ong techniq	different d ues	ata represer	ntation and	data pre-		
Co	urse	This cour	se explains th	e different	types of da	ta analytics	s technique	es	Course	CO2	Able to a	ssess and o	compare d	lifferent data	analytics t	echniques		
Obje	ctives	This cour programn	se familiarizes ning for public	s the data a cally availat	nalytics teo ble datasets	hniques us S	sing pythor	n	Outcomes	CO3	Able to de libraries f	etermine da or real life	ata analyti applicatio	cs technique ns	es using py	:hon		
		Mapping with Program Outcomes (POs)												Map	Mapping with PSOs			
No.	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3		
1	CO1	1	-	-		-		-	-	-	-	-	-	2	1	-		
2	CO2	1	1	_	_	-	-	_	-	-	_	-	-	2	1	-		
3	CO3	1	1	1	1	1	1	-		-	_	-	-	2	1	-		
								SYLLA	ABUS							1		
No.							Content							Hours	Hours CC			
	Introd	Introduction: Data analytics and its importance, introduction of python programming and installing Bython														 CO1		
I	under	standing	operators,	variables	s, data typ	Des, cond	ditional st	tatemen	its, looping	constru	cts, func	tions, list	ts and	06				
	dictio	naries in	Python, Im	porting a	nd export	ing data	in pythor	n			·	·						
	Data p	re-proce	essing : Han	dling mis	ssing valu	ues, data	transform	mation,	normalizatio	on, discr	etization					CO2		
	Data	∆nalvsis	Technique	es: Sune	rvised a	nd unsi	inervised	learni	na Unsune	rvised	technique	s - K-m	eans					
П	Hierar	chical c	lustering, [	Density b	ased clu	istering,	evaluatio	on of c	lustering, S	Supervis	ed techni	iques - I	Linear	10				
	Regre	ssion, L	ogistic Reg	ression,	K-neares	st neight	oor, naive	e Bayes	s, support v	ector m	achine, a	rtificial r	neural					
	netwo	rks (ANN	IS)															
	Learn	and inst	talling Jupy	ter Note	book, Un	derstand	ling the o	concept	of Standar	d Librar	ies in py	thon:N	umpy,			CO3		
Ш	ranua	3, 3CI-KII	icaiii, wai	JOLLID,										08				
	Case	studies:	Predicting	loan defa	ulters, Cu	ustomer	segmenta	ation, Ti	me series fo	recastin	ng etc.							
						Toto	Houro							24				
Feed	ntial D	adinge				TOLA								24				
1			d S. Guida (	"Introducti	ion to mor	hine loor	ning with	Duthon	a quida for d	ata soion	otiete" O'P		a Inc 1 <sup>si</sup>	adition 20	116			
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Supr		ary Road	linas															
Jupp 1			"Python for	data anali	veis: Data	wranaling	with Dan	ndae Niu	mPv and ID	uthon" O		dia Inc 2	ond adition	2017				
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 ح	S R	schka an	d V Mirialili	"Python	, and vipil machine li	earning M	Machine la	arnina a	and deen lear	rnina wit	h Python	scikit-lear	$\frac{1}{2}$ n and $T_{4}$	nsorFlow"	Packt Pu	hlishing		
0	Ltd. 2	<sup>nd</sup> edition	, 2019.			carring. I							., ана те			Sicility		


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P	rogrami	ne	Bach	elor of 7	[ fechnolo	gy in Civi	il Engineeri	ng					Year of Re	gulation		20	20-21
D	epartme	ent	Civil	Engine	ering	50	0	0					Seme	ster		,	VII
Co	urse								Pre		Credit St	ructure			Marks D	istributio	n
Co	ode			C	Course Na	me		re	quisite	L	Т	Р	C	INT	MID	END	Total
CE	491			Disast	ter Mana	gement			Nil	2	0	0	2	50	50	100	200
		To pro relation	ovide l nships	basic co with de <sup>-</sup>	nceptual velopmen	understaı t.	nding of dis	asters	and its		CO1	Able to and asso	understan ociated nat	d the cond tural/socia	cepts of h al phenom	azards, ena.	disasters
		To prov	vide a	general	concept i	n the dim	ensions of di	isasters	s caused		CO2	Able to consequ	understan ences of I	d the type Disasters.	es, trends,	causes a	nd
Cor Obje	urse ctives	by nati environ on disa	ire be imenta ster pi	al hazard reparedn	e human ls induced less, respo	t by huma sonse and r	s well as the an activities recovery.	with e	ters and mphasis	Course Outcomes	CO3	Able to Mappin Framew	understa g, preven ork of act	nd Disas tion and ion.	ter Manag mitigation	gement o n of Di	cycle, Risk sasters and
		To enh	ance a	iwarenes	ss of Disa	ster Risk ]	Management	institu	itional		CO4	Able to	familiariz	e with Dis	saster Mar	nagemen	t in India.
		process	ses in 1	India and	d to build	skills to r	espond to di	sasters			CO5	Able to Technol	understar logy for D	nd the ap isaster Ma	plication anagemen	of Scien t.	ce and
No.	COs						Mapping with	th Prog	gram Out	comes (POs)					Map	ping wit	h PSOs
		PO	1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	1		0	0	0	0	0	1	1	0	0	0	0	1	2	0
$\frac{2}{2}$	$\frac{\text{CO2}}{\text{CO2}}$	0		$\frac{1}{2}$	0	0	0	0	1	1	0	0	0	0	1	3	0
3	CO3	0		0	0	0	0	0	1	1	0	0	0	0	1	2	0
4	C04	0		<u> </u>	0	0	0	0	1	1	0	0	0	0	1	2	0
5	005	Ū		0	0			0		ABUS	Ū	Ū	v	U	-	-	v
No.							Co	ontent							Hours	5	COs
Ι	Introd Unders Develo	luction of the standing opment,	on Dis the co and di	sasters: oncepts isaster n	and defini	itions of I nt.	Disaster, Haz	ard, V	ulnerabil	ity, Risk, Ca	pacity –	Disaster a	nd		02		CO1
п	Types Geolog lightni attacks collaps Disaste	<b>, Trends</b> gical Ding, thur s, forest se, rural er Trend	s, Cau isaster ider-st fire); and u ls – Er	<b>ises and</b> s (earth torms, h Technol urban fi merging	Consequence iquakes, ail storms ogical Di re, road a Risks of J	iences of landslides s, avalanc sasters (cl and rail a Disasters	<b>Disasters:</b> s, tsunami, thes, drought hemical, ind ccidents, nu- – Climate Cl	mining ts, colo ustrial, clear, r hange a	g); Hydr 1 and hea , radiolog radiologia and Urba	o-Meteorolo at waves) Bi ical, nuclear cal, chemica n Disasters.	gical Di ological ) and Ma ls and b	sasters (f Disasters anmade D iological	floods, cy (epidemia isasters (b disasters)	clones, cs, pest uilding Global	06		CO2
III	Disast Disast Mappi Capaci Search disaste Redeve	er Mana er Mana ng, zona ity Deve and Re r – Dam elopmen	agemer gemer ation a elopme scue – nage an nt.	ent Cycle nt Cycle nd Micr ent; Gloł - Emerge nd Need	le and Fra – Paradig ozonation bal Disast ency Open Is Assessn	amework m Shift in Prevent er Trends ation Cer nent, Rest	n Disaster M ion and Miti – Emerging ntre – Inciden toration of C	anager gation Risks nt Com ritical	nent Pre- of Disast of Disast mand Sy Infrastruc	Disaster – R ers, Early W ers – Climat stem – Relie cture – Early	isk Asser arning S e Change f and Re Recover	ssment and ystem; Pro e and Urba habilitatic y – Recor	d Analysis eparedness an Disaste on – Post- astruction	s, Risk s, rs.– and	06		CO3
IV	<b>Disast</b> Disaste Financ Role o	er Mana er Profil ial Meci f Govern	<b>ageme</b> e of Ir hanisn nment	ent in In Idia – M n Natior t (local, s	<b>Idia:</b> lega Disas Ial Policy state and 1	sters of In on Disast national),	dia and Less ter Managerr Non-Goverr	ons Le nent, N nment a	earnt, Dis ational G and Inter	aster Manag uidelines an Governmen	ement Ac d Plans c al Agenc	ct 2005 – 2 on Disaster cies.	Institution r Manager	al and nent;	04		CO4
v	Applic Geo-in Use, F Mitiga nationa Manag	cations of formation Planning tion of l al level) gement.	of Scie cs in I and I Disast And	ence and Disaster Develop ers, S& <sup>2</sup> Prepara	<b>I Technol</b> Managen ment, Re Γ Instituti tion of D	logy for I nent, Disa gulations, ons for D visaster Ri	<b>Disaster Man</b> aster Commu , Disaster Sa Disaster Mana isk Manager	nagem inication afe De agemen nent P	ent: on Syster signs and nt in Indi lan of an	n (Early Wa d Constructi a. Study of d Area or Se	rning and ons, Stru Recent D ector Role	d Its Diss actural and visasters (a e of Engi	emination d Non Str at local, st neers in I	), Land ructural ate and Disaster	06		CO5
	C						Total H	ours							24		
Essei	ntial Re	adings															
1. Pa	ndey, M	I., "Disa	ister M	lanagem	lent", Wil	ey India F	Pvt. Ltd.										
2. J. I	P. Singh	nal, "Dis	aster I	Manager	nent", La	xmi Publi	cations.										
3. M.	C. Gup	ota, "Ma –	nual o	n natura	l disaster	managem	ient in India'	', NID	M, New I	Delhi.							
Supp	lement	ary Rea	adings	Curte	"N fame	montofi	Jatural Di	toma	davalar	na comtri-	" Derre T	)					
I. H.	IN. STIV	astava 8	сG.D.	. Gupta,	wanage	ment of N	vatural Disas	ters in	aevelopi	ng countries	, Daya F	ublishers	•				

2. Singh, J., "Disaster Management: Future Challenges and Opportunities", K W Publishers Pvt. Ltd.

3. Bhattacharya, T., "Disaster Science and Management" McGraw Hill Education (India) Pvt. Ltd.

4. Coppola D. P., "Introduction to International Disaster Management", Elsevier Science (B/H).

A SA LA NATIONAL	के ति को से स्था के ति गि को से स्था कि गाउम्ह OF TECHNOLO	that a support			Na	tional I	<b>nstitute</b> An Institute	e of Te	echnology ional Importa	nce	alaya				CURRIC	ULUM
P	rogram	ne	Bachelor of	Technolo	ogy in Co	mputer S	cience an	nd Engi	neering		Acade	mic Year	of Regulat	tion	2018	3-19
D	epartme	ent	Computer S	cience ar	nd Engine	ering						Seme	ster		VI	11
Co	urse			0						Credit	Structure			Marks Di	stribution	
С	ode				ourse Nan	ne			L	Т	Р	С	Continuo Evaluatio	us Lal	o Test/	Total
CS	6461		С	omputatio	onal Intell	igence La	ab		0	1	2	2	<b>70</b>		<b>30</b>	100
		To intro	duce about cu	rent compu	itational int	elligence te	chniques			CO1	Able to u	nderstand	different co	mputationa	l technique	:S
		To impa	alement compu	tational tech	nniques for	different ty	pes of data	a		CO2	Able to a domains	pply differe	ent computa	tional tech	niques in d	ifferent
Co Obje	urse ectives	To analy applicat	yze the perform tions	ance of cor	nputational	technique	s for differe	ent	Course Outcomes	CO3	Able to a technique	nalyze the es	performanc	e of differe	nt computa	tional
									-							
No	COs					Mapping	with Progr	ram Out	comes (POs)		-			Мар	ping with	PSOs
110.	003	PC	01 PO2	PO3	PO4	PO5	PO6	PO7	7 PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	1	1	0	0	0	0	0	0	0	0	0	0	2	1	0
2	CO2	1	1	0	0	0	0	0	0	0	0	0	0	2	1	0
3	003	-		2	0	2	0	0	0	U	0	U	U	2	1	
	1			-	1	I	1	SYLL	ABUS						1	
No.							Content							Hours		COs
	Gettin	g famili	ar with Pytho	n Program	ming and	its differe	ent packag	ges						02		
11	Impler	nentatio	on and analysi	s of ANN	for Nume	ric data								02		
111	Impler	nentatio	on and analysi	s of CNN	and RNN									04		
IV	Impler	nentatio	on and analysi	s of GAN	, LSTM aı	nd its varia	ants.							04		
																CO4
V	Text d	ata proc	essing using	ANN, CN	N, LSTM	and its va	riants.							04		CO2 CO3
VI	Hands	-on on H	Hadoop and fi	le manage	ement									04		
VII	Data s	tream pi	rocessing on A	Apache Sp	ark									04		
	To be Note:- techni	done n The to ques.	ecessarily a pics and exp	s mini-pro periments	oject grou need to b	ip-wise in be update	n groups o ed as per	of at lea the cur	ast two/three rent industry	studen / trends	ts. and upco	oming ne	w			
Faar	ntial D					Total	Hours							24		
<b>⊏SS€</b>		zaoings Annarw	al and C. 7h	ai "Minin	n text data	n" 1 <sup>st</sup> oditiv	on Spring	ner 201	2							
2	. 0.0.	illi, and	A Kapoor. "T	ensorFlow	1.x Deep	Learning	Cookboo	k", 1 <sup>st</sup> E	 dition, Packt	Publishir	ng, 2017					
3	. TWh	ite, "Ha	doop: The De	finitive Gu	uide", 4 <sup>th</sup> E	dition, O'l	Reilly, 201	15.			<u>.</u>					

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- 3. D Dev, "Deep Learning with Hadoop", 1<sup>st</sup> Edition, Packt Publishing, 2017



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	OF TECHNOLO	-															
Р	rogrami	ne	Bachelor	of Te	echnolo	gy in Cor	nputer So	cience an	d Engir	neering		Acade	mic Year	of Regula	ation	2018-	2019
D	epartme	ent	Compute	r Scie	ence an	d Engine	ering						Seme	ster		VI	11
Co	urse				Co	urso Nar					Credit \$	Structure			Marks Di	stribution	
Co	ode									L	Т	Р	С	INT	MID	END	Total
CS	412				Mobi	le Compu	ıting			3	0	0	3	50	50	100	200
		This co commur Systems	ourse explanication ne	ins th etwork	he basic: (s area	s, Issues and its	and challe application	enges in V s commur	Vireless nication		CO1	Able to o communi environm	explain the cation sy ent.	e issues c /stem an	hallenges a d compa	ind need o rison witl	of wireless n mobile
		This co understa infrastru	urse provic anding of ictures, prir	les the nobile ciples	e broad e comput s and theo	and in-dep ting with o pries, techn	th knowled different vie ologies.	lge, and a ewpoints s	critical such as		CO2	Able to d basic a application	emonstrate nd advan ons with dif	e and analy nced infra ferent view	yse mobile astructure, points.	computing technoloc	concepts, jies, and
Co Obje	urse ctives	This co devices manage network	urse provic , schemes, ment meth s	es the conc odolog	e knowle epts, alg gies use	dge of var jorithms, p ed in wire	ious termin protocols, a less mobil	nology, prin and differe le commun	nciples, nt data nication	Course Outcomes	CO3	Able to algorithm	describe a s, Protocol	and analys Is in Mobile	e the dev communic	ices, methation netwo	odologies, orks
		This co	urse provi	des th	he mecha	anism to d	levelop mo	bile data	access.		CO4	Able to d	esign and	develop th	e data man	agement an	d security
		Transac and ethi	tion and e cal issues o	comm of mob	nerce prir bile comp	nciples ove uting, inclu	er mobile d ding privac	levices and y.	l social		CO5	Able to methodol devices, a	analyse ogies and s and social,	and evalu security so ethical and	ation netwo ate the v heme for e privacy is:	rks. arious dat ∙commerce sues.	a access for mobile
							Mapping V	with Progr	am Out	comes (POs)					Map	ping with	PSOs
No.	COs	PO	1 PO	2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3	3		-	-	-	-	-	-	2	-	-	-	3	-	3
2	CO2	3	2		3	1	2	-	-	-	1	-	-	-	2	3	2
3	CO3	1	2		3	2	3	2	-	-	-	-	-	-	2	2	3
4	CO4	2	3		3	3	3	2	2	-	2	-	-	1	3	3	2
5	CO5	3	3		3	2	2	3	2	-	2	-	-	1	3	2	3
						1	1		SYLLA	BUS		1	1	1		_	
No.								Content							Hours		COs
Ι	Introd chanr syste	luction: nel stru ms. CD	Introduc Icture, lo MA. GPR	tion, catio	issues on mana	in mobile agement:	e comput HLR-VL	ing, Over R, Hiera	view of rchal,	wireless tel Hands off,	ephony Channe	: Cellular I allocati	concept, on in c	GSM, ellular	05		CO1
II	Wirele	ess Net	working, v	virele	ess LAN	loverviev	w: Mac is	sues, IEE	E 802.1	1, Wireless	multiple	access p	rotocols		05		CO1 CO2
Ш	Wirele	ess Con	nmunicati	on: T	FCP ove	r wireles	s applicat	tions. Dat	a broad	dcasting, Mo	bile IP.				06		CO2
IV	Wirele	ess App	lication F	rotoc	col : Arc	chitecture	e, Protoco	ol stack, A	Applicat	tion environ	ment, Al	oplication	S.		06		CO3
V	Data I	Manage	ment: Dat	a ma	anageme	ent issues	, Data rep	olication f	or mob	ile computer	rs, Adap	tive cluste	ering for r	nobile	07		<u>CO3</u>
	Mobil	ess netw o. data	Orks, File	syste	m, Disco	ity issued	operation Mobile	s, Security	y. In dom	and convicos	Broad	cast convi	co Trans	action	07		
VI	proce	e uata ssing. Se	ecurity and	l Faul	It tolera	nce.		Agent, C	in dem	and services	, broau			action	01		CO5
	1 10000		<b>/</b>				Т	otal							36		
Esse	ntial R	eadings	;														
1.	. Willia	m Stallin	gs, Wireles	s Com	nmunicati	ions & Net	works, 2/E,	, Pearson E	ducatior	n India, 2007.							
2	. Raj Ka	amal , Mo	bile Comp	uting,	Oxford H	ligher Edu	cation/Oxfo	ord Univers	sity Press	s, 2/E, 2014							
3.	. J.Sch	iller, Mo	bile Com	nunic	cation" F	Pearson Ed	ducation Ir	ndia, 2/E, 2	2009.								
4	. Sand	eep Sing	hal,The W	ireles	ss Applic	ation Prot	tocol , Pea	arson India	a, 1/E, 2	001							
Supp	olement	ary Rea	adings														
1.	Sand	eep Sing	hal, The V	/irele	ess Applie	cation Pro	tocol, Pea	arson India	a, 1/E, 2	001							
2	. Charl	es E Per	kins, Mob	le IP:	Design	Principles	and Pract	ices, Pear	son Edu	cation, 1/E, 1	998						
3.	. TSRa	ppaport.	"Wireless	Comm	nunicatio	ns: Princip	les & Pract	ice, 2/E, Pe	earson E	ducation, 2002	2						



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CURRICULUM

P	oaramr	ne	Bach	elor of <sup>-</sup>	Technolo	av in Cor	nnuter Se	rience an	d Engin	eering		Acade	mic Vear	of Regula	tion	2018	_10
	enartme	ont	Com	nuter Sc	cience an	d Engine	erina		a Engli	leening		Acade	Seme	ster			<u>-15</u>
Co.						9.00	9				Credit	Structure			Marks Di	stribution	<u> </u>
Co	ode				Co	ourse Nam	ie			L	T	P	С	INT	MID	END	Total
CS	414				Clou	d Compu	ting			3	0	0	3	50	50	100	200
		This cou technolo	urse in ogies.	ntroduces	the conce	pt of cloud	l computin	g and back	ground		CO1	Able to ad and histo	cquire <mark>knov</mark> ry, characte	vledge abo eristics.	ut cloud co	nputing, its	vision,
Со	urse	This co which w	urse ill be a	summariz	zes the b Cloud com	ackground puting	cryptogra	phic math	ematics	Course	CO2	Able to a technolo Comput	acquire <mark>kno</mark> ogies and c ing.	wledge ab ryptograpi	out the back	ground	ud
Obje	ctives	This cou Cloud co	urse e omputi	xplain ab ing.	out archit	ecture, type	es and the	e security f	laws in	Outcomes	CO3	Able to a Cloud ty	acquire <mark>kno</mark> pes and its	wledge ab various s	out the Clou ervices.	ud architect	ure,
		This cou available	irse de e.	escribes t	he concept	of various	cloud com	puting platf	form		CO4	Able to a	nalyse the s	security of	cloud comp	uting.	
		T									CO5	Able to a	n <mark>alyse</mark> the v	arious clo	ud platform	available.	
No	COs					I	Mapping v	with Progra	am Outo	comes (POs)					Мар	ping with I	SOs
	No.         COs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PSO1         PSO2         PSO3           1         CO1         3         2         -         -         -         -         -         -         2         -         3         2         -         -         -         -         -         -         2         -         3         2         -         -         1         -         -         2         -         2         3         2         -         -         1         -         -         2         -         -         2         3         2         -         -         1         -         -         2         -         -         2         3         2																
1	PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS02         PS03           CO1         3         2         -         -         -         -         -         -         -         2         -         3           CO2         3         2         -         -         1         -         -         2         -         2         3         2           CO3         3         3         3         1         -         1         2         -         2         -         3         3         2																
2	CO2	3		2	-	-	-	1	-	-	2	-	-	-	2	3	2
3	003	3		3	3	1	-	1	2	-	2	-	-	-	3	3	2
4	CO3       3       3       1       -       1       2       -       2       -       -       3       3       2         CO4       2       3       3       1       2       2       3       -       2       -       -       3       3       2         CO4       2       3       3       1       2       2       3       -       2       -       -       1       3       2       2         CO5       2       3       3       2       2       3       -       2       -       -       1       3       3       3       3																
5	005	2		5	5	-	L	Z			L	-	_		5	5	
No								Content	UILLA						Hours		COs
	Introdu	iction															
Ι	Definiti	on, visio	on, ch	aracteris	stics, histo	orical deve	elopment,	building c	loud cor	nputing envi	ronment.				07		CO1
Ξ	Techno	ology of	Cloud aralle	d Compu I and di	uting stributed	computing	g, Virtualiz	zation-cha	aracteris	tics, taxonor	ny, pros	and cons	, case stu	udy of	07		CO2
	some t	ypes of	virtua	lization.													
	Cloud	Comput	ing ar	chitectu	re												
Ш	Cloud	Comput	ing re	ference	model, se	ervices- la	aS, PaaS	, SaaS, Ty	ypes of (	Cloud-Public	, Private,	, Hybrid, C	community	/	08		CO3
	Cloud	Security															
IV	Securi Variou	y challe s attack	nges s and	in Clouc their pre	l Computi evention.	ng such a	s integrity	and priva	acy of da	ta stored at	cloud sei	rvers, auth	entication	etc.	07		CO4
	Cloud F	Platform	s in In	dustry													
V	Case s	tudy of	some	of the c	loud platfo	orm availa	ble such a	as Amazo	n web s	ervices, Goo	ogle AppE	Engine, Mi	crosoft Az	ure.	07		CO5
							Total	Hours							36		
Esse	ntial Re	adinas												I		I	
1	Rajku	mar Bu	iyya,	Christia	n Vecchi	iola , S.T	hamarai	Selvi, "N	Aasterin	g Cloud Co	mputing	Foundati	ons and	Applicati	ons Progra	amming",	Morgar

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#### **Supplementary Readings**

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- 1. Ricardo Puttini, Thomas Erl, Zaigham Mahmood, "Cloud Computing: Concepts, Technology & Architecture", , Prentice Hall International 1<sup>st</sup> Edition, 2013
- 2. Borko Furht, Armando Escalante, "Handbook of Cloud Computing", Springer US, 1st Edition, 2010.
- 3. K. Chandrasekaran, "Essentials of Cloud Computing", CRC Press Talyor & Francis, 1st Edition, 2015



CURRICULUM

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	The or weather	ra.															
Pi	rogrami	me	Bachelo	or of T	Fechnolo	gyin Com	puter Sc	ience and	d Engine	eering		Acade	mic Year	of Regula	tion	2018	B-19
D	epartm	ent	Compu	ter Sc	cience an	d Engine	ering					<u></u>	Semes	ster		VI	11
Col	urse de				Co	ourse Nam	ıe				Credit	Structure		IX 1	Marks Di	stribution	<b>.</b> .
20	<u>/16</u>		Wirolo		nsor Not	work				L	0	P 0	3	1IN 1 50	MID 50	END 100	1 otal 200
00	410	To provi WSN in r	de the sture	udents	with some	knowledge	about WS	N, applicati	ion of		CO1	Able to un network a	nderstand ti Ind its appli	he fundam cations an	ental conce d challenge	pt of wirele	ess sensor
		To devel impleme	op the st ntation a	udent's	s ability to sible solut	understand ions.	the challe	nges of WS	5N		CO2	Able to ex nodes an	cplain vario d the archite	us tasks ar ecture of w	nd compone	ents of sen sor networ	sor ks.
Coi	ırse	To devel protocol	op the st s and the	udent's eir unde	s ability to erlying des	understand ign.	l different c	ommunica	tion	Course	CO3	Able to id networks	entify the p	hysical lay	er design o	f wireless s	sensor
Obje	ctives	To devel algorithr	op the st ns and lo	udent's calizati	s ability to ion and po	understand sitioning pr	l time syncl rocedures.	hronization	1	Outcomes	CO4	Able to ex Framing,	kamine MAC Link manag	C protocols ement.	and conce	pts of Erro	r control,
		To provi control a	de the stu Ilgorithm	udents s and r	with some outing pro	knowledge tocols.	about the	various top	oology-		CO5	Able to in different	terpret varion	ous time s and position	ynchronizat oning algori	ion protoc ithms.	ols and
											CO6	Able to el protocols	aborate top for wireles	ology cont s sensor n	rol mechan etworks and	isms and r d main des	outing ign issues.
No	<u> </u>					ſ	Mapping v	vith Progr	am Outo	comes (POs)					Мар	ping with	PSOs
INO.	COS	PO	1 P	02	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	0		0	1	0	2	1	0	1	1	0	2	0	1	2	1
2	CO2	1		2	0	1	0	0	1	2	2	1	0	1	3	2	2
3	CO3	0		3	2	2	1	0	0	1	0	2	1	0	2	1	2
4 5	C04	3	·	2	2	1	0	2	0	2	2	1	1	0	1	2	1
6	CO6	2		1	0	2	3	2	2	0	1	2	0	1	3	1	2
	S     CO6     2     1     0     2     3     2     2     0     1     2     0     1     3     1     2       SYLLABUS																
SYLLABUS       No.     Content       Hours     COs																	
No.       Content       Hours       COs         I       Introduction: The vision of Ambient Intelligence, Application of WSN, Challenges for WSNs, Mobile ad hoc networks and wireless sensor networks, Fieldbuses and wireless sensor networks, Enabling technologies for wireless       1       CO1																	
	Senso	or netwo	rks;	4											4		<u></u>
11	Hardv	vare con ples of s	nponen sensor i	its, En nodes	nergy cor s;	Isumptio	n of sens	sor nodes	s, Opera	ating systen	ns and e	execution	environm	ients,	I		002
II	Netwo Senso	ork archi or netwo	tecture ork sce	e: Enario Gatow	s, Optim	ization (	goals an	d figures	s of me	erit, Design	princip	oles for N	VSNs, Se	ervice	3		CO2
IV	Physi	cal layer luction,	Wireles	ss ch	nannel a	nd comr	nunicatic	on funda	mentals	s, Physical	layer a	and trans	ceiver d	esign	3		CO3
v	Consi MAC   Funda	deration protocol amentals	s in WS s: s of MA	SNS;	otocols, L	.ow duty	cycle pro	otocols a	nd wak	eup concep	ts, Cont	ention-ba	sed proto	ocols,	6		CO4
VI	Scheo Link-I	lule-bas ayer pro	ed prote tocols:	ocols	, The IEE	<u>E 802.15.</u>	4 MAC pr	<u>otocol, II</u>	EEE 802	2.11 and Blu	etooth;		•		3		CO4
VII	Namir Funda	ng and a amentals	ddressi s, Addre	ing: ess an	nd name	manager	nent in wi	reless se	ensor ne	etworks, Ass	signmen	t of MAC	addresse	s,	3		CO5
VIII	Time Introd	synchro	nizatior o the tir	n: me sy	nchroniz	ation pro	blem, Pro	otocols b	ased on	sender/rec	eiver sy	nchroniza	tion (LTS	and	4		CO5
IX	Local Prope	ization a erties and	nd posi d appro	itionir baches	ng: s of local zation P	ization ar	nd positic	oning pro	cedures	s, Mathemat	ical bas	ics for the	e lateratio	n	4		CO5
x	Topol Motiva domin	ogy con ation an ating se	trol: d basic ets, Hier	ideas	s, Control	lling topo orks by c	logy in fl	at networ , Combin	rks – Po ing hier	ower control archical top	, Hieraro	chical net and powe	works by er control,		4		CO6
XI	Adapt Routin Forwa	ive node ng proto arding ar	e activit cols: nd routi	ty; ing, G	ossiping	and ager	nt-based	unicast f	orwardi	ng, Energy-	efficient	unicast, l	Broadcas	t and	4		CO6
	multic	ast, Geo	ographi	c rout	ung, Mob	ne nodes	, Total	Hours							36		
Esse	ntial R	eadings												1			
1.	. Karl H,	Willig A.	Protocol	s and a	architectur	es for wirel	ess senso	r networks	. John Wi	iley & Sons; 2	007.						
2	. Dargie	W, Poella	abauer C	. Fund	lamentals	of wireless	sensor net	tworks: the	ory and p	practice. John	Wiley & S	Sons; 2010.					
3.	Yang k	K. Wireles	s sensor	<sup>.</sup> netwo	orks. 2014.												
Supp	lemen	tary Rea	dings														
1.	Khan S	S, Pathan	AS, Alra	ijeh NA	, editors. \	Vireless se	nsor netwo	orks: Curre	ent status	and future tre	ends. CR	C press; 20	16.				
2.	. Güngö	r VÇ, Har	icke GP,	editors	s. Industria	l wireless :	sensor net	works: App	olications,	, protocols, an	d standa	ds. Crc Pre	ess; 2013.				
3.	. Forstei	A. Introd	uction to	wirele	ss sensor	networks.	John Wiley	/ & Sons; 2	2016.								



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Р	rogramr	ne	Bac	helor of	Technolo	gy in Cor	nputer So	cience an	d Engin	neering		Acade	mic Year	of Regula	ition	2018	-19
D	epartme	ent	Con	nputer So	cience an	d Engine	ering						Seme	ster		VI	
Co	urse				C	uroo Nor					Credit \$	Structure			Marks Di	stribution	
C	ode						le			L	Т	Р	С	INT	MID	END	Total
CS	418			N	atural La	nguage P	rocessin	g		3	0	0	3	50	50	100	200
		This co and alg This co	ourse i gorithr ourse i	introduces ns for analy introduces	foundation ysis of natu the advanta	al linguistio Iral languag	c and matho ges. isadvantaqu	ematical co	oncepts ent NLP		CO1	Able to cl phonetic analysis. Able to co	noose tech analysis, p	niques for honologica	basic lingui Il analysis a al models o	stic process ind morpho	sing for logical
Co Obie	urse ctives	techno This co	logies ourse f	in differen familiarizes	t real-life a some stat	pplications istical appr	oaches and	I machine l	earning	Course Outcomes	CO2	text data Able to so	in order to plve commo	gain broad on NLP tas	er understa ks using m	nding of tex odels, meth	kt data. ods, and
Coje	011700	techni	ques u	ised in Nati	iral Langua	ige Process	sing (NLP)	tasks.		Catoonioo	CO4	Able to cr	eate softwa	tical NLP. are implem	entations o	f relevant p	re-
											CO4	Able to so	ng steps for plve comme is.	r different N on NLP tas	NLP probler ks using ma	ns. achine learr	ning
							Mapping v	with Progr	am Outo	comes (POs)	)	aigentin			Мар	ping with I	SOs
No.	COs	P	D1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1		3	1	1	0	0	0	1	0	0	0	0	1	0	0	0
2	CO2		3	3	3	2	2	0	0	0	0	0	0	0	1	1	1
3	CO3		3	3	3	2	2	1	0	0	1	0	1	0	0	1	1
4	CO4		3	3	3	2	1	1	0	0	0	0	0	0	0	2	3
5	CO5		3	3	3	2	2	1	0	0	1	1	1	0	0	1	1
									SYLLA	BUS							
No.								Content							Hours		COs
I	Introd Segme	uction entatio	; Mot on	ivation a	nd challe	nges of N	latural La	inguage I	Process	ing (NLP); 1	<b>Fokenisa</b>	tion and s	Sentence	,	02		CO1
II	Lexica	l Analy	sis: N	lorpholog	y, Finite S	tate Morpl	nology								03	сс	91, CO2
III	Syntac technic Pragm Genera	etic An ques, atics a ation	alysis Linkir nd D	: Linguis ng Syntax iscourse	tic Backg and Se Analysis:	round - A emantics; Dialogue	An outline Semantic and Con	e of Engli Analysis versation	sh Synt s: Lexic al agent	ax, Gramma al Semantic s, Co-refere	rs for N s, Word: nce reso	atural Lan Sense I lution; Na	guage, P Disambigu Itural Lan	arsing iation; guage	12	co	92, CO3
IV	Overvi Systen	ew of ∣ ns, Tex	NLP a t and	pplication Intent Min	is: POS ta ing, Mach	agging, Inf ine Transl	ormation ation; Dat	Retrieval, a pre-proc	Questio cessing f	on Answering for NLP tasks	g, Informa S	ation Extra	action, Dia	alogue	11		CO3
v	Empiri Perfori	cal tec nance	hniqu evalu	es for NL ation metr	.P tasks; ics for NL	machine I P systems	earning to	echniques	for NLF	P tasks; NLF	e applicat	tion exam	oles in re	al-life;	08	co	94, CO5
							Total	Hours							36		
Esse	ntial R	eading	s														
1	D. Ju. Reco	rafsky gnition	and J. ," Pea	. H. Marti arson Edu	n, "Speec cation Ind	h and Lan lia, 2 <sup>nd</sup> edi	guage Pro tion, 2013	ocessing: A 3.	An Intro	duction to N	atural La	nguage Pro	ocessing,	Computat	ional Ling	juistics and	d Speech
2	. Aksh	ar Bha	rati, V	vineet Cha	itanya, R	ajeev San	gal, "Natu	ral Langu	age Proc	cessing: A P	aninian P	erspective	", PHI Le	arning Pv	t. Ltd., 1 <sup>st</sup>	edition, 19	995.
3	. Danie	el M. E	ikel, '	"Multiling	gual Natur	ral Langua	ige Proces	sing App	lications	: From Theo	ry to Pra	ctice", Pea	rson Edu	cation Ind	ia, 1 <sup>st</sup> edit	ion, 2012.	

4. C. D. Manning, H. Schütze, "Foundations of Statistical Natural Language Processing", MIT Press, 1<sup>st</sup> edition, 1999.

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- 2. Breck Baldwin, Krishna Dayanidhi, "Natural Language Processing with Java and LingPipe Cookbook", Packt Publishing Limited, 1<sup>st</sup> edition, 2014.

3. Nitin Indurkhya and Fred J. Damerau, "Handbook of Natural Language Processing", Taylor and Francis, 2<sup>nd</sup> edition, 2010.

		d d s worm					<b>Nationa</b> Ar	<b>I Institut</b> n Institute	e of Te	<b>chno</b> ional	ology I Import	<b>/leghala</b> ance	iya				CURRIC	CULUM
Pi	rogramı	me	Bac	helor of	Techno	logy in (	Compute	r Scienc	e and E	Engin	neering	9	Acaden	nic Year	of Regul	ation	2018	3-19
D	epartme	ent	Con	nputer S	Science a	and Engi	neering							Seme	ster		VI	11
Co Co	urse ode				Co	urse Nar	ne			_	1	Credit : T	Structure	С	INT	Marks D MID	istribution FND	n Total
CS	420			C	vber Fore	ensics an	d Analys	is			3	0	0	3	50	50	100	200
		This co and the	ourse ir wo	introduc orkspace.	es the kn	owledge i	n various	robot str	uctures			CO1	Able to a in Cyber	cquire kno Forensics	owledge a and Anal	bout the sysis.	basic conc	epts used
	-	This co	ourse	illustrate	digital in	vestigatio	n and digi	tal eviden	ice		-	CO2	Able to in	nterpret th	e comput	er forensi	cs	
Co	urco	This cou	ırse i	llustrates	with File	System A	nalysis &	file recov	very.	Co		CO3	Able to in	nplement	with fore	nsics tool	s	
Obje	ectives	This co time, re	ourse egistr	e explain y & pass	s the inf word reco	ormation ver.	hiding &	z stegano	graphy	Outc	comes	CO4	Able to a	nalvse and	l validate	forensics	data.	
	-	This co	ourse	familiar	ize with t	he Email	& databa	se forensi	ics and					5				
	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$																	
No	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$																	
110.	003	PO	1	PO2	PO3	PO4	PO5	PO6	PO7	F	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	-		1	-	1	-	-	-		-	2	-	-	-	3	-	3
2	CO2	1		1	-	1	-	-	-		-	2	-	-	-	2	-	2
3	CO3	1		2	3	1	2	-	-		-	0	-	-	-	2	3	2
4	CO4	-		2	3	-	2	2	3		-	2	-	-	1	2	3	2
5	005	-		2	3	-	2	2		DIIC	-	2	-	-	1	3	3	3
No								Content	SILLA	abus	5					Hours		COs
110.	Intro	duction	n to	Cyber	forensic	s:		Content								Tiodro		$\frac{000}{CO1}$
Ι	Inform scale I associa incider IR tear	ation Se Data brea ated with at respon n. – Fore	ecurit ach c h Con nse m ensic	ty Investi ases. Ana mputer C nethodolo cs Techno	gations, C alysing M rime. Intr ogy – Fore ology and	Corporate ( alicious se oduction - ensic dupli Systems -	Cyber For oftware. In to Identity ication and Understar	rensics, Sc ntroductio 7 Theft & d investig nding Con	cientific on to Trac Identity ation. Pro nputer In	metho dition Frauce epara	od in fo nal Com Id. Type ation for igation -	rensic ar puter Cr es of CF IR: Crea Data Ac	alysis, inv ime, Tradit techniques ating respo cquisition.	estigating tional prol – Incider nse tool k	large blems nt and it and	10		CO2
	EVID	DENCE	E CC	OLLEC	TION A	ND FO	RENSI	CS TOO	LS									CO2
II	Proces Softwa Forens softwa	sing Cri ure/ Har ics, Scio re.	me a dwar entif	and Incide re Tools. ïc metho	ent Scene Introduce d in fore	s – Worki ction to ( ensic anal	ing with V Cyber for ysis, inve	Vindows a rensics: In estigating	and DOS nformational sciences and sciences a	S Syst on So cale I	stems. C Security Data br	Current C Investig reach cas	Computer F gations, Co ses. Analy	orensics Torporate ( sing Mali	Fools: Cyber icious	08		CO3
			A N	DVAL	ΙΠΑΤΙΟ													CO2
III	Valida Investi	ting For	rensio – Ce	cs Data - ll Phone a	– Data H and Mobi	iding Tec le Devices	hniques – s Forensic	- Perform s	ing Rem	note A	Acquisi	tion –Ne	etwork For	ensics – ]	Email	08		CO3
	ETH	ICAL I	HAC	CKING														CO4
IV	Introdu	action to	o Etl	hical Had	cking – H	Foot print	ing and I	Reconnais	sance –	Scar	nning N	Vetworks	-Enumera	ntion – S	ystem	05		CO3
	Hackir	ng – Mal	lware	e Threats	– Sniffing	5												CO4
v	ETH		HA(	CKING	IN WE	B									COL	05		CO4
V	Social Injection	Enginee on – Hac	ering cking	– Denial g Wireles	ot Servio s Network	ce – Sessi cs – Hacki	on Hijack ng Mobile	1ng – Hac e Platform	king We s.	eb ser	rvers –	Hacking	web Appl	ications –	SQL	05		CO5
							Total	Hours								36		
Esser	ntial Rea	dings			ational'-	D., D.11 M	100-		Eng. 1 E			tort - C			ina I1'		)16	
	. Comp	uter Fore	UISICS	s and inve	sugations,	DY DIII Ne	ison, Ame	na rnillips	, rrank E	unnge	ger, Unris	stopher St	euari, Ceng	gage Learn	ing, india	Euliion, 20	10.	

2. Cyber Forensics, By Dejey & S. Murugan, Oxford University Press, 2018.

3. Fundamentals of Digital Forensics: Theory, Methods, and Real-Life Applications, By Joakim Kävrestad, Springer International Publishing, 2018

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1. Computer Forensics, By John R.Vacca, Cengage Learning, 2005

2. Computer Forensics and Cyber Crime: An Introduction, By Marjie T.Britz, 3<sup>rd</sup> Edition, Pearson, 2013.

3. Ethical Hacking and Penetration Testing Guide, By Rafay Baloch , CRC Press, 2015



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	OF TECHNOS																
P	rogram	me	Bache	lor of Tec	hnology	in Compı	uter Scien	ce and	Engineering	9	Acade	mic Year	of Regul	ation	2	2018-	·19
D	epartm	ent		Co	omputer S	Science a	Ind Engine	eering				Seme	ster			VII	l
Co	urse			C	ourse Nar	ne				Credit	Structure			Marks [	Distribut	ion	
C	ode								L	Т	Р	С	INT	MID	END	)	Total
CS	422			D	ata Minin	g			3	0	0	3	50	50	100		200
		This cours techniques	e illustrates	the need	of data mir	ning and da	ata pre-proc	cessing		CO1	Able to	experime es	ent with	different	data j	pre-pi	ocessing
		This cours	e explains	the differe	nt types of	f data min	ing techniq	ues as	-	CO2	Able to e	stimate and	compare	different d	ata mini	na ter	chniques
Co	uraa	techniques	; ;						Course	002							
Obje	ctives	application	is explains	the differe	int data m	ining tech	niques to re	real life	Outcomes	CO3	problems	design dat	a mining	Solution 1	ramewoi	IK TO	real life
									_								
No.	COs				<del></del>	Mapping v	with Progra	am Out	comes (POs)		1	1		Ma	pping w	vith F	'SOs
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PS	02	PSO3
1	CO1	1	1	-	-	-	-	-	-	-	-	-	-	2	1		-
2	CO2	1	1	-	-	-	-	-	-	-	-	-	-	2	1		-
3	CO3	1	1	2	-	2	-	-	-	-	-	-	-	2	1		-
-			_	<u> </u>	<u> </u>	<u> </u>											
					<u> </u>	<u> </u>											
No								STLLF	1003					Hours		(	<u>`</u>
110.							Content							Tioura	, 		.03
	Introd	luction: Da	ata Mining	, Motivati	on, Appli	cations, [	Data Minin	ng App	roaches, Dat	ta Types	s, Data Ob	jects and	k			(	201
	Attrib	utes, Chai	lenges in l	Data Mini	ng, Data	Similarity	and Diss	similari	ty measures					06			
-	Data -	-Preproce	essing: Da	ita Quality	y Issues,	Data Clea	aning, Dat	a Integ	ration, Data	Reduct	ion,						
	Data	Transform	ation and	Data Disc	retization	1											
		_									_						
	Minin growt	g Frequen h (FP-grov	t Pattern N wth) Algor	lining and ithm. Min	d Associa ing Close	ation Rule ad and Ma	es: Basic ( ax Pattern	Conce	pts, Apriori / ern Evaluatio	Algorith on Meth	m, Freque ods. Cons	ent Patter straint-Ba	n Ised			(	201
	Frequ	ent Patter	n Mining		ing cloce			io, i utt					locu	08			
	Class	ification To	echniques	: Basic C	oncepts,	Decision	Tree Clas	ssifier,	Rule-Based	Classifi	ier, Neare	st Neighb	bor	10		C	:02
	fitting	, Model E	/e bayes c	and Selec	tion	Neural N	letwork (A	ainin), J	upport vecto	ormach	ine (Svivi)	, model C	Jver	10			
	Clust	oring Toch	niquos: O	vorviow	Types of	Clustorin	a Mothod	e Dorti	itioning Motl	oode Ui	orarchica	Mothod	<b>c</b>				
	Densi	ty-Based I	Methods, (	verview, Grid-Bas€	a Methor	ds, Perfor	mance Pa	aramete	ers, Clusteri	ng with	Constrair	its	5,			CO2	& CO3
IV								01-11-1		- 				12			
		or Detectio	n: Basic C ustering-E	Soncepts, Based Apr	Outlier D proaches	etection	Methods, cation-Bas	Statist sed Ap	ical Approad proaches	ches, Pr	oximity-B	ased					
		,															
						Total	Hours							36			
Esse	ential R	eadings															
1	. J. Ha	an, J. Pei, a	nd M Kam	ber. "Data	i mining: c	oncepts a	and techniq	ques". E	Isevier, 3 <sup>rd</sup> e	edition, 2	011	l' end					
2	. P.N.	Ian, M. St	einbach, A	. Karpatne	, and V. k	umar. "In		to data	<i>mining"</i> . Pea	arson Ed	ucation In	dia, 2 <sup>nd</sup> ec	aition, 20	16.			
3	. C.C.	Aggarwal.	"Data mini	ng: the tex	ktdook". S	pringer, 1°	<sup>a</sup> edition, 2	2015.									

#### **Supplementary Readings**

- 1. C.C. Aggarwal, and C. Zhai. "*Mining text data*". Springer, 1<sup>st</sup> edition, 2012.
- 2. J. Leskovec, A. Rajaraman, and J.D. Ullman. " *Mining of massive datasets*". Cambridge University Press, 3rd edition, 2019

3. J. Dean. "Big data, data mining, and machine learning: value creation for business leaders and practitioners". John Wiley & Sons, 1<sup>st</sup> edition, 2014.



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	OF TECHNOLO																
P	rogramr	ne	Bach	elor of	Technolo	gy in Co	mputer Se	cience an	d Engin	neering		Acade	mic Year	of Regula	ation	2018-	2019
D	epartme	ent	Com	puter Se	cience an	d Engine	ering			I			Seme	ster		VI	II
Co	urse				Co	ourse Nam	he				Credit	Structure			Marks Di	istribution	
Co	ode									L	Т	Р	С	INT	MID	END	Total
CS	424	This a		avalaina	Distrib	uted Com	puting	ann in da	alanina	3	0	0	3	50	50	100	200
		distribu mutual	ourse ited oj exclusi	explains perating ion, dead	s the adva system, a llock detect	intages ar Igorithms ion, agreen	for differe nent, etc.	ges in de nt primitiv	esigning ves like		CO1	Able to o operating like mutu	describe th J system s al exclusio	e fundame uch as alg n, deadlocl	ental comp gorithms fo k detection	onents of o or different , agreement	distributed primitives t, etc
Co		This co synchro protoco	ourse o onous a ol algor	lescribes and proc ithms.	the detail esses, min	s of distrik imum spin	outed comp ning tree a	puting tech nd commu	nniques, nication	Course	CO2	Able to technique minimum	design and es for prod spinning t	d demonst cess synch ree for mes	trate the d pronization ssage forwa	listributed and const arding and r	computing ruction of receiving.
Obje	ectives	This co distribu and terr	ourse Ited mu minatio	provides utual excl	s the met lusion algo hms	nodologies rithm and d	to design listributed o	n and im deadlock de	plement etection	Outcomes	CO3	Able to mutual processe	develop th exclusion s.	e practica and dea	al understa adlock det	nding of I tection for	Distributed r various
		This co based (	ourse p on req	rovides t uirement	the techniq s of variou	ues to des s fault tole	ign and de erance sys	velop appl tem, algori	ications thm for		CO4	Able to d high reli tolerant a	esign and a ability and lgorithms.	analyse the l accuracy	e fault tolera y using th	ant system ne principle	to achieve e of fault
		failure r	ecover	ry and fau	ult tolerance	e in distribu	ited system	IS.			CO5	Able to c recovery	levelop, an algorithm t	alyse and o recover f	evaluate th the system.	ne failures a	and failure
No	<u> </u>						Mapping v	with Progr	am Outc	comes (POs)					Мар	ping with	PSOs
INO.	COS	PC	01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3		3	-	-	-	-	-	-	2	-	-	-	3	-	3
2	CO2	3		3	3	1	2	-	-	-	1	-	-	-	2	3	2
3	CO3	1		2	3	3	2	2	-	-	-	-	-	-	2	3	3
4	CO4	1		2	3	3	3	2	3	-	2	-	-	1	2	3	2
5	CO5	2		3	3	2	2	3	2	-	2	-	-	1	3	3	3
No								Contont	SYLLA	BUS					Houro		<u> </u>
INO.								Content							HOUIS		COS
I	Introd Distril	uction: buted C	Distri compu	ibuted S uting Mo	System, 1 odel, Cha	heoretica racteristic	al Founda cs, and Is	ations of sues.	Distribu	ited System	is, Oper	ating syst	tem and t	ypes,	04		CO2
																	CO1
II	Wave Algori	and Tr ithm.	avers	al Algor	rithms: E	cho Algo	rithm, Se	equential	Polling,	, Awerbuch	's DFS /	Algorithm	i, Cidon's	5 DFS	04		CO2
	Minim	nal Span	ning T	Free Alg	orithms: (	Gallager-H	lumblet-s	pira Algor	ithm, Te	esting the ed	lge optin	nization, R	eorientat	ion	0.4		CO2
111	of tree	9													04		CO3
	Comm	nunicati	on Pr	otocol	and Rout	ing Algoi	rithm: Ba	lanced S	liding W	Vindow Pro	tocol, O	rdering, (	Communi	cation			CO3
IV	Protoc Destin	cols, Ag	reemond ased f	ent Pro orwardi	tocols, Co	ommit Pr	otocols, ation, Car	Leader El	ection /	Algorithms. ne Netchang	Propert e Algorit	ies, Routi hms.	ng Algori	thms,	05		CO4
V	Deadle	ock Free ning Loo	e Pack vical C	et Swite Jocks an	ching: Dea nd Causal	dlock fre	e packet: ork and im	Model, B	uffer gra	aph, Require	ements a	nd Destin	ation Sch	emes,	05		CO4
	5												•				CO5
\/I	Distrik	buted N	/Iutual nghal'	i Exclusi 's dynau	ion and A mic infor	Ngorithm: mation_st	s: Distribu	uted Mut	ual Excl	and Keben	ort's alg nkalvani	orithm, R 's fair mu	icart–Agr	awala	06		CO3
VI	algorit	thm, Qu	iorum	-based r	mutual ex	clusion al	gorithms,	Maekawa	a's algor	ithm	maryann						CO4
VII	Distrik Knapp	outed D o's classi	eadlo) eadlo	ock Dete	ection and stributed (	d Termina deadlock (	ation Algo detection,	orithms: S , algorithr	System ns,	model, Prel	liminarie	s, Models	s of dead	locks,	04		CO5
VIII	Failure	e Recov	very a	nd Faul	t tolerand	e in distr	ibuted sy	/stems: U	nreliable	e failure de	tectors,	The conse	ensus pro	blem,			CO4
	Atomi proble (DFS)	c broad ems, An Distribu	lcast, imple uted S	A soluti ementat hared M	ion to ato tion of a /lemory	omic broa failure de	dcast, Th tector, A	e weakes n adaptiv	t failure e failure	e detectors t e detection	to solve protocol	fundameı . Distribut	ntal agree ted File S	ement ystem	04		CO5
	1,2.5/	2.301100															

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CURRICULUM

P	rogram	me		Bachel	or of Tec	hnoloav i	n Compu	iter Scien	ice and	Engineering	a	Acade	mic Year	of Reaul	ation	20	
D	epartm	ent			Co	omputer S	Science a	nd Engin	eering		5		Seme	ster			VIII
Со	urse				0.						Credit	Structure			Marks D	istributic	'n
C	ode					burse Man	le			L	Т	Р	С	INT	MID	END	Total
CS	426				Bio	oinformati	cs		<u> </u>	3	0	0	3	50	50	100	200
		This of biolog	course gical da	introduces Itabases	the impor	tance of bi	oinformati	cs and ana	lysis of		CO1	Able to d domain	iscover diff	erent prol	olems preva	iling in bi	oinformatics
		This c	ourse	explains th	e different	types of bio	oinformatic	s technique	es		CO2	Able to a	ssess diffe	rent bioinf	ormatics te	chniques	
Co	urse	This c techni	course iques	introduces to different	the differe application	ent bioinfor domains	matics and	I machine I	learning	Course	CO3	Able to d related to	<mark>esign</mark> comp biological	outational data anal	framework ysis	for solving	g problems
Obje	ctives									Outcomes							
	1																
No.	COs			200	500		Mapping v	with Progra	am Outo	comes (POs)				<b></b>	Map	ping wit	h PSOs
	001	P	°O1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	P012	PSO1	PSO	2 PSO3
1			1	1	-	-	-	-	-	-	-	-	-	-	1	1	-
2	CO2	·	1	2	- 2	-	- 2						-		2	2	
5	003	, 	•	-	2					_	_						
		I							SYLLA	BUS							I
No.								Content							Hours		COs
	Introd	luction	a Bio	informati	es goals	scono	nnlicatio	ne and li	mitation	e Basic co	ll archit/	octuro Th	o structu	ro			
	conte	nt and	l scale	e of deox	yribonuc	, scope, a leic acid (	(DNA), Ge	enes and	protein	s, Central d	ogma, Ir	nportance	e of prote	ins,	06		CO1
1	Gene	and ce	ell reg	gulation, l	Biologica	l Databas	ses, Infor	mation Re	etrieval	from Biolog	gical Dat	abases			00		
	Seque	ence A	lignm	nent: Pai	r-wise se	quence a	lignment	, Sequend	ce hom	ology versu	s seque	nce simila	arity,				
	seque	ence s ence a	lignm	ent	s sequen		y, metrio		quence	angnment,	Sidiisiic	ai siyiiin	ance of		00	(	CO1, CO2
11	Multin		-	o Alianm	ont i Soo	ring funo	tion Exh	ouctivo o	laorithr	na Houristi	o olgorit	hma nra	tion locu	100	00		
	winnt	Jie Set	quenc	e Alighin	ent . 500	ring runc	uon, exn	ausuve a	igontin	ns, neurisii	c algorit	nins, prae	Silical 1551	les			
	Datab	ase si	imilari	ity search	ning : Bas	sic Local	Alignmer	nt Search	Tool (B	BLAST), FAS	STA, Cor	nparison	of FASTA	and			
	BLAS	)															CO2
	Protei	in mot	ifs an	d domair	n predicti	on :Identi	fication of	of motifs a	and dor	nains in mu	Itiple se	quence a	lignment,	Motif			
Ш	Gene	Predic	ction :	: Gene pr	ediction i	in prokary	otes and	d in eukar	yotes	Dalabases	Sing Sta		loueis		14		
	Phylo	aonoti	ice · ·	Torminol	ogy Gon	o phylogo		e spocios	s nhvlor	nony Phylo	aonotic	trop cons	truction				
	Distar	nce – k	based	methods	s, Charac	ter- base	d method	ls, Phylog	genetic	tree evaluat	ion		ucuon,				
	Funct	ional (	Genoi	mics : Se	quence-b	ased app	roaches,	Microarr	ay-base	ed approach	es, Con	nparison o	of SAGE a	and			02 8 003
IV	DNA r	microa	arrays	i											08		02 & 003
	Case	studie	es for	machine	learning	technique	es based	analysis	of biolo	ogical datas	ets						
	1						Total	Hours							36		
Esse	ential R	eading	gs											1		I	
1	. J. Xio	ong. "E	Essent	tial bioinfo	rmatics".	Cambridge	e Universi	ity Press.	1st editi	on, 2006.							

2. E. Keedwell, and A. Narayanan. "Intelligent bioinformatics: The application of artificial intelligence techniques to bioinformatics problems". John Wiley & Sons, 1<sup>st</sup> edition, 2005

#### 3. J.M. Claverie, and C. Notredame. "Bioinformatics for dummies". John Wiley & Sons, 2<sup>nd</sup> edition, 2007

#### **Supplementary Readings**

- 1. S. Mitra, S. Datta, T. Perkins, and G. Michailidis. "Introduction to machine learning and bioinformatics". CRC Press, 1st edition, 2008.
- 2. Z.R. Yang. "Machine learning approaches to bioinformatics". World scientific, 1<sup>st</sup> edition, 2010

3. Y.Q. Zhang, and J.C. Rajapakse. "Machine learning in bioinformatics", Wiley, 1st edition, 2009

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	"" OF THE PROV																	
Programme		ne	Bachelor of Technologyin Computer Science and Engineering         Academic Year of Reg           Operation Science and Engineering         Academic Year of Reg													ulation 2018-19		
D	epartme	ent	Con	nputer So	cience an	d Engine	ering						Seme	ster		VI	II	
Co	urse				Co	ourse Nam	ne				Credit	Structure			Marks Di	stribution		
					luter	not of Th				L	T	P	C	INT	MID	END	Total	
63	428	<b>T</b> o 1999						definition	a da	3	U		3	5U	50		200	
		signific	ance	of the Inter	net of Thin	gs.	e about the	definition a	and		CO1	loT, and a	applications	the basic of s of loT in t	in the real life.			
	-	To develop the student's ability to understand the architecture, operation, and business benefits of an IoT solution. CO2 Able to explain the mechanis different layers of IoT.													sm of various protocols used in			
Co	urse	To develop the student's ability to understand different protocols used for communication between various IoT devices.												hallenges ility in IoT.	es of Interoperability and techniqu ວT.			
Obje	ctives	To develop the student's ability to understand the relationship between Outcomes CO4 Able to examine different Se												erent Servi	ervice and Resource Discovery in Ic			
	-	To prov issues i	ride kı in loT	nowledge t	o students	about vario	ous privacy	and securi	ity		CO5	Able to interpret about various privacy and security issues in lo communication.						
		CO6 Able to imagine and improve computing, fog computing a											improve th puting and	the relationship between IoT, and big data.				
No	$CO_{2}$						Mapping v	with Progr	am Outc	omes (POs)	)				Мар	ping with	PSOs	
INU.	COS	PC	)1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
1	CO1	2		0	0	0	0	1	2	0	1	1	0	0	2	1	1	
2	CO2	2		3	1	1	0	2	1	0	3	2	1	2	1	2	2	
3	CO3	3		2	1	0	2	3	0	1	0	1	3	1	3	2	2	
4	CO4	1		0	3	2	0	2	1	0	3	2	1	0	1	2	2	
5	CO5	2		0	1	0	2	3	1	0	1	2	1	0	3	2	3	
6	CO6	1		2	0	3	1	2	0	2	0	1	0	0	2	3	2	
NL								0	SYLLA	BUS							00-	
NO.	Introdu	untion						Content							Hours			
I	Introduction: What is IoT, Ad-hoc and Sensor Networks, Architecture of IoT, Application of IoT: Smart home, Intelligent transportation systems, Industrial aumtomation, Smart healthcare, Smart grids;											ligent	4		COT			
II	IoT Sta Desig CoSIP Advar Multic Power power	andards ning th 9, Mess nced M cast DN r and L r Wi-Fi,	: e arc sage essa IS (n Lossy IEEE	chitecture Queue ge Queu nDNS), D y Networ 5 802.15.6	e of an If Telemetr iing Proto NS Serv rks (RPL) 6, EPCglo	P-based lo y Transp ocol (AM ice Disco ), 6LoWP obal, LTE-	oT, Appli ort (MQ QP), Data overy (DN AN, IEEE A, Z-Wav	cation Pr TT), Exte a Distribu IS-SD); Ir E 802.15.4 ve;	rotocols: ensible   ution Se nfrastruc 4 and Zi	: Constrain Message a rvice (DDS cture Proto igBee, Blue	ed Appli ind Pres i); Servio cols: Ro etooth L	ication Pr sence pro ce Discov outing Pro ow Energ	otocol (C otocol (X very Proto otocol fo gy (BLE),	coAP), MPP), pcols: r Low Low-	11		CO2	
III	<ul> <li>Interoperability:</li> <li>Applications in the IoT, The verticals: Cloud-based solutions, REST Architecture: The Web of Things, Messaging Queues and Publish/Subscribe Communications, Session initiations for the IoT, Optimized Communications: the Dual-network Management Protocol, Discoverability in Constrained Environments, Data Formats: Media types for sensor markup language;</li> </ul>											aging s: the types	5		CO3			
IV	Disco Servic Archit	verabili ce and cecture	ity: Res for D	source D Discovery	Discovery / in the lo	, Local T, Lightw	and Larg	ge-scale rvice Disc	Service covery ir	Discovery	/, Sclab er loT Ne	le and s etworks;	elf-config	Juring	3		CO4	
V	Secur Secur Distril Autho Privac IoT-O	ity and ity issu oution a rizatior cy issue AS app	Privations in and Second Seco	acy in the n the IoT: Security I chanism the IoT: ion scena	e loT: Tradition Bootstrap s for seco The role arios, Hyl	nal vs Lig oping, Pro ure IoT se of Auther orid gatev	htweight ocessing rvices; itication, vay-base	security, data in th IoT-OAS: d commu	Lightwe ne encry Delega inication	eight Crypto pted domai tion-based s;	ography in: Secu authoriz	, Key Agro re data ag ation for t	eement, gregatior the IoT,	١,	7		CO5	
1/1		and F		mnutira	for lat-									1	•		000	

VI Cloud and Fog Computing for for:	6	006	
Role of the loT hub: Virtualization and replication, Operational scenarios, Synchronization protocol;			
Total Hours	36		
ssential Readings	-		
1. Cirani S, Ferrari G, Picone M, Veltri L. Internet of Things: Architectures, Protocols and Standards. John Wiley & Sons; 2018.			
2. Lea P. Internet of Things for Architects: Architecting IoT solutions by implementing sensors, communication infrastructure, edge compu Publishing Ltd; 2018.	ting, analytics, ar	nd security. Pack	
3. Buyya R, Dastjerdi AV, editors. Internet of Things: Principles and paradigms. Elsevier; 2016.			
upplementary Readings			
1. Chou T. Precision-Principles, Practices and Solutions for the Internet of Things. McGraw-Hill Education; 2017.			
2. Santos M, Moura E. Hands-On IoT Solutions with Blockchain: Discover how converging IoT and blockchain can help you build effective 2019.	solutions. Packt	Publishing Ltd;	
3. Al-Fuqaha A, Guizani M, Mohammadi M, Aledhari M, Ayyash M. Internet of things: A survey on enabling technologies, protocols, and a surveys & tutorials. 2015 Jun 15;17(4): 2347-76.	pplications. IEEE	communication	



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Programme		me	Bachelor of Technology in Computer Science and Engineering         Academic Year of Reg           nt         Computer Science and Engineering         Semester											of Regula	Ilation 2018-19			
D	epartme	ent	Comp	outer So	cience an	d Engine	ering					Otan t	Seme	ster		VI tradition of the	11	
Course Code					Co	ourse Nam	ne				Credit S	Structure	<u> </u>		Marks Dis		Totol	
20	430			н	uman Co	mputer li	Iteraction	<u> </u>		3	n		3	50	50	100	200	
		This cou	urse int	roduces	the concep	of human	computer	interaction.			CO1	Able to a	Able to acquire knowledge about the basic con					
		This cou	urse illu er intera	ustrates t action.	the various	software p	process and	d design of	human		CO2	Able to a	acquire kno	wledge abo	about the design of human			
Co Obje	urse ctives	This cou with con	urse de nputer.	escribes	the variou	s existing	models of	interacting	human	Course Outcomes	CO3	Able to a	acquire kno	wledge ab	out the vario	ous models and		
		This cou mobile a	urse ex and web	cplains th b interfac	ne designin :e.	ig of huma	n compute	r interactio	n using		CO4	Able to design the human computer interaction.					on using the	
		CO5 Able to design the human co											uman comp	omputer interaction in web				
		·				I	Mapping v	vith Progra	am Outco	omes (POs)	1				Мар	oing with I	PSOs	
No.	COs	PO	)1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO	
1	CO1	3		-	-	-	-	-	-	-	-	-	-	-	-	-	1	
2	CO2	3		3	-	-	-	-	-	-	2	-	-	-	3	3	1	
3	CO3	3		3	2	1	1	1	-	-	2	-	-	-	3	3	2	
4	CO4	3		3	2	2	1	2	2	-	2	-	-	1	3	3	2	
5	CO5	3		3	2	2	1	2	2		2	-	-	1	3	3	3	
								Contant	SYLLA	505					Lours		$\overline{\mathbf{CO}_{\mathbf{c}}}$	
NU.	Introdu	uction						Jonteni							Hours		005	
I	The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.											06	CO1					
II	Design of Human Computer Interaction and the Software Process Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design											07 CC		CO2				
III	Models and Theories         Cognitive models –Socio-Organizational issues and stake holder requirements – Communication and collaboration models-Hypertext, Multimedia and WWW.         Mobile Human Computer Interaction											07	CO3					
IV	Mobile Inform	e system ation Are	: Platfo chitect	orms, A ture, Mo	pplication bile 2.0, N	framewor Nobile Des	ks- Types sign: Elerr	s of Mobile nents of M	e Applica <sup>:</sup> lobile De	tions: Widge sign, Tools.	ets, Appli	cations, G	ames- Mo	obile	08	CO4		
	Web Interface Design Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.												08 (		CO5			
V							Total	Hours							36			
V			5											I		I		
V	ntial R	eadings		lov Gro	egory Abo	wd, Russe	ell Beale, '	"Human C	Computer	Interaction	", 3 <sup>rd</sup> Ed	ition, Pear	son Educ	ation, 200	4			
V Esse 1	<b>ntial R</b> o. Alan	eadings Dix, Jan	net Fin	nay, Ore			" 1 <sup>st</sup> Edit	ion. O'Re	eilly Med	lia Inc., 200	9							
V Esse 1 2	<b>ntial R</b> . Alan . Brian	<b>eadings</b> Dix, Jan 1 Fling, "	net Fin "Mobil	le Desig	n and Dev	velopment	, i Luit	,										
V Esse 1 2 3	ntial Ro Alan Brian Bill S	eadings Dix, Jan Fling, " Scott and	net Fin ''Mobil d There	le Desig esa Neil	gn and Dev , "Design	velopment ing Web I	nterfaces"	, 1 <sup>st</sup> Editi	ion, O'Re	eilly, 2009								
V Esse 1 2 3	ntial Ro . Alan . Brian . Bill S	eadings Dix, Jan h Fling, " Scott and	net Fin "Mobil 1 There	le Desig esa Neil	n and Dev, "Design	velopment ing Web I	nterfaces"	, 1 <sup>st</sup> Editi	ion, O'Re	eilly, 2009								
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V ====================================	ntial Ro Alan Brian Bill S Dement K. M K. M Editi	eadings Dix, Jan h Fling, " Scott and tary Rea fleena an e van D ion, 2017	net Fin "Mobil I There adings Id R. S Drongel 7.	le Desig esa Neil s ivakuma len, Ada	n and Dev , "Design ar, "Huma am Denni	ing Web I n-Comput s, Richard	ter Interac	tion",Pren	tion, O'Re ntice Hall to Gonz	lndia, 1 <sup>st</sup>	Edition,2 d Krishr	2014 naswamy	"Lean Mc	bile App	Developn	nent", O']	Reilly	

# National Institute of Technology Meghalaya An Institute of National Importance

CURRICULUM

P	rogram	ne	Bachelor of Technology									Y	ear of Re		2018-19			
Department Humanities and Social Sciences											Semes		VIII					
Co	urse	Course Name Credit Structure												Marks D	istribution			
Code					Cou	rse Name				L	Т	Р	С	INT	MID	END	Total	
HS	492				Entre	preneursh	ір			2	0	0	2	50	50	100	200	
	This course introduces the basic concepts of entrepreneurship										CO1	Able to entrepre	understand neurship	the basic	concepts	in the area	ı of	
		This co	ourse	e explains t	he import	ance of en	trepreneur	rship			CO2	Able to apply their understanding of the role and importance of entrepreneurship for economic development						
Course		This co initiati	ourse ve	e familiariz	es person	al creativit	y and entr	repreneuri	al	Course Outcomes	CO3	Able to a initiative	analyze pe e	rsonal cre	ativity and	d entreprei	neurial	
Obje		This co	ourse	e explains t	he elabora	ation of bu	siness ide	a			CO4	Able to business	evaluate th idea	e key ster	os in the e	laboration	of	
		This co	ourse	e describes	how to cr	eate a busi	iness plan				CO5	Able to create their own business plan by understandi the stages of the entrepreneurial process and the resources needed for the successful development of entrepreneurial ventures						
No	COs						Mapping	with Prog	ram Outc	comes (POs)					Map	ping with	PSOs	
INO.	COS	PC	)1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
1	CO1	0	)	0	1	0	0	2	1	1	3	2	3	3				
2	CO2	0	)	0	2	0	0	2	1	1	3	2	3	3				
3	CO3	0	)	0	1	0	0	2	1	1	3	2	3	3				
4	CO4	0	)	0	1	0	0	2	1	1	3	2	3	3				
5	CO5	0	)	0	2	0	0	2	1	1	3	2	3	3				
									SYLLA	BUS								
No.							(	Content							Hours		COs	
I	Definit Entrep Develo	tion of l reneurs opment,	Innov hip ii Typ	vation, Ent n Economi es of Entre	repreneur c Theory, epreneursł	s and Entro Entrepren hip, Contri	epreneursh eurial Pra butions of	nip, Histor ctice, Entr Entreprer	rical Dev repreneur neurs to t	velopment of rial Economy the Society, H	Entrepre y, Entrepi Entrepren	neurship, eneurship eurship in	and Econo India.	omic	05	A	ll COs	
II	Feature Busine	es and T ess, The	Гурея Life	s of Busine Cycle of a	esses and I a Small Co	Entreprene ompany, S	eurs, Entre mall Busin	preneursh ness Enter	ip and S prises, S	mall Busines mall Busines	ss, The In ss Sector	nportance in India.	of Small		03		CO2 CO3	
III	Forms Entrep	of Entro reneuria	eprer al Pro	neurial Org oject, Basi	ganization cs of Vent	, Sources o ture Marke	of Capital, eting, Func	Entreprer lamentals	neurial Profession of Entre	rocess, Entre preneurial M	preneuria lanageme	al Strategie ent.	es,		06	CO2 CO3 CO4		
IV	Busine Entrep Model	ess Proc reneuria Canvas	ess, l al Pro 5, De	Product De ojects, Sou veloping a	esign, Ope rces of Bu n Effectiv	erational A siness Ide e Business	rt, Stock I as, Desigr Model, L	Manageme ning a Bus Legal Forn	ent, Tech siness Inv ns of Bus	nical and Te vestment, Kn siness.	chnologi owledge	cal Analys Economy,	is of Business		06		CO2 CO3 CO4	
V	Startin the Bu Strateg	g a Nev siness C gic Guid	v Con Conce leline	mpany, Bu ept, Writin es and Obje	iying an E g a Busine ectives for	xisting Bu ess Plan, R the Devel	siness, Fra lisk-oppor lopment o	anchising, tunities Po f Small Bu	, Family erspectiv usiness E	Business, Op e, Mitigation Enterprise in 1	pportunity of Risks India, En	y Identific 5, Funding trepreneur	ation, Defi New Vent Biographi	ning tures, ies.	04		CO3 CO4 CO5	
							Total	Hours							24			
Esse	ntial Re	adings																
1	. Rober	rt D. His	srich	, Michael	P. Peters,	and Dean	A. Shephe	erd, "Entre	epreneurs	ship", McGra	w Hill E	ducation, '	Fenth editi	on, 2018.	<b>-</b> • • •	4000		
2	. D. F.	Kuratko	o and	R. M. Ho	dgetts, "E	ntrepreneu	rship: A C	Contempo	rary App	roach", The	Dryden I	Press, Harc	court Brace	e College	Publisher	s, 1998.		
Supp	olement	ary Rea	ading	gs														

1. D. H. Holt, "Entrepreneurship: New Venture Creation", Prentice-Hall of India, 1999.

2. L. M. Bhole, "Financial Institutions and Markets", Tata McGraw-Hill, 2001.