#### SEMESTER VII

S.No.	Category	Course Code	Course Title	L	T	P	C
Theory							
1.	HS	BA20151	Entrepreneurship Development	3	0	0	3
2.	PC	CI20701	IOT Security	3	0	0	3
3.	PE	CI2035*	Professional Elective Course III	3	0	0	3
4.	PE	CI2045*	Professional Elective Course IV	3	0	0	3
5.	OE	CI2090*	Open Elective II	3	0	0	3
Practica						9 4	
6.	PC	CI20702	IOT Security Laboratory	0	0	4	2
7.	EE	CI20703	Mini Project	0	0	6	3
			TOTAL	15	0	8	20

#### SEMESTER VIII

S.No.	Category	Course Code	Course Title	L	T	P	C
Theory							
1.	PC	CI20801	Industrial IOT	3	0	0	3
2.	PE	CI2055*	Professional Elective Course V	3	0	0	3
3.	PE	CI2065*	Professional Elective Course VI	3	0	0	3
Practica	ı				11		
4.	EE	CI20802	Project Work	0	0	12	6
			TOTAL	9	0	12	15

## PROFESSIONAL ELECTIVE COURSES (PE-III)

S.No.	Category	Course Code	CourseTitle	L	Т	P	C
1.	PE	CI20351	Smart Sensor Technologies	3	0	0	3
2.	PE	CI20352	Web and Internet Technologies	3	0	0	3
3.	PE	CI20353	Cyber Security Essentials	3	0	0	3
4.	PE	CI20354	Augmented Reality and Virtual Reality	3	0	0	3
	Z ( 113	t) 1800 204	TOTAL	12	0	0	12

Approved
BOARD OF STUDIES
BE CSE (IOT)

AUTONOMOUS

AUTONOMOUS

# PROFESSIONAL ELECTIVE COURSES (PE-IV)

S.No.	Category	Course Code	Course Title	L	Т	P	C
1.	PE	CI20451	Robotics and Its Applications	3	0	0	3
2.	PE	CI20452	IT Infrastructure Management	3	0	0	3
3.	PE	CI20453	Wireless Sensor Networks	3	0	0	3
4.	PE	CI20454	Cyber Forensics	3	0	0	3
			TOTAL	12	0	0	12

# PROFESSIONAL ELECTIVE COURSES (PE-V)

S.No.	Category	Course Code	CourseTitle	L	T	P	C
1.	PE	CI20551	Mobile Computing	3	0	0	3
2.	PE	CI20552	Software Defined Networks	3	0	0	3
3.	PE	CI20553	Information Retrieval	3	0	0	3
4.	PE	CI20554	Mobile Adhoc Networks	3	0	0	3
			TOTAL	12	0	0	12

# PROFESSIONAL ELECTIVE COURSES (PE-VI)

S.No.	Category	Course Code	CourseTitle	L	T	P	C
1.	PE	CI20651	Natural Language Processing	3	0	0	3
2.	PE*	CI20652	Deep Learning	3	0	0	3
3.	PE	CI20653	Information Visualization	3	0	0	3
4.	PE	CI20654	Service Oriented Architecture	3	0	0	3
			TOTAL	12	0	0	12



#### **OPEN ELECTIVE COURSES (OE-II)**

S.No.	Category	Course Code	CourseTitle	L	Т	P	C
1.	OE	CI20903	Human Computer Interaction	3	0	0	3
2.	OE	CI20904	Android Application Development	3	0	0	3
			TOTAL	6	0	0	6

#### **SUMMARY**

S.NO.	CATEGORY		CREDITS AS PER SEMESTER									
5.110.	CATEGORI	I	П	III	IV	v	VI	VII	VIII			
1	HS	3	4	1	-	-		3		11		
2	BS	11	8	4	4	-	•	-	-	27		
3	ES	7	5	5	6	8=	-	-	-	23		
4	PC	-	4	12	11	19	16	5	3	70		
5	PE	-	-	-	<b>4</b>	3	3	6	6	18		
6	OE	-		-	•	-	3	3	-	6		
7	EE	-		( <b>=</b> 1)	0	1	1	3	6	12		
8	MC	-	0	0		:=	-		-	0		
	TOTAL	21	21	23	21	23	23	20	15	167		



## SEMESTER - VII

BA20151	ENTREPRENEURSHIP DEVELOPMENT	3	0	0	
COURSE C	DBJECTIVES				_
To enable th	ne students to				
1 unde	erstand the Management principles.				
4	the entrepreneurial competencies & analyse the support rendered by government an	d ot	her		
	cies in entrepreneurship development.				
	rstand the business opportunities & to prepare a Feasibility Report.				
	ose a business plan.				
5 appra	aise & comprehend the various factors to be considered for launching a small busines	s.			Ī
UNIT I	BASICS OF MANAGEMENT			9	
Management:	: Meaning, Definition; Nature & Importance - Roles of management - Functions of	f Ma	nage	emen	t
	nagement - Functional areas of Management: Marketing, Finance, Production, HRM				
	Development of Management Thought: Classical, Neo - classical; System as				
	An Overview.				•
UNIT II	ENTREPRENEURIAL COMPETENCE & ENVIRONMENT			9	
	The state of the s				
Entrepreneuri ypes - Chara Entrepreneuri for small entre	ial Competence: Entrepreneurship - Definition, Role and expectations - Entreprene acteristics of the Entrepreneur - Entrepreneurial Competencies - Functions of a ial Environment: Role of Socio-Cultural, Economic and Political Environment - Institute epreneurs; Assistance Programme for Small Scale Units - Institutional Framework, Competencies	n E	ntrep onal S	orene Suppo	n
Entrepreneuri ypes - Chara Entrepreneuri For small entre Government I	ial Competence: Entrepreneurship - Definition, Role and expectations - Entreprene acteristics of the Entrepreneur - Entrepreneurial Competencies - Functions of a ial Environment: Role of Socio-Cultural, Economic and Political Environment - Instite epreneurs; Assistance Programme for Small Scale Units - Institutional Framework, Candustrial Policies and Regulations.	n E	ntrep onal S	orene Suppo	nui
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CO2	! t	ake up s	self-em	oloyme	nt havir	g been	expose	d to ent	renrene	urial en				ying (K3
CO3	S	elect a l	est bus	iness id	lea by n	sing an	proprio	to moth	reprene	assess its	ronme	ıt.	Appl	ying (K3
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2.	Cl	ifford M	1.Baum	back &	Joseph	R.Man	cuso. "	Entrepr	eneursh	in and V	ontun 1		ent", Pre	
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CI2070	)1				IC	OT SEC	CURITY	Å					3	0 0	3
COU	RSE OBJ	IECTIVES													
To enab	ole the stud	dents to													
1		T and cyber ph													
2	know the	e perspective o	of IC	T secu	re desig	n based	l on avail	lable tec	hnolog	gy.					
3	study abo	out role of cryp	ptog	graphy	for IOT.	i.	(9								
4	find the	available authe	entic	ation c	redentia	als and p	privacy c	concerns	i.						
5	acquire t	he knowledge	of e	xplorir	ng cloud	service	es and se	curity fo	or IoT.						
UNIT I	0 1 122	NTRODUCTI											54.75		9
Cyber se	ecurity ve	ersus IoT secur	urity	and cy	ber phy:	sical -	systems	vulneral	bilities	, attac	ks, an	d cou	ntern	neasu	res -
Primer c	on threats,	vulnerability,	, and	d risks	(TVR) -	Primer	r on attac	cks and o	counter	rmeas	ures -7	Гоdау	's Io	T atta	cks -
Threat n	nodeling a	an IoT system.	١.												
UNIT II	I S	ECURITY EN	NGI	NEER	ING FO	OR IOT	T DEVE	LOPMI	ENT						9
Building	g security	in to design	and	devel	opment,	secure	design,	technol	logy se	electio	n – se	curity	y pro	ducts	and
		security lifecy													
			5				_					13			
HNIT I	II C	RVPTOGRA	APH	IC FII	NDAMI	ENTAI	SFOR	IOT SE	CURI	TY E	NGIN	EER	ING		9
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Cryptog	graphy and entals - 1		curin	g the Io	T - Cry	ptograp	hic mod	ule princ	ciples -	Crypt	tograp	hic ke	y ma		ment
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Cryptogr fundame cryptogr UNIT IV An intro Authoriz Guide to	entals - In raphy.  V III reduction and performing	Examining cry  DENTITY AN  to identity and access controling an IoT PIA	ND A and rol; M	g the loopgraphic	oT - Cry c contro SS MAN manage ing IoT	NAGEN gement, Privacy	IoT prometries MENT S	otocols  OLUTI tication	- Futi	Crypt ure di ntials,	irectio	hic ke	the	IoT	ment and 9 ture, IoT,
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#### TEXT BOOKS

- Brian Russell and Drew Van Duren, "Practical Internet of Things Security", Packt Publishing, 2<sup>nd</sup> edition, 2018.
- Fei Hu, "Security and Privacy in Internet of Things (IoTs): Models, Algorithms, and Implementations", CRC Press (Taylor & Francis Group), 2016.

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- 1. David Etter, "IoT Security: Practical guide book", Create Space, 1st Edition, 2016.
- 2. Sean Smith, "The Internet of Risky Things", O'Reilly Media, 1st Edition, 2017.
- Sridipta Misra, Muthucumaru Maheswaran, Salman Hashmi, "Security Challenges and Approaches in Internet of Things", Springer, 2016.
- Ollie White house, "Security of Things: An Implementers' Guide to Cyber-Security for Internet of Things
  Devices and Beyond", NCC Group, 2014.

#### CO-PO MAPPING:

со	Programme Outcomes (POs)												Spe Outc	amme cific omes Os)
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO	PSO
					=					0	1	2	1	2
COI	3	3	1	1	1	84	848	<b>=</b>	1	X.	##************************************	-	2	1
CO2	3	3	3	1	3	-	-	-	1	-	-	1	2	1
CO3	3	3	3	1	3	-	•	<b>97</b> 8	1		1	2	2	1
CO4	3	3	3	1	3	-	-	-	1	-	2	3	2	1
CO5	3	3	3	1	3	-	-	( <b>4</b> )	1	8-	2	3	2	1



C120	10702 IOT SECURITY LABORATORY	0	0	4	2
cou	URSE OBJECTIVES				
To er	nable the students to				
1	learn the state of art open source hardware in IoT				
2	study about role of security for IOT security.				
3	find the method of upload and analyze the data in IoT using cl	oud.			_
4	acquire the knowledge of amazon web service in IoT.				

#### LIST OF EXPERIMENTS

- 1. To detect unauthorized tampering using a accelerometer and trigger an alert system.
- 2. Identify security vulnerabilities on a common IoT device using an open source scanner.
- 3. Monitor and analyze the data traffic of an IoT device to identify possible privacy leaks.
- Implement a basic block cipher algorithm to understand how encryption secures data in IoT devices.
- 5. Implement basic Burglar alarm security system with the help of sensor and buzzer.
- 6. Set up an IoT device (like a Raspberry Pi) and identify potential security vulnerabilities. .
- 7. Set up different IoT networking protocols and analyze their security features.
- 8. Conduct experiments to read RFID tags, and discuss security implications.
- 9. Write a program on Arduino/Raspberry Pi to upload data (temperature and humidity) to thing speak cloud.
- 10. Explore the working of AWS IoT Device Defender.

	TOTAL PERIODS 60
COURSE OUTCOMES  At the end of this course, students will be able to	BT MAPPED (Highest Level)
analyze the IOT open source processing module.	Analyzing (K4)
apply the IOT security concept with symmetric and asymmetric cryptography.	Applying (K3)
analyze cloud data flow from connected IoT devices.	Analyzing (K4)
apply AWS IoT Core to connect and monitor edge devices.	Applying (K3)
	At the end of this course, students will be able to analyze the IOT open source processing module.  apply the IOT security concept with symmetric and asymmetric cryptography.  analyze cloud data flow from connected IoT devices.

со		Programme Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	3	1	1	1	-	-	-	1		-	•	2	1	
CO2	3	3	3	1	3	-	-	-	1	-	-	1	2	1	
CO3	3	3	3	1	3	:=	-		1	-	1	2	2	1	
CO4	3	3	3	1	3		-	-	1	4	2	3	2	1	



CI20703	MINI PROJECT	0	0	6	3
COURSI	E OBJECTIVES				
To enable	the students to				
1	recognize the significance of scope and the problems of projec	Ē .			
2	understand the strategic plans, project prioritization methods as	nd projects			
3	analyze the importance of scheduling / allocating resources to a	ı project			
4	understand the importance of project management as it effects	strategy and business	succe	SS	

#### **GUIDELINES**

- The students are expected to get formed into a team of convenient groups of not more than 3 members for a project.
- Every project team shall have a guide who is the member of the faculty of the institution. Identification of student group and their faculty guide has to be completed within the first two weeksfrom the day of the beginning of 7th semester.
- The group has to identify and select the problem to be addressed as their project work and study literature survey to finalize a comprehensive aim and scope of their work.
- 4. A project report has to be submitted by each student group for their project work.
- 5. Three reviews have to be conducted by a team of faculty (minimum 3 and a maximum of 5) along with their faculty guide as a member of faculty team (for monitoring the progress of project planning and implementation).

	TOTAL PERIODS	90
SE OUTCOMES  nd of this course, the students will be able to		
formulate a real world problem, identify the requirement and developing solutions.		3)
identify technical ideas, strategies and methodologies.	Understandin	g(K2)
utilize the new tools, algorithms, techniques that contribute to obsolution of the project.		4)
test and validate through conformance of the developed prototy analysis the cost effectiveness		)
	formulate a real world problem, identify the requirement and developed solutions.  identify technical ideas, strategies and methodologies.  utilize the new tools, algorithms, techniques that contribute to obsolution of the project.  test and validate through conformance of the developed prototy	SE OUTCOMES and of this course, the students will be able to  formulate a real world problem, identify the requirement and develop the design solutions.  identify technical ideas, strategies and methodologies.  Understandin utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.  Analysing (Kanalysing (Kanal

#### CO-PO MAPPING:

		PSOs												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	1	1		-	ı	· 1	1	2	3	2
CO2	3	2	2	1	1	1	_	-	1	1		-2	3	2
CO3	3	2	2	1	1	1		_	I	1/	MEER	NG CO	LLEGA	2
CO4	3	2	2	1	1	1	_		1	14	BOAD	Approve	d 3	2



#### SEMESTER - VIII

	120801	INDUSTRIAL IOT	3	0	0	3
CO	URSE OI	BJECTIVES				
To e	nable the	students to				
1	learn iot	fundamental computations and evolutions of industry 4.0.				
2	know the	e perspective of industrial iot process.				
3	study ab	out iiot reference architectures and offsite technologies.				
4	find the	available on site reality and communication technologies.				
5	acquire t	he knowledge of industrial data acquisition and its applications.				
U	NIT I	OVERVIEW OF INDUSTRIAL IOT			9	)
indus	try 4.0 -	re, application based IOT protocol, cloud computing, fog computing industrial revolution, Evolution of industry 4.0, environmental in IIoT – Basics of CPS, CPS and IIoT.			MA PERSON	
U	NIT II	INDUSTRY 4.0 BASICS			9	)
proce	SS.	npacts of industry 4.0 – Industrial IoT – Industrial internet systems, in  IIOT REFERENCE ARCHITECTURE	ndustrial ser	nsing	, indu	stria
					1.2	
_	III III				9	-
Busin Techr	ess mode nologies –	els – definition, business for IoT and IIoT, reference architecture of Iot cloud computing and fog computing for IIoT.	oT and IIo1	Γ, IIR		-
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3.	Anand Sharma, Sunil Kumar Jangir, Manish Kumar, Dilip Kumar Choubey, Tarun Shrivastava, S Balamurugan, "Industrial Internet of Things Technologies and Research Directions", CRC Press, 2020.
4.	Sudan Jha, Usman Tariq, Gyanendra Prasad Joshi, Vijender Kumar Solanki, "Industrial Internet of Things Technologies, Design, and Applications", CRC Press, 2022.

## Mapping of Course Outcomes with Programme Outcomes (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-Weak

		Programme Outcomes(POs)												
COs	POI	PO2	РО3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	1	, <del>-</del>	( <del>-</del> 9)		-	-	-	1	2	1
CO2	3	2	2	1	2	-	-	-	-	-	-	1	2	1
СОЗ	3	2	2	1	2	-	1=0	140	-	141	-	2	2	1
CO4	3	2	2	1	2		-	-	-	1,00	+	2	2	1
CO5	3	2	2	1	2	-	( <u>1</u>	-	-	15	-	2	2	1



CI20802	PROJECT WORK	0	0	12	6
COURSE	OBJECTIVES				
To enable t	the students to				
1	recognize the significance of scope and the problems of project	et			
2	understand the strategic plans, project prioritization methods a	nd projects			
3	understand the importance of scheduling/allocating resources	s to a project			
4 ·	develop strategies for developing and reinforcing high perform	nanceteams			

#### **GUIDELINES**

- The students are expected to get formed into a team of convenient groups of not more than 3 members for a project.
- Every project team shall have a guide who is the member of the faculty of the institution. Identification of student group and their faculty guide has to be completed within the first two weeks from the day of the beginning of 8th semester.
- The group has to identify and select the problem to be addressed as their project work and studyliterature survey to finalize a comprehensive aim and scope of their work.
- A project report has to be submitted by each student group for their project work.
- 5. Three reviews have to be conducted by a team of faculty (minimum 3 and a maximum of 5) along with their faculty guide as a member of faculty team (for monitoring the progress of projectplanning and implementation).

	OTAL PERIODS	180		
COURSE At the end		BT MAPPED (Highest Level)		
CO1	prepare a literature survey in a specific domain as a team/ indiv to motivate lifelong learning	idual Applying	(K3)	
CO2	identify theproblem by applying acquired knowledge	Understan	ding(K2)	
CO3	choose efficient tools for designing project modules	Applying	(K3)	
CO4	design engineering solutions to complex problems utilizing a sys approach and combine all themodules for efficient testing	stems Analysing	(K4)	

#### CO-PO MAPPING:

# Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1- Weak

*		Programme Outcomes(POs)													
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	
CO1	3	2	2	1	1	1	3-		1	1	1	2	3	2	
CO2	3	2	2	1	1	1	# <u></u>	-	1	1	1	2	3	2	
CO3	3	2	2	1	1	1	-	-	1	1	1	2	3	2	
CO4	3	2	2	1	1	1	-	-	1	1	DING	COLI	3	2	

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BOARD OF STUDIES
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- V		
COMPAGNIT.		

## Professional Elective Course III

	YAA	Professional Elective Course III					
	120351	SMART SENSOR TECHNOLOGIES		2	•	Ι.	T
CC	DURSE	OBJECTIVES		3	0	0	
То	enable	the students to					
1	learn	smart sensor fundamentals, its characteristics and in capabilities.					
2	know	the concepts of communication control strategies for smart sensors.					
3	study	about RF sensing and semiconductor sensor packaging approaches.					
4	find t	he smart sensor standards to extend the system to the network.					
5	acqui	re the knowledge of next phase of sensing system.					
UN	NIT I						-
		INTRODUCTION TO SMART SENSOR		Т	T	9	
Hein	MOU	r basics – sensor output characteristics, other sensing technologies,	digital out	put	sens	ors -	-
	3	to increase sensor IQ: MCU control, MCUs for sensor interfere	techniques	and	d ev	ctom	
consi	deratio	ns, software, tools and support, sensor integration.	reemiques	and	u sy.	stem	
UN	IT II	COMMUNICATIONS AND CONTROL FOR SMART SENSO	200				
Defin	itions a	and Background - definitions and background, office/building automa	JRS			9	
other	aspects	of network communications and background, office/building automa	ation, home	auto	omat	ion,	
etwo	rke co	s of network communications; control techniques - state machin	es, fuzzy lo	ogic	, ne	ural	
	,,	momed fuzzy logic and neural networks, adaptive control, other con-	trol areas, th	ne in	npac	t of	
rune	iai inte	ligence.					
2000							
UNIT	III	TRANSCEIVERS, TRANSPONDERS, AND TELEMETRY		_			_
		TRANSCEIVERS, TRANSPONDERS, AND TELEMETRY Wireless data and communications DE				9	
ntrodu	uction -	Wireless data and communications, RF sensing telemetry, REMEMEN	S; MEMS bo	eyor	nd se	1/20	
ntrodu nicro	uction -	Wireless data and communications, RF sensing, telemetry, RF MEMS ed actuators, other micro machined structures: Packaging a semicary				ensor	
ntrodu nicro ensor,	uction - machin , hybrid	Wireless data and communications, RF sensing, telemetry, RF MEMS ed actuators, other micro machined structures; Packaging – semicor packaging, packaging for monolithic sensor, reliability implications.				ensor	;d
ntrodu nicro ensor, UNIT	machin hybrid	Wireless data and communications, RF sensing, telemetry, RF MEMS ed actuators, other micro machined structures; Packaging – semicor packaging, packaging for monolithic sensor, reliability implications, MECHATRONICS AND SENSING SYSTEMS	iductor pack , testing sma	kagii art s	ng a	ensors pplie	d
ntrodu nicro ensor, UNIT	machin hybrid	Wireless data and communications, RF sensing, telemetry, RF MEMS ed actuators, other micro machined structures; Packaging – semicor packaging, packaging for monolithic sensor, reliability implications.  MECHATRONICS AND SENSING SYSTEMS  smart-power ICs, embedded sensing, sensing arrays, other system are	iductor pack , testing sma	kagii art s	ng a	ensors pplie ors.	
ntrodu nicro ensor, UNIT	machin hybrid	Wireless data and communications, RF sensing, telemetry, RF MEMS ed actuators, other micro machined structures; Packaging – semicor packaging, packaging for monolithic sensor, reliability implications.  MECHATRONICS AND SENSING SYSTEMS  smart-power ICs, embedded sensing, sensing arrays, other system are	iductor pack , testing sma	kagii art s	ng a	ensors pplie ors.	d
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ntrodu nicro ensor, UNIT trodu ensing EEE 1- UNIT	machin hybrid IV cetion - 3 - intro 451.3, 1	Wireless data and communications, RF sensing, telemetry, RF MEMS ed actuators, other micro machined structures; Packaging – semicor packaging, packaging for monolithic sensor, reliability implications.  MECHATRONICS AND SENSING SYSTEMS  smart-power ICs, embedded sensing, sensing arrays, other system aspeduction, setting the standards for smart sensors and systems - IEEE IEEE 1451.4, extending the system to the network.  THE IMPLICATIONS OF SMART SENSOR STANDARDS d-play – communicating sensor data via existing wiring – automated.	ects; standar	ds fe	enso for sm	pplie prs. 9 mart 1.2,	
ensor, UNIT trodu ensing EE 1- UNIT ensor- eb – p	machin hybrid riversity action - g - intro 451.3, l	Wireless data and communications, RF sensing, telemetry, RF MEMS ed actuators, other micro machined structures; Packaging – semicor packaging, packaging for monolithic sensor, reliability implications.  MECHATRONICS AND SENSING SYSTEMS  smart-power ICs, embedded sensing, sensing arrays, other system aspeduction, setting the standards for smart sensors and systems - IEEE IEEE 1451.4, extending the system to the network.  THE IMPLICATIONS OF SMART SENSOR STANDARDS  d-play – communicating sensor data via existing wiring – automated/control over the internet – alternative standards: The next phase of secondard control over the internet – alternative standards: The next phase of secondards.	remote sens	kaginart so	or sn	pplie prs. 9 mart 1.2,	
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CO3	recognize the implementation of RF sensor networks and semiconductor sensor packaging.	Applying (K3)
CO4	know about the smart sensor standards.	Understanding (K2)
CO5	comprehend the remote sensing and future system using smart sensors.	Analysing (K4)
TEX	T BOOKS	
1.	Randy Frank, "Understanding Smart Sensors", ARTECH HOUSE, INC., 2000.	
2.	Youn-Long Lin, Chong-Min Kyung, Hiroto Yasuura, Yongpan Liu, "Smart S Springer International Publishing, 2015.	Sensors and Systems",
	PRIVATE	
REFE	RENCES	
1.	Peter Brida, Ondrej Krejcar, Ali Selamat, Attila Kertesz, "Smart Sensor Technolo 2021.	ogies for IoT", MDPI,
1. 2.	Peter Brida, Ondrej Krejcar, Ali Selamat, Attila Kertesz, "Smart Sensor Technological Peter Brida, Ondrej Krejcar, Ali Selamat, Attila Kertesz, "Smart Sensor Technological Peter Brida, Ondrej Krejcar, Ali Selamat, Attila Kertesz, "Smart Sensor Technological Peter Brida, Ondrej Krejcar, Ali Selamat, Attila Kertesz, "Smart Sensor Technological Peter Brida, Ondrej Krejcar, Ali Selamat, Attila Kertesz, "Smart Sensor Technological Peter Brida, Ondrej Krejcar, Ali Selamat, Attila Kertesz, "Smart Sensor Technological Peter Brida, Ondrej Krejcar, Ali Selamat, Attila Kertesz, "Smart Sensor Technological Peter Brida, Ondrej Krejcar, Ali Selamat, Attila Kertesz, "Smart Sensor Technological Peter Brida, "Smart Sensor Technologica Peter Brida, "Smart Sensor Technologica Peter Brida, "Smart Sensor Technologica Peter Br	
1.	Peter Brida, Ondrej Krejcar, Ali Selamat, Attila Kertesz, "Smart Sensor Technolo 2021. Subhas Chandra Mukhopadhyay, Gourab Sen Gupta, "Smart Sensors and Sensing	

				Progra	mme O	utcome	s (POs)	)				PS	Os
PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO1	PSO2
3	2	2	1	1	-	-	-	_	-	-	2	2	1
- 3	2	2	1	1	-	-	-	-	-	-	2	2	1
3	2	2	1	1	-	-	-	-	-	-	2	2	1
3	2	2	1	1	-	-	¥	-	-	-	2	2	1
3	2	2	1	1	-	-	_	-	-	-	2	2	1
	3 3 3	3 2 3 2 3 2 3 2	3 2 2 3 2 2 3 2 2 3 2 2	PO1         PO2         PO3         PO4           3         2         2         1           -3         2         2         1           3         2         2         1           3         2         2         1           3         2         2         1	PO1         PO2         PO3         PO4         PO5           3         2         2         1         1           -3         2         2         1         1           3         2         2         1         1           3         2         2         1         1           3         2         2         1         1	PO1         PO2         PO3         PO4         PO5         PO6           3         2         2         1         1         -           -3         2         2         1         1         -           3         2         2         1         1         -           3         2         2         1         1         -           3         2         2         1         1         -	PO1         PO2         PO3         PO4         PO5         PO6         PO7           3         2         2         1         1         -         -           3         2         2         1         1         -         -           3         2         2         1         1         -         -           3         2         2         1         1         -         -	PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8           3         2         2         1         1         -         -         -           3         2         2         1         1         -         -         -           3         2         2         1         1         -         -         -           3         2         2         1         1         -         -         -           3         2         2         1         1         -         -         -	3     2     2     1     1     -     -     -     -       3     2     2     1     1     -     -     -     -       3     2     2     1     1     -     -     -     -       3     2     2     1     1     -     -     -     -	PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO1 0           3         2         2         1         1         -         -         -         -         -           3         2         2         1         1         -         -         -         -         -           3         2         2         1         1         -         -         -         -         -           3         2         2         1         1         -         -         -         -         -	PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO1 0 1         PO1 1           3         2         2         1         1         -         -         -         -         -         -           3         2         2         1         1         -         -         -         -         -         -           3         2         2         1         1         -         -         -         -         -         -           3         2         2         1         1         -         -         -         -         -         -	PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO1 0 1 2         PO1 1 2           3         2         2         1         1         -         -         -         -         -         2           3         2         2         1         1         -         -         -         -         -         2           3         2         2         1         1         -         -         -         -         -         2           3         2         2         1         1         -         -         -         -         -         2	PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO1 0 1 2 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2



	352	WEB AND INTERNET TECHNOLOGIES	3	0	0	
COL	JRSE	OBJECTIVES				
To e	nable	the students to				
1	ana	lyze the basic concepts of web programming and internet protocols.				
2	kno	w how to design interactive web pages using Scripting languages.				
3	lear	n server-side programming using servlets.				
4	dev	elop web pages using XML/XSLT.				
5	dev	elop application using recent environment like Node JS				
UNI	ΤΙ	WEB SITE BASICS AND WEB DESIGNING			ç	)
Wide XHT1	Web, ML; A	tials - Clients, Servers, and Communication; The Internet - Basic Internet Internet - HTTP request message, response message, Web Clients Web Servers; An Introduction to HTML History - Versions, Basic XHTML Syntax and HTML Elements - Relative URLs, Lists-tables, Frames-Forms.	Markup L	angu	ages	
						_
UNIT		CLIENT SIDE PROCESSING AND SCRIPTING  Processing - The JavaScript Language, History and Versions; Introdu-			9	
		, Basic Syntax, Variables and Data Types; Statements - Operators, Literal lt-in Objects, JavaScript Debuggers.	is, Functio	ns, C	Бјес	t
		200			_	
Applic	ating position	SERVER SIDE PROCESSING AND SCRIPTING  programming and presentation - JSP Technology, introduction JSP and sets - Basic JSP, JavaBeans Classes and JSP, tag libraries and files, support	for the m	odel	view	P
Separa Applio Contro Declar XML XML	eation parties of the contraction of the contractio	programming and presentation - JSP Technology, introduction JSP and sets - Basic JSP, JavaBeans Classes and JSP, tag libraries and files, support Paradigm; Representing Web Data - XML Documents and Vocabula, Namespaces; DOM based XML processing - Event oriented parsing; ments - Selecting XML Data; XPATH - Template based transformations ments in browsers.	for the m laries, Ve SAX - Tr	odel ersior ansfo	g JSI view is an ormin layin	P
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Separa Applio Contro Declar XML XML UNIT Introd smart 1451 UNIT	cation oller ration documents of the cation	programming and presentation - JSP Technology, introduction JSP and set is - Basic JSP, JavaBeans Classes and JSP, tag libraries and files, support Paradigm; Representing Web Data - XML Documents and Vocabula, Namespaces; DOM based XML processing - Event oriented parsing; ments - Selecting XML Data; XPATH - Template based transformations ments in browsers.  JSP AND XML  1 - smart-power ICs, embedded sensing, sensing arrays, other system and - introduction, setting the standards for smart sensors and systems - EE 1451.3, IEEE 1451.4, extending the system to the network.	for the m laries, Ve SAX - Tr s; XSLT -	odel ersion ansfor Disp	g JSI view ss an ormin layin ds fo	P
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CO3	program se web pages.		le web	pages	that ha	ave to	proces	s reque	est from	n client-	side	Analy	sing (F	(4)
CO4	represent v	veb data	using	xml a	nd dev	elop w	eb pag	es usir	ıg jsp.			Analy	sing (F	(4)
CO5	create web	and int	ernet a	pplicat	ion us	ing no	de js.					Appl	ying (K	[3)
TEX	T BOOKS													
1.	Jeffrey C 2006.	Jackson	, "Web	Techi	nologie	esA (	Compu	ter Sci	ence F	erspecti	ve", Pea	rson Ed	ucation	ι,
2.	Brad Dayl Developme Edition, Pe	ent: The	e defin	itive g	guide t									
REFE	RENCES													
1.	Robert. W.	Sebest	a, "Pro	gramn	ning th	e Wor	ld Wid	e Web	", Fou	rth Editi	on, Pear	son Edu	cation,	2007
2.	Deitel, Go Education,		"Intern	et & V	Vorld '	Wide V	Web H	ow To	Progra	m", Thi	rd Editio	on, Pears	son	
3.	Marty Hal Education,										ı, Volun	ne I and	II, Pea	rson
4.	Ethan Brow	wn , "W	eb Dev	elopm	ent wit	th node	and e	xpress'	', Orell	y Educa	tion, 201	14.		
CO-PC	O MAPPIN	G:										3.		
	(1,2,	M 3 indica	appin	g of Co	ourse o	Outco f corre	mes w	ith Pro ) 3 - S	ogram trong,	me Out 2 - Med	come lium, 1	- Weak		
	1		Prog	gramm	e Out	comes	(POs)	)					P	SOs
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO
CO1	3	2	1	1	1	-			1	-	-	1	2	1
CO2	3	2	2	1	2	-	-	-	1	-	-	1	2	1
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**CO4** 

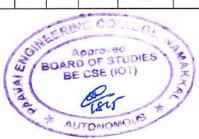
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CI203	53 CYBER SECURITY ESSENTIALS	1.			T
Same	SE OBJECTIVES	3	0	0	3
USPG-EUDPHWARM	ble the students to				
	terpret the threats and vulnerabilities in computer systems.				_
	fer the need for security in operating systems and networks.		-		5-31-
	derstand the security counter measures- firewalls and intrusion detection sys	tom			
	ow about privacy principles and policies.	tem.			
	alyze the typical threats, security planning and know about cyber laws.				
UNIT					
OMI	INTRODUCTION TO CIBER SECURITY			9	
unit unit	II SECURITY IN OPERATING SYSTEM & NETWORKS			9	
HOLWOIK	communications; wireless network security - denial of service, distributed de	twork security a	,		15 11
UNIT I	communications; wireless network security - denial of service, distributed de  II DEFENCES: SECURITY COUNTERMEASURES			9	us u
UNIT I		enial of service.	man	9 agem	ent,
UNIT I	DEFENCES: SECURITY COUNTERMEASURES  aphy in Network Security - firewalls, intrusion detection and prevention systems, security requirements of databases, reliability and integrity, database disclo	enial of service.	man	9 agem	ent,
UNIT I Cryptogr databases UNIT I	DEFENCES: SECURITY COUNTERMEASURES  aphy in Network Security - firewalls, intrusion detection and prevention systems, security requirements of databases, reliability and integrity, database disclo	ystems, network	man g and	9 agem big c	ent.
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	Charles P. Pfleeger, Shari Lawrence, Pfleeger Jonathan Margulies, "Security in Computing", 5th
1.	Edition, Pearson Education, 2015.
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	Nelson Phillips and Enfinger Steuart, - "Computer Forensics and Investigationsl", Cengage Learning, New
2.	Delhi, 2009.
3.	AllanFriedman and P. W. Singer, "Cybersecurity and Cyberwar: What Everyone Needs to Know"
4.	Erdal Ozkaya, "Cybersecurity: the beginner's guide: a comprehensive guide to getting started in cybersecurity"

				Pr	ogran	nme O	utcom	es (PC	Os)				PS	Os
со	PO1	PO2	РО3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	2	1	-	-	-	-	-	2	2	1
CO2	3	2	2	1	2	1	-	-	-		-	2	2	1
CO3	3	2	2	1	2	1	-	5 <b>4</b> 8	=	-	-	2	2	1
CO4	3	2	2	1	2	1	-	-	-	-	-	2	2	1
CO5	3	2	2	1	2	1	-	•	-	-	-	2	2	1



	0354	AUGMENTED REALITY AND VIRTUAL REALITY	3	0	0	
COUI	RSE OB	JECTIVES				
To ena	able the s	students to				
1 is	mpart the	e fundamental aspects and principles of AR/VR technologies				
2		internals of the hardware and software components involved in the developplications	opme	nt of A	R/VR	
3 16	earn abou	ut the graphical processing units and their architectures				-
4 g	gain knov	vledge about AR/VR application development	-			
5 k	cnow the	technologies involved in the development of AR/VR based applications				
UN	IT I	INTRODUCTION			9	)
Compos of Trac	nents of ' kers – N	of Virtual Reality – Virtual Reality Vs 3D Computer Graphics – Bener VR System – Introduction to AR-AR Technologies-Input Devices – 3D Polavigation and Manipulation Interfaces – Gesture Interfaces – Types of Computer – Graphics Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Human Visual System – Personal Graphics – Display – Personal Graphics – Di	osition Gestur	Track	ers – T Devid	yr
1.00	Devices	- Graphics Display - Human Visual System - Personal Graphics Dis	spiays	Lai	50 , 0	u
		d Displays – Human Auditory System.	spiays	Dar	50 , 0.	uı
Display UNI Modelii	ys – Soun IT II ng – Geo	ord Displays – Human Auditory System.  VR MODELING  ometric Modeling – Virtual Object Shape – Object Visual Appearance –	Kinen	natics I	9 Modeli	ng
UNI Modelin Transfo World - and Ma UNI VR Pro	ys – Soun IT II  ng – Geo ormation – Physica apping – I T III ogrammin	d Displays – Human Auditory System.  VR MODELING	Kinen chies - ation -	natics I - View Force	Modeli ing the Smoot	ng e 3
UNI Modelin Transfo World - and Ma UNI	ys – Soun IT II  ng – Geo ormation – Physica apping – I T III ogrammin	Matrices – Object Position – Transformation Invariants – Object Hierard Modeling – Collision Detection – Surface Deformation – Force Computa Behavior Modeling – Model Management.  VR PROGRAMMING	Kinen chies - ation -	natics I - View Force	Modeli ing the Smoot	ng e 3
UNI Modelin Transfo World - and Ma UNI VR Pro Java 3D	ys – Soun IT II  ng – Geo ormation – Physica apping – I T III ogrammin	Matrices – Object Position – Transformation Invariants – Object Hierard Modeling – Collision Detection – Surface Deformation – Force Computa Behavior Modeling – Model Management.  VR PROGRAMMING	Kinen chies - ation -	natics I - View Force	Modeli ing the Smoot	ng e 3 hii
UNI  Modelin Transfo World - and Ma UNI  VR Pro Java 3D  UNI  Human Applica	ys – Sound IT II  ng – Geormation – Physical pping – I  T III  grammin  T IV  Factors i  ations of YR Applie	was Displays – Human Auditory System.  VR MODELING  Ometric Modeling – Virtual Object Shape – Object Visual Appearance –  Matrices – Object Position – Transformation Invariants – Object Hierarcal Modeling – Collision Detection – Surface Deformation – Force Computa Behavior Modeling – Model Management.  VR PROGRAMMING  og – Toolkits and Scene Graphs – World ToolKit – Java 3D – Comparison	Kinen chies - ation -	ratics I View Force Vorld T	Modeli ing the Smoot Smoot ToolKit	ng a dic
UNI  Modelin Transfo World - and Ma UNI  VR Pro Java 3D  UNI  Human Applica VR - V Busines	ys – Sound IT II  ng – Geormation – Physical pping – I  T III  grammin  T IV  Factors i  ations of YR Applie	was described Displays – Human Auditory System.  VR MODELING  Ometric Modeling – Virtual Object Shape – Object Visual Appearance – Matrices – Object Position – Transformation Invariants – Object Hierarch Modeling – Collision Detection – Surface Deformation – Force Computa Behavior Modeling – Model Management.  VR PROGRAMMING  In Comparison Applications  APPLICATIONS  In VR – Methodology and Terminology – VR Health and Safety Issues – Ver – Education, Arts and Entertainment – Military VR Applications – Entertainment in Manufacturing – Applications of VR in Robotics – Information	Kinen chies - ation -	ratics I View Force Vorld T	Modeli ing the Smoot Smoot ToolKit	ng hii dic ns R
UNI  Modelin Transfo World - and Ma UNI  VR Pro Java 3D  UNI  Human Applica VR - V Busines UNI	ys – Sound IT II  ng – Geo  ormation  – Physical  apping – I  T III  ogrammin  O  T IV  Factors i  ations of YR Applic  sss – VR in	was described Displays – Human Auditory System.  VR MODELING  Ometric Modeling – Virtual Object Shape – Object Visual Appearance – Matrices – Object Position – Transformation Invariants – Object Hierarch Modeling – Collision Detection – Surface Deformation – Force Computa Behavior Modeling – Model Management.  VR PROGRAMMING  In a Toolkits and Scene Graphs – World ToolKit – Java 3D – Comparison  APPLICATIONS  In VR – Methodology and Terminology – VR Health and Safety Issues – Ver a Education, Arts and Entertainment – Military VR Applications – Entertainment – VR in Education  In Entertainment – VR in Education	Kinen chies - ntion - n of W	Porce  Vorld T  I Socie ag Applaalization	Modeliing the Smoot Smoot 9 ToolKit 9 Ty-Medication – V	ng hi: ans R
UNI  Modelin Transfo World - and Ma UNI  VR Pro Java 3D  UNI  Human Applica VR - V Busines  UNI  Introduce	ys – Sound IT II  ng – Geo  ormation  – Physical  apping – I  T III  ogrammin  O  T IV  Factors i  ations of YR Applic  sss – VR in	when the description of the computer of the co	Kinen chies - ntion - n of W	Porce  Vorld T  I Socie ag Applaalization	Modeliing the Smoot Smoot 9 ToolKit 9 Ty-Medication – V	ng 3 hii

COs		COUL	RSE O	UTCO	MES								BT MA	PPED
		At the	end of	this co	urse, th	e stude	nts wil	l be abl	e to			(Hi	ghest Le	evel)
CO1		unders	stand th	e basic	concep	ots of A	R and	VR.				Ur	nderstand	ling (K2)
CO2		unders	stand th	e tools	and tec	chnolog	gies rela	ated to	AR/VI	₹.		Ur	nderstand	ling (K2)
CO3		know	the wor	king p	rinciple	of AR	/VR re	lated se	nsor de	evices.		Ur	nderstand	ling (K2)
CO4		design	of vari	ious mo	dels us	sing mo	deling	technic	ques.				Applyin	g (K3)
CO5		develo	p AR/	VR app	licatio	ns in di	fferent	domai	ns.				Applyin	g (K3)
TEX	т во	OKS												
1.				er, John					ity Blue	eprints: (	Create c	ompellir	ng VR	
2.			Schm y, 2016		Tobia	s Holle	erer, "A	Augmei	nted Re	eality: P	rinciple	s & Pra	ictice", A	Addison
REFE	RENC	ES												
1.								erstand	ling Vir	tual Rea	ality – Ir	iterface,	Applica	tion,
9.9%				rgan Ka							2001			
2.		John \	/ince, `	Introdu	iction t	o Virtu	al Real	ity", Sj	oringer-	-Verlag,	2004.			
CO-PC	) MAP	PING:												
			(3/2/	apping	g of Co	urse O	utcom	es with	Progr	amme ( g,2-Med	Outcom	es Weak		
			(3/2/	marca				mes(PC		5,2		TTCIAL	PS	SOs
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	2	1	-	-		-		2	2	1
CO2	3	2	2	1	2	1	-	-	-		•	2	2	1
CO3	3	2	2	1	2	1	-	-	-	-	7-	2	2	1
CO4	3	2	2	1	2	1	<b>.</b>	-	-	-	-	2	2	1
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CO5

Approved
BOARD OF STUDIES
BE CSE (IOT)

AUTONOMOUS

## Professional Elective Course IV

	20451	ROBOTICS AND ITS APPLICATIONS	3	0	0	3
CO	OURSE	OBJECTIVES				
To	enable t	he students to			-	
1	learn th	basics of robotics and their applications				
2	study th	e need for various sensors and drives in robotics				
3	gain the	rough knowledge about the robot kinematics				
4	knowle	ge on path planning and different trajectories				
5	apply th	e programming of robots in contemporary use				
UI	I TIN	INTRODUCTION TO ROBOTICS			9	
Intr	oduction	- Automation and robotics - Robotics in science fiction - Types - Mo	bility -	Terrain -	Compor	ents
		and performance characteristics, Automation			compon	OHIC
UN	IITII	WORKING COMPONENTS FOR ROBOTS			9	
D-i-	rec Ela	stric - Hydraulic and Draumetic Deiros Tarailla				
		etric - Hydraulic and Pneumatic Drives - Tactile sensors - Proximity				
		ion Sensor Systems - Image Processing and Analysis - Image Data Red Object Recognition	iction -	Segmenta	tion - Fea	ture
	IT III					
UN	11 111	ROBOT KINEMATICS AND DYNAMICS			9	
ZCAVASA	inuous a	nd discrete models.  PATH PLANNING		-	9	
Typ	es of Tra	instarias Trajactore Planning and Augideur - foliated - Bul Di			-7.8	
		ectories - Trajectory Planning and Avoidance of Obstacles - Path Plan	ning - S	kew Moti	on - Joint	
UN	IT V	otion and Straight Line Motion.				
Indu	strial A	APPLICATION OF ROBOTS			9	
		APPLICATION OF ROBOTS	te Contr	olled Rob		
Exa:	ATC.		te Contr	olled Rob		
Exai		APPLICATION OF ROBOTS tomation - Robots for Nuclear - Thermal and Chemical Plants - Remo	te Contr	rolled Rob		
	CO	APPLICATION OF ROBOTS tomation - Robots for Nuclear - Thermal and Chemical Plants - Remo	te Contr		ots - Typ	oical
	СО	APPLICATION OF ROBOTS  tomation - Robots for Nuclear - Thermal and Chemical Plants - Remo Automated Industries.  TOTAL PERIODS	te Contr	BT	ots - Typ	oical O
COs	CO At t	APPLICATION OF ROBOTS  tomation - Robots for Nuclear - Thermal and Chemical Plants - Remo Automated Industries.  TOTAL PERIODS  URSE OUTCOMES	te Contr	BT M	ots - Typ 45 MAPPEI	oical O
COs	CO At t	APPLICATION OF ROBOTS tomation - Robots for Nuclear - Thermal and Chemical Plants - Remo Automated Industries.  TOTAL PERIODS URSE OUTCOMES ne end of this course, the students will be able to	te Contr	BT M (High	45  MAPPEI  dest Leve	) (K2)
COs	CO At t und exp	APPLICATION OF ROBOTS  tomation - Robots for Nuclear - Thermal and Chemical Plants - Remo Automated Industries.  TOTAL PERIODS  URSE OUTCOMES  ne end of this course, the students will be able to erstand the necessity and basics of robotics in real time applications	te Contr	BT M (High Underst	ots - Typ  45  MAPPEI  est Leve  anding (	) (K2)
COs CO1 CO2	At t und exp app robo	APPLICATION OF ROBOTS  tomation - Robots for Nuclear - Thermal and Chemical Plants - Remo Automated Industries.  TOTAL PERIODS  URSE OUTCOMES  ne end of this course, the students will be able to erstand the necessity and basics of robotics in real time applications ain the components and working principle in robots by the use of image processing, obstacle detection and path planning in	te Contr	BT M (High Underst	45 MAPPEI test Leve anding (I	) (1) (K2) (K2)

XT BOOKS
Mikell P. Groover, "Industrial Robotics: Technology, Programming and nd Applications", 2 Edition, McGraw-Hill Publishers
John J. Craig, "Introduction to Robotics, Mechanics and Control", 2010, 3 Edition, Pearson Education
FERENCES
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Lorenzo Sciavicco Bruno Siciliano, "Modelling and Control of Robot st Manipulators", 1 Edition, Springer Science & Business Media, Berlin, 2012
Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata McGraw Hill Publishing Company Limited, 2010.
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# Mapping of Course Outcomes with Programme Outcome (1,2,3 indicates the strength of correlation) 3 - Strong, 2 - Medium, 1 - Weak

					Prog	ramme	Outcor	nes (PC	s)				PSOs	
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	1	-	-	-	-	-	1	2	1
CO2	3	2	2	2	2	1	-	-/	-	-	-	1	2	1
СОЗ	3	2	2	2	2	1	-	1=1	-	(=)	<b>(4</b> 0)	1	2	1
CO4	3	2	2	2	2	1	-	-	-	-	-	1	2	1
CO5	3	2	2	2	2	1	-	-	-	-	-	1	2	1

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Approved
BOARD OF STUDIES
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CI204:	152 IT INFRASTRUCTURE MANAGEMENT	3	0	0	3
COURS	SE OBJECTIVES				
To enab	ple the students to				
1	know the basics of it infrastructure.				
2	understand the basics of data center and its performance metrics.				
3	acquire the basics of compute and storage services provided in cloud.				
4	learn the basics of cloud platforms and technologies.				
5	study the security issues associated with cloud infrastructure.				
UNIT	I INTRODUCTION TO INFRASTRUCTURE			9	
ntroduct	tion to IT Building Blocks - Infrastructure, Nonfunctional Attributes, Calculating	Availabil	ity, Av	ailabil	ity
	ges and Intervals, Mean Time Between Failures (MTBR), Mean Time to Re ability, Availability Patterns; Performance concepts – Introduction to Performan				
Infrastruc	cture Design, Performance of aRunning System, Performance Patterns.				
UNIT	II DATA CENTERS		1	9	
Structure, Cabling a	tion, Datacenter Building Blocks – Datacenter Categories, Location of Power Supply, Cooling, Fire Prevention, Detection, And Suppression, Equand Patching, Datacenter Energy Efficiency; Datacenter Availability –Availability –Av	ipment Ra	cks, D	atacen	ter
Structure, Cabling a	e, Power Supply, Cooling, Fire Prevention, Detection, And Suppression, Equand Patching, Datacenter Energy Efficiency; Datacenter Availability -Available ers, Datacenter Performance, Datacenter Security.	ipment Ra	cks, D	atacen	ter
Cabling a Datacente UNIT I Introducti Mainfram Compute Operating	e, Power Supply, Cooling, Fire Prevention, Detection, And Suppression, Equand Patching, Datacenter Energy Efficiency; Datacenter Availability -Availables, Datacenter Performance, Datacenter Security.	ipment Ra lability Ti n, Conta – Compositing Syste	iner Toute Per	atacen edunda  9 echnol- forma	ogy nce
Structure, Cabling a Datacente UNIT I Introducti Mainfram Compute Operating	e, Power Supply, Cooling, Fire Prevention, Detection, And Suppression, Equand Patching, Datacenter Energy Efficiency; Datacenter Availability –Available ers, Datacenter Performance, Datacenter Security.  III COMPUTE AND STORAGE  tion, Compute Building Blocks, Memory, Interfaces, Compute Virtualizationes, Midrange Systems, X86 Servers, Supercomputers; Compute Availability Security; Popular Operating Systems, Operating System Availability, Operating System Security; Storage - Storage Building Blocks, DAS, NAS, SAN, Softwality, Storage Performance, Storage Security.	ipment Ra lability Ti n, Conta – Compositing Syste	iner Toute Per	atacen edunda  9 echnol- forma	ter int ogy
Cabling a Datacente UNIT I Introducti Mainfram Compute Operating Availabili UNIT I Introducti At A G Economic	e, Power Supply, Cooling, Fire Prevention, Detection, And Suppression, Equand Patching, Datacenter Energy Efficiency; Datacenter Availability –Available ers, Datacenter Performance, Datacenter Security.  III COMPUTE AND STORAGE  tion, Compute Building Blocks, Memory, Interfaces, Compute Virtualizationnes, Midrange Systems, X86 Servers, Supercomputers; Compute Availability Security; Popular Operating Systems, Operating System Availability, Operage System Security; Storage - Storage Building Blocks, DAS, NAS, SAN, Softwality, Storage Performance, Storage Security.  IV INFRASTRUCTURE DEPLOYMENTS  tion, Hosting Options, Enterprise Infrastructure Deployment, Converged Infrastruction, Hosting Options, Enterprise Infrastructure Deployment, Converged Infrastruction, Cloud Computing Platforms And Technologies, Cloud Reference cos of Cloud, Open Challenges, Cloud Platforms in Industry, Amazon Web Servers, Patched Patched Patched Platforms in Industry, Amazon Web Servers, Patched Platforms in Industry, Amazon Web Servers, Patched Platforms Platforms Platforms in Industry, Amazon Web Servers, Patched Platforms Platfor	n, Conta  Compating System  Co	iner Toute Personal Storag	9 echnolorforma rforma ge, Sto  9 omputing	ogy nce nce rage
Cabling a Datacente UNIT I Introducti Mainfram Compute Operating Availabili Introducti At A G Economic	e, Power Supply, Cooling, Fire Prevention, Detection, And Suppression, Equand Patching, Datacenter Energy Efficiency; Datacenter Availability –Availability area, Datacenter Performance, Datacenter Security.  III COMPUTE AND STORAGE  tion, Compute Building Blocks, Memory, Interfaces, Compute Virtualizationnes, Midrange Systems, X86 Servers, Supercomputers; Compute Availability Security; Popular Operating Systems, Operating System Availability, Operating System Security; Storage - Storage Building Blocks, DAS, NAS, SAN, Softwardity, Storage Performance, Storage Security.  IV INFRASTRUCTURE DEPLOYMENTS  tion, Hosting Options, Enterprise Infrastructure Deployment, Converged Infrastruction, Hosting Options, Cloud Computing Platforms and Technologies, Cloud Reference of Cloud, Open Challenges, Cloud Platforms in Industry, Amazon Web Service, Pages Programment Converged Infrastructure.	n, Conta  Compating System  Co	iner Toute Personal Storag	9 echnolorforma rforma ge, Sto  9 omputing	ogy nce nce rage
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COs	COURS	E OUT	COM	ES									BT MAI	PPED
	At the e	nd of th	is cours	se, the s	students	s will be	e able to	0				(	Highest	Level)
CO1	design th	ne funda	mental	s of IT	Infrasti	ucture.							Applying	g (K3)
CO2	impleme	ent the d	ata cen	ter infr	astructi	ire and	its asso	ciated p	erform	ance me	trics.		Applying	g (K3)
CO3	desire kı	nowledg	ge on in	frastruc	cture se	rvices (	IaaS) p	rovided	by diff	erent ver	ndors.	Un	derstand	ing (K2)
CO4	identify	various	Cloud	platfori	ms and	associa	ted tech	nologie	es.				Applying	g (K3)
CO5	understa	nd vario	ous sect	urity iss	sues ass	ociated	with d	ata cent	ers and	cloud ap	plication	ns. Un	derstand	ing (K2)
TEXT	BOOKS	3												
	SJaak La	an, "IT	Infrast	ructure	Archite	cture –	Infrastr	ucture l	Building	g Blocks	and Cor	ncepts",	ThirdEdit	ion,
1.	Lulu Pre	ss Inc,	2017.											
~	Thomas	Erl, Z	Zaighan	Mahi	mood,	Ricardo	o Puttin	ni, "Cl	oud Co	omputing	g: Conc	epts, Te	chnology	and
2.	Archited	ture", F	rentice	Hall, 2	2013.									
DECED	RENCES									-				
KEFER	ENCES													
KEFEK		"Introdu	ıction	to S	torage	Area	Netwo	orks a	ınd Sy	stem 1	Network	ing", R	tedbooks	. 2012.
1.												ing", R	tedbooks	. 2012,
	IBM,	ww.rec	lbooks.	ibm.co	m/Redl	ooks.n	sf/doma	ains/sar	n?Open	&start=4	6.		tedbooks	. 2012
1.	IBM, https://w	/ww.rec	lbooks. Cloud C	ibm.co Computi	m/Redl	oooks.n m Begi	sf/doma	ains/sar End",	n?Opend	&start=4	6.		edbooks	. 2012.
1.	IBM, https://w Ray J. R Matthew	ww.red afael, "( Portno	lbooks. Cloud C y, "Virt	ibm.co lomputi walizati	m/Redling: Fro	oooks.n m Begi entials",	sf/doma	ains/sar End", Viley, 20	n?Opend Second	&start=4 Edition,	6. Wiley, 2	2018.		
1.	IBM, https://w Ray J. R Matthew	afael, "O Portno therson	lbooks. Cloud C y, "Virt , Aman	ibm.co lomputi walizati	m/Redling: Fro	oooks.n m Begi entials",	sf/doma	ains/sar End", Viley, 20	n?Opend Second	&start=4 Edition,	6. Wiley, 2	2018.	Redbooks	
1. 2. 3. 4.	IBM, https://w Ray J. R Matthew Lee Bro O'Reilly	afael, "Cortno therson, 2017.	lbooks. Cloud C y, "Virt , Aman	ibm.co lomputi walizati	m/Redling: Fro	oooks.n m Begi entials",	sf/doma	ains/sar End", Viley, 20	n?Opend Second	&start=4 Edition,	6. Wiley, 2	2018.		
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1. 2. 3. 4.	IBM, https://w Ray J. R Matthew Lee Bro O'Reilly	Portno therson v, 2017.	ibooks. Cloud C y, "Virt , Aman Map	ibm.co: Computi malizati da Ber	m/Redbing: Fro	m Beginentials", efensive	sf/doma nning to John W Securi	ains/sar End", Viley, 20 ity Han	n?Opend Second 012. dbook:	&start=4 Edition, Best Pra	Wiley, 2  actices for set (1/2/3)	2018.		
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CO4

CO5



(	CI20453	WIRELESS SENSOR NETWORKS	3	0	0	3
СО	URSE OBJ	ECTIVES				
То	enable the st	udents to				
1	understand	the overview of wireless sensor networks.				
2	describe th	ne design methodology for transmission and wireless sensor network.				
3	know abou	at the mac protocols features and wireless sensor technology.				
4	understand	the use of routing protocol and transport control protocol.				
5	analyze the	e characteristics of middleware and network management.				
1	UNIT I	INTRODUCTION				9
appli	cations - Ex	sic overview of the technology; Applications of Wireless Sensor networks; Batamples of category 2 WSN Applications - Examples of category 1 WSN applications - Examples of category - Examples -			197	
τ	JNIT II	BASICS, TRANSMISSION TECHNOLOGY AND SYSTEMS				9
		hnology- Sensor Taxonomy- WN Operating Environment - WN Trends - Rad less Technologies.	io recn	потов	gyPn	mer
-	w water and a	The state of the s				
	NIT III	MAC PROTOCOLS				9
Back LR -	ground-Fun WPANs Sta	damentals of MAC Protocols - MAC Protocols for WSNs - Sensor-MAC Case and Case Study.			802.	15.4
Back LR - U	ground-Fun WPANs Sta NIT IV	damentals of MAC Protocols - MAC Protocols for WSNs - Sensor-MAC Case and Case Study.  ROUTING PROTOCOLS AND TRANSPORT CONTROL PR	отос	ols		15.4
Back LR - U Back Routi	ground-Fund WPANs Sta NIT IV ground - Dat ing strategies	damentals of MAC Protocols - MAC Protocols for WSNs - Sensor-MAC Case and Case Study.	OTOC	OLS or ne	tworl	15.4 9
Back LR - U Back Routi	ground-Fund WPANs Stan NIT IV ground - Dating strategies s - Examples	damentals of MAC Protocols - MAC Protocols for WSNs - Sensor-MAC Case and ard Case Study.  ROUTING PROTOCOLS AND TRANSPORT CONTROL PR  a Dissemination and gathering - Routing challenges and design issues in wireless in wireless in wireless sensor networks; Traditional transport control protocols - Trans of existing transport control protocols - Performance of transport control protocols - MIDDLEWARE AND NETWORK MANAGEMENT	OTOCo	OLS or ne	tworl desi	15.4 9 cs- gn
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Back UBack Routil	ground-Fund WPANs Stands NIT IV ground - Date ing strategies is - Examples UNIT V Middleward gement requirement an agement an agement and COURSE	damentals of MAC Protocols - MAC Protocols for WSNs - Sensor-MAC Case and ard Case Study.  ROUTING PROTOCOLS AND TRANSPORT CONTROL PR  a Dissemination and gathering - Routing challenges and design issues in wireless in wireless sensor networks; Traditional transport control protocols - Trans of existing transport control protocols - Performance of transport control protocols - MIDDLEWARE AND NETWORK MANAGEMENT  To Principles - Middleware architecture - Existing middleware; Network managements - Traditional network management models - Network management dearchitecture - WSN design issues - Performance modeling of WSNs.	OTOCo ess sens port pro otocols. managen esign is:	OLS or new otocol ment; critical	Netve Exam	9 cs-gn
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#### TEXT BOOKS

1. Kazem Sohrby, Daniel Minoli, "Wireless Sensor Networks: Technology, Protocols and Applications", John Wiley and sons, 2007.

#### REFERENCES

- Holger Karl, Andreas Willing, "Protocols and Architectures for Wireless Sensor Networks", JohnWiley & 1. Sons, 2005.
- 2. Feng Zhao, Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufmann, 2004.
- Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks Theory And 3. Practice", By John Wiley & Sons Publications ,2011.
- 4. Anna Hac, "Wireless Sensor Network Designs", John Wiley 2003.

#### CO PO MAPPING:

CO-					Progr	amme	Outcor	nes (Po	Os)			_	I	PSOs	
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	2	2	-	-	-	-		-	1-	-	1	2	1	
CO2	3	2	2	-	-		•			-	-	1	2	1	
CO3	3	2	2	-	-	-	S(#)	(#)	-		-	1	2	1	
CO4	3	2	. 2	Ē	-	-		•		-	-	1	2	1	
CO5	3	2	2	-		-	•	-	-	-	_	3	2	1	



CI20		CYBER FORENSICS	3	0		0	3		
COL	JRSE	OBJECTIVES							
To e	nable	the students to							
1	learn	digital forensics.							
	becom	me familiar with forensics tools.							
	know	and identify crime and dos.							
1	acqui	ire about the tools and graphics.					11		
	under	rstand the data hiding and virtual machine.							
UNI	ΤI	INTRODUCTION TO DIGITAL FORENSICS					9		
verv	iew o	f Digital Forensics, Preparing for Digital Investigations, Digital Forensics Inv	estigati	ons,	Pri	vate	sector		
		n Investigations, Data recovery workstations, Conducting an Investigation.							
UNI	ГII	INVESTIGATOR AND DATA ACQUISITION			T	9	9		
vest	igator	Office - Understanding Forensics Lab Accreditation Requirements, D	etermin	ing	the	e Ph	ysical		
		nts for a Digital Forensics, Selecting a Basic Forensic Workstation; Data Acc				en encosa	#10011111111111		
		mats for Digital Evidence, Using Acquisition Tools, Validating Data Acquis							
		sitions, Using Remote Network Acquisition Tools, Using OtherForensics Acqu				5	uni		
UNIT III PROCESSING CRIME AND SYSTEMS									
the	ssing ( Scen	Crime and Incident Scenes - Identifying Digital Evidence, Preparing for a Search ne, Storing Digital Evidence, Reviewing a Case; Working with Windoing File Systems, Examining NTFS Disks, Understanding Whole Disk Encry	ws an	d D	OS	alEvi Sys	tems,		
Proces t the Jnder Micro	ssing ( Scentistandi soft S	Crime and Incident Scenes - Identifying Digital Evidence, Preparing for a Search ne, Storing Digital Evidence, Reviewing a Case; Working with Windoing File Systems, Examining NTFS Disks, Understanding Whole Disk Encryptartup Tasks, Virtual Machines.	ws an	d D	OS	Sys Sys Reg	dence tems, gistry,		
Process at the Under Micro	ssing C Scenarios Standingsoft S	Crime and Incident Scenes - Identifying Digital Evidence, Preparing for a Search ne, Storing Digital Evidence, Reviewing a Case; Working with Windoing File Systems, Examining NTFS Disks, Understanding Whole Disk Encryptartup Tasks, Virtual Machines.  TOOLS AND GRAPHICS FILES	ows and	d D Vind	OS	Sys Sys Reg	dence tems, gistry,		
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Process It the Jinder Micro UNIT Comp Macin Graph Forma	ssing C Scenstandi soft S IV uter F tosh I ics Fi its.	Crime and Incident Scenes - Identifying Digital Evidence, Preparing for a Search ne, Storing Digital Evidence, Reviewing a Case; Working with Windoing File Systems, Examining NTFS Disks, Understanding Whole Disk Encryptartup Tasks, Virtual Machines.  TOOLS AND GRAPHICS FILES  Forensics Tools - Software/ Hardware Tools, Validating and Testing Forens File Systems - Examining Linux File Structures, Understanding Macintosh Files, Recognizing a Graphics File, Locating and Recovering Graphics Files, I	ows and ption, V	d D Vind	oos lows re; l	Sys Sys Reg Linux Recov	dence tems, gistry, a and rering		
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# TEXT BOOKS Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, "Computer Forensics and Investigations", Cengage Learning, India Edition, 2016. CEH official Certfied Ethical Hacking Review Guide", Wiley India Edition, 2015. REFERENCES John R.Vacca, "Computer Forensics", Cengage Learning, 2005 MarjieT.Britz, "Computer Forensics and Cyber Crimel: An Introduction", 3rd Edition, Prentice Hall, 2013. AnkitFadia, "Ethical Hacking", Second Edition, Macmillan India Ltd, 2006 Kenneth C.Brancik, "Insider Computer Fraud", Auerbach Publications Taylor & FrancisGroup—2008

#### CO PO MAPPING:

COs				9	Progra	mme (	Outcon	ies(PO	s)				PS	SOs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2	1	1	-	-	-		•	2	2	1
CO2	3	2	1	2	1	1	-	-	-	-	-	2	2	1
CO3	3	2	1	2	1	1	-	-	-	-	-	2	2	1
CO4	3	2	1	2	1	1	-	-	-	+	-	2	2	1
CO5	3	2	1	2	1	1	-	-	-	-	-	2	2	1



PROFESSIONAL ELECTIVE COURSES - V

CI20551	MOBILE COMPUTING	3	0	0
	OBJECTIVES			
To enable	the students to			
1 unde	rstand the basic concepts of mobile computing.			
	the basics of mobile telecommunication system.			
3 unde	rstand the basic functions of mobile internet protocol and transport layer.			
4 ident	ify the characteristics of wireless ad hoc networks and state the design issues	in routin	g proto	ocols.
5 gain	knowledge about different mobile device operating systems and security issue	es.	· ·	
UNIT I	INTRODUCTION			9
Characteris MAC Issue	mputing - Mobile Computing Vs Wireless Networking; Mobile Comp tics of Mobile computing, Structure of Mobile Computing Application; MAC s, Fixed Assignment Schemes, Random Assignment Schemes, Reservation Ba	Protoco	ls - Wi	tions; reless
UNIT II	MOBILE TELECOMMUNICATION SYSTEM			9
Telecommu	em for Mobile Communication (GSM) - General Packet Radio Service (GPRS nication System (UMTS), Cellular Mobile Communication Networks.	S), Unive	ersal M	lobile
UNIT III Overview of	MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER  of Mobile IP - Features of Mobile IP, Key Mechanism in Mobile IP,	route In	nprove	9 ement
UNIT III Overview of	MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER  of Mobile IP - Features of Mobile IP, Key Mechanism in Mobile IP,  n; Overview of TCP/IP - Architecture of TCP/IP, Adaptation of TCP Window	route In	nprove	9 ement
UNIT III  Overview of Optimization	MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER  of Mobile IP - Features of Mobile IP, Key Mechanism in Mobile IP,  n; Overview of TCP/IP - Architecture of TCP/IP, Adaptation of TCP Window	route In	nprove	9 ement
UNIT III  Overview of Optimization CP Perform UNIT IV  Introduction Traditional F	MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER  of Mobile IP - Features of Mobile IP, Key Mechanism in Mobile IP,  n; Overview of TCP/IP - Architecture of TCP/IP, Adaptation of TCP Windonance.  WIRELESS AD-HOC NETWORKS  - Ad-Hoc Basic Concepts, Characteristics, Applications, Design Issues; Recouting Protocols, Popular Routing Protocols; Vehicular Ad Hoc networks (VAccurity issues in MANET.	route In	nprove	9 ement in 9 ial of TVs
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CO4	state the characteristics of wireless ad hoc networks and state the design issues in routing protocols.	Apply (K3)
CO5	select the OS for the application of different mobile device and the security issues.	Analyze (K4)
TEXT	BOOKS	
1.	Prashant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI L Ltd. New Delhi, 2012.	earning Pvt,
2.	Alan Colman, Jun Han, and Muhammad Ashad Kabir, "Pervasive Social Computing Pervasive Systems and Mobile Applications", Springer, 2016.	Socially-Aware
REFER	ENCES	
1.	Jochen H. Schller, "Mobile Communications", Second Edition, Pearson Education, Ne	ew Delhi, 2010.
2.	William.C.Y.Lee, "Mobile Cellular Telecommunications-Analog and Digital S Edition, TataMcGraw Hill Edition, 2006.	Systems", Second
3.	Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile states and Pvt Ltd, 2005.	ystems", Thomson
4.	UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, "Prince Computing", Springer, 2003.	ciples of Mobile

			Prog	gramn	ne Ou	tcome	s (PO	s)						PSOs
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	1	-	-	-	-	-	-	-	2	2	1
CO2	3	2	1	2	2	32	-	-	-		-	2	2	1
CO3	3	2	1	2	2	1	-	(S#S	-	-	-	2	2	1
CO4	3	2	1	2	2	-		•	-		-	2	2	1
CO5	3	2	1	2	2		-	-	-	-		2	2	1



C	120552	SOFTWARE DEFINED NETWORKS	3	0	0	3
COU	JRSE OBJE	CTIVES				
To er	nable the stu	dents to				
1	know at	bout the working of software defined networks.				
2	study al	oout the SDN controllers.				
3	learn the	e fundamentals of software defined networks protocols.				
4	understa	and the SDN programming concepts.				
5	gain kno	owledge about the juniper SDN framework.				
ι	JNIT I	INTRODUCTION			П	9
Histor	v of Softwa	re Defined Networking (SDN) - Modern Data Center, Traditional Switch	Arch	itectur	e Wh	, SDN
		How SDN Works, Centralized and Distributed Control and Date Planes.		ntectur	c, wii	y SDN
	NIT II	OPEN FLOW & SDN CONTROLLERS				9
	ve. 00.055-00.0050					
	Protocol spo	SDN PROTOCOLS  ecifications, Border Gateway Protocol (BGP); Cisco Application Cen	tric I	nfrastrı	icture	9 (ACI)
SDN OpenF	Protocol spe Flow - Openl	ecifications, Border Gateway Protocol (BGP); Cisco Application Cen Flow versions, Components of an OpenFlow Switch, Flow and group table isses, Counters, metering and metadata.				(ACI)
SDN OpenF handli UI	Protocol sports of the	ecifications, Border Gateway Protocol (BGP); Cisco Application Cen Flow versions, Components of an OpenFlow Switch, Flow and group table isses, Counters, metering and metadata.  SDN PROGRAMMING	es, Ru	le mato	ching,	(ACI) Action
SDN OpenFrandli Uf Progra SDNs Applic Uf unipe	Protocol sporflow - Openling, Table ming, Table ming SDN; Network is cations.  NIT V  er SDN Frances	ecifications, Border Gateway Protocol (BGP); Cisco Application Centrology Flow versions, Components of an OpenFlow Switch, Flow and group table isses, Counters, metering and metadata.  SDN PROGRAMMING  Ns - Northbound Application Programming Interface, Current Languages at Functions Virtualization (NFV) and Software Defined Networks - Constitutions Virtualization (NFV) and Software Defined Networks - Constitution (NFV) - Constitution (NFV) - Constitution (NFV)	and To	ools; Co	ehing, ompos nentati	(ACI) Action 9 ition of and
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## TEXT BOOKS Paul Goransson and Chuck Black, "Software Defined Networks: A Comprehensive Approach", First Edition, Morgan Kaufmann, 2014. 2. Thomas D. Nadeau, Ken Gray, "Software Defined Networks", O'Reilly Media, 2013. REFERENCES Siamak Azodolmolky, -Software Defined Networking with Open Flow, Packet Publishing, 2013. Harvey M. Deital, "Operating Systems", Third Edition, Pearson Education, 2007. Vivek Tiwari, SDN and Open Flow for Beginnersl, Amazon Digital Services, Inc., 2013. 3. Fei Hu, Editor, -Network Innovation through Open Flow and SDN: Principles and Design, CRC Press, 2014.

#### CO-PO MAPPING:

	Programme Outcomes (POs)												PSOs	
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2	-	-	-	-	-	-	-	2	2	1
CO2	3	2	1	2	-	-	200	-	72	-	-	2	2	1
CO3	3	2	1	2	=	-	-	-	-	-	-	2	2	1
CO4	3	2	1	2	=	-	-	-	-	-	-	2	2	1
CO5	3	2	1	2	-	•	177.0	-	-	-	-	2	2	1



CI2	0553	INFORMATION RETRIEVAL	3	0	0
COUL	RSE OF	BJECTIVES	1.		
To ena	able the	students to			
1	acqui	re knowledge about information retrieval systems.			
2	write	code for text construction and compression.			
3	learn	to evaluate information retrieval systems and language models.			
4	under	stand the concepts of Text Classification and Text clustering.			
5	know	about search engine and information extraction.			
UN	ITI	INTRODUCTION TO INFORMATION RETRIEV			
Boolea	n retriev	al model; The term vocabulary and postings lists; Dictionary and tolera	ant retrie	eval	
UN	T II	INDEXING AND COMPRESSION			
Blocke	d sort -	based indexing, single pass in memory indexing, distributed indexing, d	vnamic i	ndexing.	other t
UNI	T III	EVALUATION, PROBABILISTIC AND LANGUAGE MODE	LS		
UNI	T III	EVALUATION, PROBABILISTIC AND LANGUAGE MODE information retrieval - XML retrieval, Probabilistic information retrieval	LS		
UNI Evalua informa	T III tion in ation ret	EVALUATION, PROBABILISTIC AND LANGUAGE MODE information retrieval - XML retrieval, Probabilistic information retrieval.  TEXT CLASSIFICATION & TEXT CLUSTERING	LS rieval, L	anguage	models
UNI Evalua informa UNI The terresults Feature	tion in ation ret	information retrieval - XML retrieval, Probabilistic information retrieval.  TEXT CLASSIFICATION & TEXT CLUSTERING  ification problem - Naive Bayes text classification, K- nearest neighbor; Vector-space clustering - K-means algorithm, Hierarchical clustering	LS rieval, L	anguage upport ve	models
UNI Evalua informa UNI The terresults Feature	T III tion in ation ret T IV xt class:	information retrieval - XML retrieval, Probabilistic information retrieval.  TEXT CLASSIFICATION & TEXT CLUSTERING  ification problem - Naive Bayes text classification, K- nearest neighbor; Vector-space clustering - K-means algorithm, Hierarchical clustering  WEB SEARCH BASICS, CRAWLING, INDEXES, LINK ANA	LS rieval, L hbors; S ng.	anguage upport vo	models
UNI Evalua informa UNI The ter Feature UN Web C	T III  tion in ation ret  T IV  ext classic exclusions  T IV  Characte outing in	information retrieval - XML retrieval, Probabilistic information retrieval.  TEXT CLASSIFICATION & TEXT CLUSTERING  ification problem - Naive Bayes text classification, K- nearest neighbor; Vector-space clustering - K-means algorithm, Hierarchical clustering  WEB SEARCH BASICS, CRAWLING, INDEXES, LINK ANA  ristic - Search user experience, Index size and estimation, near duplication dexes; Connectivity servers - Web As a graph, Page Rank, Hubs and Attraction, Question answering, Opinion summarization, Social Network	LS rieval, L hbors; S ng. ALYSIS ates and Authorit	anguage upport ve	models ector M
UNI Evalua informa UNI The ter Feature UN Web C	tion in ation ret	information retrieval - XML retrieval, Probabilistic information retrieval.  TEXT CLASSIFICATION & TEXT CLUSTERING  ification problem - Naive Bayes text classification, K- nearest neighton; Vector-space clustering - K-means algorithm, Hierarchical clustering  WEB SEARCH BASICS, CRAWLING, INDEXES, LINK ANA  ristic - Search user experience, Index size and estimation, near duplicated dexes; Connectivity servers - Web As a graph, Page Rank, Hubs and attraction, Question answering, Opinion summarization, Social Network  TO	LS rieval, L hbors; S ng.  ALYSIS ates and Authorit	anguage upport ve	models ector M g; Craw
UNI Evalua informa UNI The ter Feature UN Web C	T III  tion in ation ret  IT IV  ext classic  Selective  Characte outing in ation ex	information retrieval - XML retrieval, Probabilistic information retrieval.  TEXT CLASSIFICATION & TEXT CLUSTERING  ification problem - Naive Bayes text classification, K- nearest neighbor; Vector-space clustering - K-means algorithm, Hierarchical clustering  WEB SEARCH BASICS, CRAWLING, INDEXES, LINK ANA  ristic - Search user experience, Index size and estimation, near duplication dexes; Connectivity servers - Web As a graph, Page Rank, Hubs and Attraction, Question answering, Opinion summarization, Social Network	LS rieval, L nbors; S ng. ALYSIS ates and Authorit TAL PE	anguage upport ve	models ector M g; Craw pplication
UNI Evalua informa UNI The ter Feature UN Web C Distrib	T III  tion in ation ret  IT IV  ext classic Selection  IT V  Characte outing in ation ext  COULT At the	information retrieval - XML retrieval, Probabilistic information retrieval.  TEXT CLASSIFICATION & TEXT CLUSTERING  iffication problem - Naive Bayes text classification, K- nearest neighbon; Vector-space clustering - K-means algorithm, Hierarchical clustering  WEB SEARCH BASICS, CRAWLING, INDEXES, LINK ANA  ristic - Search user experience, Index size and estimation, near duplicated dexes; Connectivity servers - Web As a graph, Page Rank, Hubs and Attraction, Question answering, Opinion summarization, Social Network  TOTORSE OUTCOMES	LS rieval, L nbors; S ng. ALYSIS ates and Authorit TAL PE	anguage upport vo	models ector M g; Craw pplication
UNI Evalua informa  UNI The ter Feature  UN Web C Distrib Inform	T III  tion in ation ret  T IV  ext classic exclusion ex	EVALUATION, PROBABILISTIC AND LANGUAGE MODE information retrieval.  TEXT CLASSIFICATION & TEXT CLUSTERING  ification problem - Naive Bayes text classification, K- nearest neight on; Vector-space clustering - K-means algorithm, Hierarchical clustering  WEB SEARCH BASICS, CRAWLING, INDEXES, LINK ANA ristic - Search user experience, Index size and estimation, near duplicated dexes; Connectivity servers - Web As a graph, Page Rank, Hubs and attraction, Question answering, Opinion summarization, Social Network TO'  RSE OUTCOMES  end of this course, the students will be able to	LS rieval, L nbors; S ng. ALYSIS ates and Authorit TAL PE	anguage  upport vo  shingling ies. IR ap  ERIODS  BT M ghest Lev	models ector M g; Craw pplication IAPPE vel) anding
UNI Evalua informa  UNI The ter Feature  UN Web C Distrib Inform  COs CO1	tion in ation retained T IV  TIV  Ext classic Selection  TIV  Characte outing in ation extended the could be co	EVALUATION, PROBABILISTIC AND LANGUAGE MODE information retrieval.  TEXT CLASSIFICATION & TEXT CLUSTERING iffication problem - Naive Bayes text classification, K- nearest neighbor; Vector-space clustering - K-means algorithm, Hierarchical clustering WEB SEARCH BASICS, CRAWLING, INDEXES, LINK ANAISTIC - Search user experience, Index size and estimation, near duplicated dexes; Connectivity servers - Web As a graph, Page Rank, Hubs and Attraction, Question answering, Opinion summarization, Social Network TOTORSE OUTCOMES end of this course, the students will be able to a sabout information retrieval systems.	LS rieval, L nbors; S ng. ALYSIS ates and Authorit TAL PE	anguage upport vo	models ector M g; Craw pplication IAPPE vel) anding
UNI Evalua informa  UNI The ter Feature  UN Web C Distrib Inform  COs CO1 CO2	tion in ation retained ation retained ation retained ation retained ation expected at the discussion of the summer	EVALUATION, PROBABILISTIC AND LANGUAGE MODE information retrieval.  TEXT CLASSIFICATION & TEXT CLUSTERING infication problem - Naive Bayes text classification, K- nearest neighbor; Vector-space clustering - K-means algorithm, Hierarchical clustering - WEB SEARCH BASICS, CRAWLING, INDEXES, LINK ANAISTIC - Search user experience, Index size and estimation, near duplicated dexes; Connectivity servers - Web As a graph, Page Rank, Hubs and attraction, Question answering, Opinion summarization, Social Network TOTO RESE OUTCOMES end of this course, the students will be able to a sabout information retrieval systems.  arrize the different types of indexing and compression techniques.	LS rieval, L nbors; S ng. ALYSIS ates and Authorit TAL PE	anguage upport versions ies. IR apply ERIODS BT M ghest Leverstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstan	models ector M g; Craw pplication IAPPE vel) anding anding

10452.150401	AT BOOKS
1.	Christopher D. Manning, Prabhakar Raghavan and Hinrich Schutze, "Introduction to Information Retrieval"
	Cambridge University Press. 2008.
2.	ChengXiang Zhai, "Statistical Language Models for Information Retrieval", (Synthesis Lectures
۷.	Series on Human Language Technologies), Morgan & Claypool Publishers, 2008.
REFE	RENCES
	Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, "Information Retrieval: Implementing and
1.	Evaluating Search Engines", MIT Press, 2010.
	Ricardo Baeza-Yates and Berthier Ribeiro-Neto, "Modern Information Retrieval: The Concepts and
2.	Technology behind Search", Second Edition, ACM Press Books, 2011.
	Stefan Buettcher, Charles L. A. Clarke and Gordon, V. Cormack, "Information Retrieval: Implementing
3.	and Evaluating Search Engines", The MIT Press, 2010.
4.	Ricardo Baeza-Yates and Berthier Ribeiro-Neto, "Modern Information Retrieval", Addison Wesley, 1999.

#### CO-PO MAPPING:

## Mapping of Course Outcomes with Programme Outcome (1,2,3 indicates the strength of correlation) 3 - Strong, 2 - Medium, 1 - Weak

				7/ 2		Prog	ramme	Outco	mes (PO	Os)			PSC	Os
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	2	2	-	-	-	-		2	2	2
CO2	3	2	1	1	2	-	-	-		-	-	2	2	2
CO3	3	2	1	2	2	-	-	-	(4)	-	-	2	2	2
CO4	3	2	1	2	2	-	=	-	-	-	-	2	2	2
CO5	3	2	1	2	2	-	-	-	.=	-	-	2	2	2



CI	20554	MOBILE ADHOC NETWORKS	3	0	0	3
CO	URSE O	BJECTIVES				
То	enable the	e students to				
1	acquire th	ne different types of mac protocols.		1		
2	familiariz	te with different types of adhoc routing protocols.				
3	know the	TCP issues in adhoc networks.				
4	understan	d the architecture and protocols of ad-hoc networks.				
5	know abo	out the various quality wireless networks.				
Ul	NIT I	INTRODUCTION			9	)
Fund	amentals	of Wireless Communication Technology - The Electromagnetic Sp	ectrum,	Radio	Propaga	ation
Mech	anisms, C	Characteristics of the Wireless Channel; Mobile Ad-Hoc Networks (MA	NETs) a	nd Wi	reless Se	ensor
Netw	orks (W	SNs)- Concepts and Architectures, Applications of Ad-Hoc and	Sensor 1	Netwo	rks, De	esign
Chall	enges in	Ad-Hoc and Sensor Networks.				
UN	II TIV	MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS			9	)
Issues	s in desig	ning a MAC Protocol - Classification of MAC Protocols; Contention b	ased Pro	otocols	- Conter	ıtion
based	Protoco	ls with Reservation Mechanisms, Contention based Protocols with	Schedu	ling 1	Mechani	sms;
Chan	nel MAC	-IEEE 802.11.				
UN	ΤШ	NETWORK PROTOCOLS			9	
Addre	essing iss	ues in AD-HOC Network; Routing Protocols- Design issues, Goals as	nd Classi	ification	n ,Proac	ctive
vs. R	eactive R	outing, Unicast Routing Algorithms, Multicast Routing Algorithms, 1	Hybrid R	Couting	g Algori	thm,
Powe	r/ Energy	aware Routing Algorithm, Hierarchical Routing, QOS aware Routing.				
UN	IT IV	END -TO - END DELIVERY AND SECURITY			9	
Trans	port Laye	er- Issues in Designing- Transport Layer Classification, ADHOC Tr	ansport l	Protoc	ols; Seci	urity
Issues	in ADH	OC Networks-Issues and Challenges, Network Security Attacks, Secure	Routing	Protoc	ols.	
UN	IT V	CROSS LAYER DESIGN AND INTEGRATION OF ADHOC FO	OR 4G	T	9	6
Cross	Layer 1	Design- Need for Cross Layer Design, Cross Layer Optimization		eter (	Optimiza	ition
		ross Layer Cautionary Perspective; Co-operative Networks- Arch				
opera	tion, Co-c	operative Antennas; Integration of Ad-Hoc Network with other Wired a	and Wire	less N	etworks.	
-1		TOTA	L PERIO	ODS	45	5
co.	COU	RSE OUTCOMES	В	T M	APPED	
COs	At the	end of this course, the students will be able to	(Highe	st Lev	vel)	
CO1		nents the concepts, network architectures and applications of ad hoc reless sensornetworks.	F	Applyi	ng (K3)	
CO2	create t	he unique issues in ad-hoc/sensor networks.	A	Applyi	ng (K3)	
CO3	identify	the protocol design issues of ad hoc and sensor networks.	12	Analy	ze (K4)	
CO4		and routing protocols for ad hoc and wireless sensor networks with to some protocol design issues.	Uno	derstai	nding (K	2)
CO5	apply t	he quos related performance measurements of ad hoc and sensor ks.	F	Applyi	ng (K3)	

1.	C. Siva Ram Murthy, and B. S. Manoj, -"Ad Hoc Wireless Networks: Architectures and Protocols" -Prentice Hall Professional Technical Reference, 2008.
2.	
REFE	RENCES and
1.	Stefano Basagni, Marco Conti, Silvia Giordano and Ivanstoj menovic, "Mobile adhoc networking", Wiley-IEEE press, 2004.
2.	Feng Zhao and LeonidesGuibas, -"Wireless Sensor Networks", Elsevier Publication – 2002.
7	Holger Karl and Andreas Willig - "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005.
3.	The interest for wheless sensor Networks" Wiley 2005

# Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-weak

COs					Progra	amme (	Outcor	mes(P	Os)				PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PS O2
CO1	3	2	2	-	1	-	-		-	-	-	2	2	2
CO2	3	2	2	-	1		-	-	140	-	_	2	2	2
CO3	3	2	2	-	1	12	-		-	-	_	2	2	2
CO4	3	2	2	-	1		-	-	_	_	·-	2	2	
CO5	3	2	2	-	1	5=0	-		_		_	2	2	2



#### PROFESSIONAL ELECTIVE COURSES -VI

COUR	651	NATURAL LANGUAGE PROCESSING	3	0	0	3
COUR	SE OBJ	TECTIVES				
To enab	ole the st	tudents to				
1	learn th	ne fundamentals of natural language processing.				
2	underst	and the use of components innlp.				
3	gain kr	nowledge on parsing and methodologies.				
4	grasp t	he role of semantics and pragmatics.				
5	acquire	the nlp techniques to the applications.				
j	PRE-RI	EQUISITES: Artificial Intelligence, Probability and Statistics				
UNIT	ГІ	INTRODUCTION			-1	9
		Expressions and Automata, Words and Transducers, N-grams, Part-of-Spectimum Entropy Models.	ech, Ta	gging	g; Hio	lder
UNIT	TI I	SPEECH				)
						)
UNIT	Ш	SYNTAX				)
Formal C Complex		rs of English - Syntactic Parsing, Statistical Parsing, Features and Unific	ation, l	Lang	uage	and
UNIT	- 3					
	IV	SEMANTICS AND PRAGMATICS			9	)
The Rep	oresentat	SEMANTICS AND PRAGMATICS  ion of Meaning - Computational Semantics, Lexical Semantics, Conputational Discourse.	mputat	ional		
The Rep	oresentates, Comp	ion of Meaning - Computational Semantics, Lexical Semantics, Con	mputat	ional		ical
The Rep Semantic UNIT Informati	oresentates, Comp	tion of Meaning - Computational Semantics, Lexical Semantics, Conputational Discourse.	nal Ag	ents;	Lex	ical
The Rep Semantic UNIT Informati	oresentates, Comp	tion of Meaning - Computational Semantics, Lexical Semantics, Conputational Discourse.  APPLICATIONS  action - Question Answering and Summarization, Dialogue and Conversation guage similarities and differences, The transfer metaphor, The interlingual is	nal Ag dea; U	ents;	Lex Mac mean	ical
The Rep Semantic UNIT Informati	oresentates, Composition Extraon - Lananslation	ction of Meaning - Computational Semantics, Lexical Semantics, Conductational Discourse.  APPLICATIONS  action - Question Answering and Summarization, Dialogue and Conversation guage similarities and differences, The transfer metaphor, The interlingual is to Using statistical techniques, Usability and system development.	nal Ag dea; U	ents; sing DS	Mac mean	o hine ing,
The Rep Semantic UNIT Informati Franslatio Direct tra	coresentates, Composition Extraon - Lanunslation  CO At t	ction of Meaning - Computational Semantics, Lexical Semantics, Conputational Discourse.  APPLICATIONS  action - Question Answering and Summarization, Dialogue and Conversation guage similarities and differences, The transfer metaphor, The interlingual in Using statistical techniques, Usability and system development.  TOTAL P	nal Ag dea; U	ents; sing  DS  MA nest l	Mac Mac PPE	hine ing,
The Rep Semantic UNIT Informati Translatic Direct tra	consentation Extra	ction of Meaning - Computational Semantics, Lexical Semantics, Consutational Discourse.  APPLICATIONS  Action - Question Answering and Summarization, Dialogue and Conversation guage similarities and differences, The transfer metaphor, The interlingual is to Using statistical techniques, Usability and system development.  TOTAL P  URSE OUTCOMES  the end of this course, the students will be able to	nal Ag dea; U ERIO BT (High	DS MA	Lex Mac	on thine sing, sin
The Rep Semantic UNIT Informati Translatio Direct tra	coresentate cs, Comparison Extra con - Lan con	ction of Meaning - Computational Semantics, Lexical Semantics, Conputational Discourse.  APPLICATIONS  Action - Question Answering and Summarization, Dialogue and Conversation guage similarities and differences, The transfer metaphor, The interlingual in the course of the course, Usability and system development.  TOTAL P  URSE OUTCOMES  the end of this course, the students will be able to the fundamentals of natural language processing.	nal Ag dea; U ERIO BT (High	DS MA	Maccomean 4 PPE Leve	bical
The Rep Semantic UNIT Informati Translatio	coresentates, Comparison Extraon - Landard description	ction of Meaning - Computational Semantics, Lexical Semantics, Conputational Discourse.  APPLICATIONS  Action - Question Answering and Summarization, Dialogue and Conversation guage similarities and differences, The transfer metaphor, The interlingual in the course of the computational system development.  TOTAL P  URSE OUTCOMES  The end of this course, the students will be able to ribe the fundamentals of natural language processing.  Onstrate the use of components in NLP.	nal Ag dea; U ERIO BT (High Under	DS MAnest l	Lex Mac	hine hine by the bound of the b

1.	Daniel Jurafsky, "Speech and Language Processing: An Introduction to Natural Language Processing,
1.	Computational Linguistics and Speech", Pearson Publication, 2014.
2.	Steven Bird, Ewan Klein and Edward Loper, "Natural Language Processing with Python", First
۷.	Edition, O'Reilly Media, 2009.
REFER	ENCES
1.	Breck Baldwin, "Language Processing with Java and Ling Pipe Cookbook", Atlantic Publisher, 2015.
	Richard M Reese, "Natural Language Processing with Java", O'Reilly Media, 2015.
2.	Richard W. Reese, "Natural Language Processing with Java", O Reiny Media, 2013.
	Nitin Indurkhya and Fred J. Damerau, "Handbook of Natural Language Processing ", Second Edition,
3.	

#### CO-PO MAPPING:

### Mapping of Course Outcomes with Programme Outcome (1,2,3 indicates the strength of correlation) 3 - Strong, 2 - Medium, 1 - Weak

					Pro	gramn	ie Out	comes	(POs)	)			P	SOs
со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	1	-	-	-	-	1	2	2
CO2	3	2	-	2	121	1	1	-	-	-	-	1	2	2
CO3	3	2	-	2	8 <b>=</b> 8	1	1	-	-	-	2 <b>=</b> 0	1	2	2
CO4	3	2	-	2	-	1	1	-	-	-	-	1	2	2
CO5	3	2	1	2	-	1	1	-	-	-	-	1	2	2



CI2	0032	DEEP LEARNING	3	0	0	3
COL	JRSE (	OBJECTIVES				
To e	nable t	he students to				
1	unders	stand the basic ideas and principles of neural networks.				-
2	unders	stand the basic principles of deep learning.				
3	familia	arize with image processing facilities.				
4	unders	stand and implement deep learning architectures.			_	
5		the applications of deep learning			-	-
	PRE	E-REQUISITES: Artificial Intelligence, Probability and Statistics				_
UN	ITI	DEEP NETWORKS	-		9	
Regul	arizatio	on for Deep Learning - Parameter Norm Penalties, Norm Penalties as Constration and Under-Constrained Problems; Dataset Augmentation; Noise Robustness	s; Sen	ni -Su	pervi	
		ultitask Learning; Early Stopping; Parameter Tying and Parameter Sharing; Spars Other Ensemble Methods Dropout; Adversarial Training –Tangent Distance,				s
Baggi Manif UNI	ng and old Ta FIII	Other Ensemble Methods Dropout; Adversarial Training –Tangent Distance, ngent Classifier.  CONVOLUTIONAL NETWORKS	Tang	gent P	Prop a	s ·
Baggi Manif UNI The C	ng and Told Ta  TIII  onvolu  asic Co  perviseo	Other Ensemble Methods Dropout; Adversarial Training —Tangent Distance, ngent Classifier.  CONVOLUTIONAL NETWORKS  tion Operation - Motivation, Pooling; Convolution and Pooling as an Infinitely Strophylological Structured Outputs; Data Types - Efficient Convolution Algorithms Algorithms (Prophylological Prophylological Prophylologic	Tang	gent P	Prop a  9  Varian  andor	ts ·
Baggi Manif UNI The C the Ba Unsup UNI Unfold Seque	r III  onvolution Conversion Conv	Other Ensemble Methods Dropout; Adversarial Training —Tangent Distance, ngent Classifier.  CONVOLUTIONAL NETWORKS  tion Operation - Motivation, Pooling; Convolution and Pooling as an Infinitely Strophylolution Function; Structured Outputs; Data Types - Efficient Convolution Algorithms	Tang ongPr gorith	gent P ior - V ms; R	9 Varian andor	ts om o
Baggi Manif UNI The C the Ba Unsup UNI Unfold Seque	ng and fold Tail  FIII  onvolutionsic Concervised  FIV  ding Conce; Andencie	Other Ensemble Methods Dropout; Adversarial Training —Tangent Distance, ngent Classifier.  CONVOLUTIONAL NETWORKS  tion Operation - Motivation, Pooling; Convolution and Pooling as an Infinitely Strophylological Structured Outputs; Data Types - Efficient Convolution Algorithms The Neuroscientific Basis for Convolutional Networks.  RECURRENT AND RECURSIVE NETS  omputational Graphs; Recurrent Neural Networks; Bidirectional RNNs; Encoder-Inchitectures; Deep Recurrent Networks; Recursive Neural Networks; The Challer of the Convolutional Networks and Convolutional RNNs; Encoder-Inchitectures; Deep Recurrent Networks; Recursive Neural Networks; The Challer of the Convolutional Networks and Convolutional RNNs; Encoder-Inchitectures; Deep Recurrent Networks; Recursive Neural Networks; The Challer of the Convolutional Networks and Convolutional RNNs; Encoder-Inchitectures; Deep Recurrent Networks; Recursive Neural Networks; The Challer of the Convolutional Networks and Convolutional Networks and Convolutional RNNs; Encoder-Inchitectures; Deep Recurrent Networks; Recursive Neural Networks; The Challer of the Convolutional Networks and Convolutional RNNs; Encoder-Inchitectures; Deep Recurrent Networks; Recursive Neural Networks; The Challer of the Convolutional RNNs and Convolut	Tang ongPr gorith	gent P ior - V ms; R	9 Varian andor	ts n
Baggi Manif UNI The C the Ba Unsup UNI Unfold Seque Depen UNI Image advers Entity Recur	r III onvolutasic Copervised r IV ding Conce; Andencie T V s segn Recog	Other Ensemble Methods Dropout; Adversarial Training –Tangent Distance, ngent Classifier.  CONVOLUTIONAL NETWORKS  tion Operation - Motivation, Pooling; Convolution and Pooling as an Infinitely Strophylology of the Neuroscientific Basis for Convolutional Networks.  RECURRENT AND RECURSIVE NETS  computational Graphs; Recurrent Neural Networks; Bidirectional RNNs; Encoder-I rechitectures; Deep Recurrent Networks; Recursive Neural Networks; The Challes-Echo State Networks.  APPLICATIONS  mentation - Object Detection, Automatic Image Captioning, Image generation etworks; Video to Text with LSTM models - Attention models forcomputer Vision, spition - Opinion Mining using Recurrent Neural Networks - Parsing and Senting eural Networks, Sentence Classification using Convolutional Neural Networks, December 1.	Tang OngPr gorith Decod lenge On wi Case ment A	ior - V ms; R ler Sec of L th Ge Study Analys que Ge	9 Varian andor  9 quence ong-T  9 enerati	tts m
Baggi Manif UNI The C the Ba Unsup UNI Unfold Seque Depen UNI Image advers Entity Recur	r III onvolutasic Copervised r IV ding Conce; Andencie r V s segn sarial no Recog sive No	Other Ensemble Methods Dropout; Adversarial Training –Tangent Distance, ngent Classifier.  CONVOLUTIONAL NETWORKS  tion Operation - Motivation, Pooling; Convolution and Pooling as an Infinitely Strophylology of Proposition of Structured Outputs; Data Types - Efficient Convolution Algorithms of Features; The Neuroscientific Basis for Convolutional Networks.  RECURRENT AND RECURSIVE NETS  Imputational Graphs; Recurrent Neural Networks; Bidirectional RNNs; Encoder-Inchitectures; Deep Recurrent Networks; Recursive Neural Networks; The Chales-Echo State Networks.  APPLICATIONS  Internation - Object Detection, Automatic Image Captioning, Image generation etworks; Video to Text with LSTM models - Attention models for computer Vision, spition - Opinion Mining using Recurrent Neural Networks - Parsing and Senting eural Networks, Sentence Classification using Convolutional Neural Networks, Data Details of Control of Cont	Tang OngPr gorith Decod lenge On wi Case ment A Dialog	ior - V ms; R ler Sec of L th Ge Study Analys ue Ge	9 Varian andor  9 quence ong-T  9 enerati : Nam sis usi	ts e-tive
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CO2	design and implement deep learning applications.	Applying (K3)
CO3	critically analyze different deep learning models in image related projects.	Analysing (K4)
CO4	understand and implement deep learning architectures.	Understanding (K2)
CO5	know the various nlp and image processing applications that utilizes deep learning methods.	Analysing (K4)
TEX	KT BOOKS	
1.	Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press,	2017.
2.	Francois Chollet, "Deep Learning with Python", Manning Publications, 2018.	
REFE	RENCES	12-22
1.	Phil Kim, "Matlab Deep Learning: With Machine Learning, Neural Networks and Apress, 2017.	ArtificialIntelligence",
2.	Ragav Venkatesan, Baoxin Li, "Convolutional Neural Networks in Visual Con 2018.	mputing", CRCPress,
3.	Navin Kumar Manaswi, "Deep Learning with Applications Using Python", Apress	, 2018.
4.	Joshua F. Wiley, "R Deep Learning Essentials", Packt Publications, 2016.	

### Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicatesstrength of correlation) 3-Strong, 2-Medium, 1-Weak

COs					P	rogran	nme O	utcom	es(POs	)			PSC	Os
COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1 2	PSO1	PSO2
CO1	3	2	•		-	·	/( <b>*</b>		-			2	3	2
CO2	3	2		1		•	•	•		-	-	2	3	2
CO3	3	2		1			-					2	3	2
CO4	3	2		1	4		•		-	( <b>4</b> )		2	3	2
CO5	3	2	1	1	1		-		-	•		2	3	2



CIZ	20653	INFORMATION VISUALIZATION	3	0	0	3
COU	RSE OF	BJECTIVES				
To en	able the	students to				
1	know th	ne data types and information, analysis	-			
2	underst	and the concepts and significance of data visualization.				
3	learn th	e visualization idioms and map data attributes to graphical attributes.				
4	evaluate	e the effectiveness of visualization designs.				
5	compre	hend the considerations in information dashboard design.				
PRE-I	REQUIS	SITES: Artificial Intelligence, Probability and Statistics				
UN	I TIV	INTRODUCTION				9
Visua	lization	Definition and Need - Data Abstraction, Data Semantics and Types, Data Ty	pes, D	atase	t, Tyr	es(DL);
		es - Semantics, Task Abstraction, Analyze tasks abstractly, Actions, Targets,				
	II TI	ANALYSIS				9
Four 1	levels fo					
Valida and C unjust	ation Ap Channels, tified 3D	or Validation - Reasons to Validate, Four levels of Design, Angles of Attacoproaches, Validation Examples; Marks and Channels - Defining Marks and Channel Effectiveness; Relative versus Absolute Judgements - Rules of The Nounjustified 2D, Eyes beat memory; Resolution over Immersion - Overvi	Char numb	nnels, to be	Usin follo	g Marks wed, No
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COs	COL	RSE O	UTCO	MES							5-710V-c=1	BT M	APPED	
COs	At th	e end o	f this c	ourse	, the st	udents	will be a	able to				(High	est Level	)
CO1	descr	ibe the o	data ab	stracti	on and	data vis	ualizatio	on				Und	erstanding	g (K2)
CO2	desig	n and cr	eate da	ıta visı	ıalizati	ons.				3		A	pplying (I	(3)
CO3	apply	data tra	nsforn	nations	such a	as aggre	gation a	nd filter	ing for v	visualiza	tion.	A	pplying (I	K3)
CO4	evalu	ate choi	ce of c	olour	and vis	ual enco	oding su	itable fo	r visuali	ization.		A	pplying (I	K3)
CO5	use k	nowledg	ge of p	ercepti	on and	cogniti	on to de	sign info	ormation	n dashbo	ards.	A	pplying (I	<b>(3)</b>
TEXT	ВООК	S												
1.	Tama	ara Mun	zner, "	Visual	ization	Analys	is and D	esign",	CRC Pr	ess, 201	4.			
2.		nen Few				board D	Design: I	Displayir	ng Data	for At-a	-glance	Monito	ring", ana	lytics
REFEI	RENCE	S												
	Alex	ander Te	elea, "I	Data V	isualiz	ation Pr	inciples	and Pra	ctice", C	CRC Pre	ss, Sec	ond Edit	ion, 2014.	
	Andy	Kirk, "	Data V	isuali:	zation:	A Succ	essful D	esign Pr	ocess",	PACKT	Publis	hing, 20	12.	
	Karl	Pover, "	Leanir	ıg Qlik	View	Data V	isualizat	ion", PA	CKT, 2	013.				
	Stepl	nen Few	, "Show	w Me 1	he Nu	mbers: I	Designin	g Table	s and Gi	aphs to	Enligh	ten", An	alytics Pre	ess,
	Seco	nd Editi	on, Jun	ie 2012	2.									
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CO2	3	1	1	1	-	-	-	-	\—.	-	2=2	2	2	2
	_	1	1	1	-	-	-	-	-	-	-	2	2	520
CO3	3		-							1	1			2
CO3	3	1	1	1			-	-	11=	-	-	2	2	2



	54	SERVICE ORIENTED ARCHITECTURE 3	0	0	3
COU	RSE OB	JECTIVES		i i	
To ena	able the s	students to			
1	gain u	nderstanding of the basic principles of service orientation.			
2	unders	stand web service oriented analysis.			
3	learn t	echnology underlying the service design.			
4	familia	arize advanced concepts such as top down and bottom up strategy.			
5	to kno	w about various ws -specification standards.			_
	PRE-R	EQUISITES: Artificial Intelligence, Probability and Statistics			
UN	ITI	BASICS OF SOA			9
past Ar	rchitectur	OA, Evolution and Characteristics of SOA, SOA Timeline, ROOTS of SOA - Cores, SOA vs. Client server architecture, SOA vs. Distributed internet architecture vice architecture, service orientation and object orientation.			
UNI	IT II	WEB SERVICES		9	9
and Co	intempor	ary SOA - Message exchange Patterns Service Activity Coordination Atomic			ces
Busines	ss activiti	ary SOA - Message exchange Patterns, Service Activity, Coordination, Atomic ies, Orchestration, Choreography.			
Busines UNI	ss activiti T III	PRINCIPLES OF SERVICE-ORIENTATION	Tran	sactio	ons,
UNI' Introduce Service	ss activiti T III ction - Se layer al	ies, Orchestration, Choreography.	Tran	sactio	ens,
UNI Introduction Service	ss activiti T III ction - Se layer al	PRINCIPLES OF SERVICE-ORIENTATION  ervice-orientation and the enterprise, Anatomy, Principles of service-orientation; Service, Application Service Layer, Business Service Layer, Orchestration	Tran	e Laye	ens,
Busines UNI Introduct Service Service UNI SOA D	ss activiti T III ction - Se layer al layer con T IV	PRINCIPLES OF SERVICE-ORIENTATION  ervice-orientation and the enterprise, Anatomy, Principles of service-orientation; Service Layer, Application Service Layer, Business Service Layer, Orchestration in figuration scenarios.	Service	e Layee Lay	ers- yer,
Busines UNI' Introduct Service Service UNI' SOA Deagile str	ss activiti T III ction - Se layer al layer con T IV	PRINCIPLES OF SERVICE-ORIENTATION  ervice-orientation and the enterprise, Anatomy, Principles of service-orientation; Service Layer, Orchestration infiguration scenarios.  PLANNING AND ANALYSIS  Strategies - SOA delivery lifecycle phases, The top-down strategy, The bottom-up	Service	e Layee Laye	ers-
Busines UNI' Introduct Service Service UNI' SOA D agile str UNI WS-BP variable element	ss activiti T III ction - Se layer al layer con T IV delivery Se rategy; Se IT V DEL basic	PRINCIPLES OF SERVICE-ORIENTATION  ervice-orientation and the enterprise, Anatomy, Principles of service-orientation; Substraction, Application Service Layer, Business Service Layer, Orchestration in Infiguration scenarios.  PLANNING AND ANALYSIS  Strategies - SOA delivery lifecycle phases, The top-down strategy, The bottom-upervice Modeling.	Service Service Service Type eleme	e Layer Laye	ons,  One of the one o

COs	COURSE OUTCOMES	BT MAPPED								
COS	At the end of this course, the students will be able to	(Highest Level)								
CO1	design the basics of SOA.	Applying (K3)								
CO2	desire about the service layers of webservices.	Understanding (K2)								
CO3	understand and discuss service and design in SOA.	Understanding (K2)								
CO4	demonstrate the basic Modelling of SOA.	Applying (K3)								
CO5	describe the various applications of SOA.	Understanding (K2)								
TE	KT BOOKS									
,	Thomas Erl-"Service -Oriented Architecture: Concepts, Technology, a	nd Design", Pearson Education,								
1.	2008.									
2.	Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide",									
۷.	Prentice Hall, 2004.									
REFI	CRENCES									
	Thomas Erl, "SOA Principles of Service Design —(The Prentice Hall	Service -Oriented Computing								
1.	Series from Thomas Erl)", 2005.									
2.	Newcomer, Lomow, "Understanding SOA with Web Services", Pearson	Education,2005.								
3.	Ron Schmelzer et al. "XML and Web Services", Pearson Education, 20	02.								

#### CO PO MAPPING:

### Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak

COs	Programme Outcomes(POs)													PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
CO1	3	-	-		8#8		-	-		-	-	2	2	1		
CO2	3	2	-	-	650	-	(#)	-	-	-	( <del>*</del> )	2	2	1		
CO3	3	2	2	-		-	1	-	-	4	-	1	2	1		
CO4	3	2	2	2	1	-	1	-	-	-	3-2	1	2	1		
CO5	3	2	2	2	1	-	1	-	-			1	2	1		



#### OPEN ELECTIVE COURSES -II

	0903	HUMAN COMPUTER INTERACTION	3	0	0	3
CO	URSE	OBJECTIVES				
То	enable t	he students to				
1	learn	the foundations of human computer interaction.			-	
2	famili	ar with the design technologies for individuals and persons with disabilities				
3	under	stand the concept of mobile hci				
4	learn	the guidelines for user interface				
5	under	stand the wen interfaces				
	PRI	E-REQUISITES: Artificial Intelligence, Probability and Statistics				
UN	I TI	FOUNDATIONS OF HCI				9
proce	essing a	I/O channels – Memory – Reasoning and problem solving; The Computer: I nd networks; Interaction: Models – frameworks – Ergonomics – styles – elen Case Studies				
UN	IT II	DESIGN AND SOFTWARE PROCESS				9
2752/32	with viewers	principles, standards, guidelines, rules. Evaluation Techniques – Universal Des	sign			le.
HCI I		MODELS AND THEORIES  Cognitive models: Socio-Organizational issues and stakeholder requirements ation models-Hypertext, Multimedia and WWW		mmu		9
HCI I	Models	MODELS AND THEORIES  : Cognitive models: Socio-Organizational issues and stakeholder requirements		mmu	nicati	9
HCI and c	Models collabora	MODELS AND THEORIES  : Cognitive models: Socio-Organizational issues and stakeholder requirements ation models-Hypertext, Multimedia and WWW  MOBILE HCI	– Co		nicati	9 ion
HCI and cuni	Models collabora IT IV ile Ecos es- Mob	MODELS AND THEORIES  : Cognitive models: Socio-Organizational issues and stakeholder requirements ation models-Hypertext, Multimedia and WWW	- Co	Appli	nicati	on on ons,
HCI I	Models collabora IT IV ile Ecos es- Mob	MODELS AND THEORIES  : Cognitive models: Socio-Organizational issues and stakeholder requirements ation models-Hypertext, Multimedia and WWW  MOBILE HCI  ystem: Platforms, Application frameworks- Types of Mobile Applications: Wide	- Co	Appli	cations Ca	on on ons,
HCI I and c UNI Mobi Game Studie	Models collabora IT IV ile Ecos es- Mob es	MODELS AND THEORIES  : Cognitive models: Socio-Organizational issues and stakeholder requirements ation models-Hypertext, Multimedia and WWW  MOBILE HCI  ystem: Platforms, Application frameworks- Types of Mobile Applications: Widile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design:	- Co	Appli	cations Ca	on on on s,
HCI I and c UNI Mobi Game Studie UNI Desig	Models collaborate IT IV ille Ecos es- Mobies IT V gning W	MODELS AND THEORIES  : Cognitive models: Socio-Organizational issues and stakeholder requirements ation models-Hypertext, Multimedia and WWW  MOBILE HCI  ystem: Platforms, Application frameworks- Types of Mobile Applications: Widile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design: WEB INTERFACE DESIGN	- Co	Appli	cations Ca	on on on s, ase
HCI I and c UNI Mobi Game Studie UNI Desig	Models collaborate IT IV ille Ecos es- Mobies IT V gning W	MODELS AND THEORIES  Cognitive models: Socio-Organizational issues and stakeholder requirements ation models-Hypertext, Multimedia and WWW  MOBILE HCI  System: Platforms, Application frameworks- Types of Mobile Applications: Widile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design: WEB INTERFACE DESIGN  WEB INTERFACE DESIGN  Web Interfaces — Drag & Drop, Direct Selection, Contextual Tools, Overlays,	- Co	Appli Tools	cations Ca	on on on s,
UNI Mobi Game Studio UNI Desig	Models collaborated in the Ecos collaborated i	MODELS AND THEORIES  Cognitive models: Socio-Organizational issues and stakeholder requirements ation models-Hypertext, Multimedia and WWW  MOBILE HCI  ystem: Platforms, Application frameworks- Types of Mobile Applications: Widile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design WEB INTERFACE DESIGN  WEB INTERFACE DESIGN  Veb Interfaces — Drag & Drop, Direct Selection, Contextual Tools, Overlays, ass Flow - Case Studies	- Co	Appli Tools and	generation of the second of th	on on on s, ase
HCI I	Models collaborate IT IV ille Ecos es- Mobres IT V gning Was, Proce	MODELS AND THEORIES  Cognitive models: Socio-Organizational issues and stakeholder requirements ation models-Hypertext, Multimedia and WWW  MOBILE HCI  ystem: Platforms, Application frameworks- Types of Mobile Applications: Widile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design WEB INTERFACE DESIGN  WEB INTERFACE DESIGN  Veb Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, ass Flow - Case Studies  TOTAL P	- Co lgets, assign, Inlays	Appli Tools and	cation  Signature  Virtue  4	on on on on s, ase
HCI I	Models collaborate IT IV ille Ecos es- Mobiles IT V gning Was, Proce	MODELS AND THEORIES  Cognitive models: Socio-Organizational issues and stakeholder requirements ation models-Hypertext, Multimedia and WWW  MOBILE HCI  System: Platforms, Application frameworks- Types of Mobile Applications: Wide ile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design: WEB INTERFACE DESIGN  WEB INTERFACE DESIGN  Web Interfaces — Drag & Drop, Direct Selection, Contextual Tools, Overlays, ass Flow - Case Studies  TOTAL PURSE OUTCOMES	- Co lgets, assign, Inlays ERIO	Appli Tools and DDS	cation  Signature  Virtue  PED  eveel)	on on on on s, ase
HCI I and c UNI Mobi Game Studie UNI Desig	Models collaborated IT IV ille Ecos es- Mobiles IT V gning Was, Proce	MODELS AND THEORIES  Cognitive models: Socio-Organizational issues and stakeholder requirements ation models-Hypertext, Multimedia and WWW  MOBILE HCI  System: Platforms, Application frameworks- Types of Mobile Applications: Wide ille Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design: WEB INTERFACE DESIGN  WEB INTERFACE DESIGN  Web Interfaces — Drag & Drop, Direct Selection, Contextual Tools, Overlays, ass Flow - Case Studies  TOTAL PORSE OUTCOMES  e end of this course, the students will be able to	- Co lgets, and light signs, light sign, l	Applit Tools and DDS   Indicate the Indicate	Viri	tti tti

CO3	assess the importance of user feedback.	Applying (K3)
CO4	explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites	Analysing (K4)
CO5	develop meaningful user interface.	Applying (K3)
TEX	гвоокѕ	
1.	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interpretation, 2004 (UNIT I, II & III)	eraction", 3rd Edition,
2.	Brian Fling, "Mobile Design and Development", First Edition, O'Reilly Media I	nc., 2009 (UNIT – IV)
3.	Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, O'Reilly	, 2009. (UNIT-V)
REFEI	RENCES	
1.	Alan Cooper,RobertReimann, David Cronin, Christopher Noessel,"About Fa Interaction Design", 4th Edition, Wiley, 2014	ce: The Essentials of
2.	Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven Jacobs, Niklas Elm User Interface: Strategies for Effective Human Computer Interaction", Six Education, 2016.	
3.	Jenny Preece, Helen Sharp, Yvonne Rogers, "Interaction Design: Beyond Human Wiley Student Edition, 4th Edition, Wiley, 2015	Computer Interaction",

#### CO PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1- Weak

20		Programme Outcomes(POs)													
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	2	2	-	1	-	-	•	-	-	-	-	1	2	1	
CO2	2	2	-	1	-	-	-	-	-		20	1	2	1	
CO3	2	2	-	1	-		-			-	-)	1	2	1	
CO4	2	2		1	-		-	-	-	-	-	1	2	1	
CO5	2	2	-	1	•		-	-	-	-	-	1	2	1	



CI2090	4	ANDROID APPLICATION DEVELOPMENT	3	0	0						
COUI	RSE OB	JECTIVES									
To ena	ble the s	tudents to									
1	unders	stand android SDK.	_								
2	gain a	basic understanding of android application development.									
3	know	about android studio developmenttool.									
4 acquire knowledge of android application design.											
5	learn t	o test and publish android applications.				9 ation, 9 with 9 aging Fools ation, K3) K3)					
UN	IT I	FOUNDATIONS OF HCI				9					
Intro	luction t	o Android - The Android Platform, Android SDK, Eclipse Installation, A	ndroi	id In	stalla	9 ming 9 with 9 ging 15 (3) (3) (3) (4)					
		First Android application, Understanding Anatomy of Android Application				9 gring 9 Fool action (K3) (K3) (K4)					
UNI	TII	ANDROID APPLICATION				9					
		nterface Design Essentials - User Interface Screen elements, Designing Using with Dialogs.	Jser I	nterf	aces	9 tition, 9 with 9 ging 9 Tools tion, 45 ED (33) (33) (33)					
78	r IV	ANDROID APPLICATION DESIGN ESSENTIALS				0					
					9						
Workin		Fragments; Using Android Preferences; working with files and dire	ctori	es; l	Mana	gin					
Applica	tion res	ources - Working with different types of resources.									
2.5	T V	1 4 4 COS / 19 /	Master the Android Development Tools; Design DESIGN ESSENTIALS  terface Screen elements, Designing User Interfaces  IGN ESSENTIALS  rences; working with files and directories; Manages of resources.  NDROID APPLICATION  cation, Testing Environment; Leveraging Android Ton - Distribution model, application for publication and the control of the control	9							
UNI Testing	T V Androic	/ H 4409 / 12 / 1				00					
UNI Testing	T V Androic	TESTING AND PUBLISHING ANDROID APPLICATION  d application - Testing mobile application, Testing Environment; Leverage n; Publishing Android application - Distribution model, application ne Android Market.	n foi	r pu	blica	oo tio					
UNI Testing and A <sub>l</sub> Publish	Androic oplication ing on the	TESTING AND PUBLISHING ANDROID APPLICATION  d application - Testing mobile application, Testing Environment; Leverage n; Publishing Android application - Distribution model, application ne Android Market.	n foi	pu DS	blica	00 tio					
UNI Testing	Androic oplication ing on the	TESTING AND PUBLISHING ANDROID APPLICATION  d application - Testing mobile application, Testing Environment; Leverage n; Publishing Android application - Distribution model, application ne Android Market.  TOTAL PI	ERIO	DS T M	blica	000 tion 45					
UNI Testing and A <sub>l</sub> Publish	Androic oplication ing on the CO At t	TESTING AND PUBLISHING ANDROID APPLICATION  d application - Testing mobile application, Testing Environment; Leveragen; Publishing Android application - Distribution model, application are Android Market.  TOTAL PLOURSE OUTCOMES	ERIO B (H	DS T M	blica APP	45 ED					
UNI Testing and Ap Publish	Androic oplication ing on the CO At the identity	TESTING AND PUBLISHING ANDROID APPLICATION  diapplication - Testing mobile application, Testing Environment; Leveragen; Publishing Android application - Distribution model, application are Android Market.  TOTAL PLOURSE OUTCOMES  the end of this course, the students will be able to	ERIO B (H	DS T M lighe	APP	45 ED vel;					
UNI Testing and Ap Publish COs	Android opplication ing on the identity out.	TESTING AND PUBLISHING ANDROID APPLICATION  diapplication - Testing mobile application, Testing Environment; Leveragen; Publishing Android application - Distribution model, application are Android Market.  TOTAL PLANTAGE OUTCOMES  the end of this course, the students will be able to antify various concepts of android development.	B (H	DS T M lighe	APP) est Leving (F	45 ED (3)					
UNI Testing and Ap Publish COs CO1 CO2	Android opplication ing on the idea out util pro	TESTING AND PUBLISHING ANDROID APPLICATION  diapplication - Testing mobile application, Testing Environment; Leveragen; Publishing Android application - Distribution model, application are Android Market.  TOTAL PICURSE OUTCOMES  the end of this course, the students will be able to antify various concepts of android development.  line design a simple android application.	B (H A A	T M lighe pply pply	APP est Leving (Fing (Fi	45 ED (3)					
UNI Testing and Ap Publish  COs  CO1  CO2  CO3	Androic opplication ing on the country out it is proposed bases	TESTING AND PUBLISHING ANDROID APPLICATION  diapplication - Testing mobile application, Testing Environment; Leveragen; Publishing Android application - Distribution model, application he Android Market.  TOTAL Plantage of this course, the students will be able to entify various concepts of android development.  In design a simple android application.  ize rapid prototyping techniques to design user interface.  gram mobile applications for the android operating system that use	ERIO B (H A A	DDS T M lighe pply pply pply	APPI est Leving (Fing (F	45 ED (3) (3) (3)					

1.	T.Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson
2.	Education, 3 <sup>rd</sup> ed. (2012).
EFER	ENCES
1.	Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd.
2.	Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd.
3.	Wallace Jackson, "Android Apps for Absolute Beginners", Press, 2012.

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## Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1- Weak

COs		Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	1	-	-	•	-	-	-			-	1	2	1	
CO2	3	1	-	•	-	-	-	2 <b>¥</b> 8	-	2	-	1	2	1	
CO3	3	1	2	-	1	-	-	2		-	-	1	2	1	
CO4	3	1	2	-	1				-	-	-	1	2	1	
CO5	3	1	2		1	-		1 <b>.</b>				1	2	1	

