		Sem	nester – II							
	Course Code		Catagoriu	F	Peric	ods	Credito	N	lax Marks	5
SL.No	Course Code	Course Title	Category	L	Т	Ρ	Credits	CAM	ESM	Total
Theory	/									
1	A23PCPT204	PYTHON AND R PROGRAMMING	DSC	3	0	0	4	25	75	100
2	A23PCPT205	No SQL with MONGO DB	DSC	3	0	0	4	25	75	100
3	A23PCPT206	OPERATIONAL RESEARCH	DSC	3	0	0	4	25	75	100
4	A23PCPE204,2 05,206	GREEN COMPUTING / MOBILE COMPUTING/ CLIENT SERVER COMPUTING	DSE	3	0	0	4	25	75	100
Practic	cal			•	•					
5	A23PCPL203	PYTHON AND R PROGRAMMING LAB	DSC	0	0	4	2	50	50	100
6	A23PCPL204	No SQL with MONGO DB LAB	DSC	0	0	10	2	50	50	100
Skill Er	nhancement Cours	se	•					•	•	•
7	A23PCPS202	Web Programming	SEC	0	0	4	2	100	0	100
	1	1	1	I			22	300	400	700

Department	Comp	outational Studies	Program	nme: M.	Sc. Con	nputer	Scienc	e		
Semester	Second	1	Course	Categor	y Code:	DSC	*En	d Semeste	r Exam Ty	pe: TE
Course Code	A23PC	PT <b>2</b> 04	Perio	ods / We	ek	Cr	edit	Ma	ximum Ma	rks
Course Code	A251 C	1 1 207	L	Т	Р		С	CA M	ESE	TM
Course Name	PYTH	ON AND R PROGRAMMING	4	0	0		4	25	75	100
Prerequisite	Basic	knowledge in python and R Program	nming			<u>i</u>			L	1
	A.C1		• • • • • • • • •	11.					BT M	apping
	After th	e completion of this course, the stude	ents will be c	ible to:					(Highes	st Level)
Course Outcome	CO1	To understand the Fundamentals of language.	Computers a	and intro	oductior	n to pyt	hon an	d R	ŀ	2
		Organize, visualize, and analyze larg programming language	ge, complex	datasets	by mea	ns of P	ython a	and R	ŀ	3
	CO3	To understand the function.							k	3
	<b>CO4</b>	To understand the data interface							ŀ	<b>K</b> 4
	C05	To study about Inheritance and Files	s.						ŀ	<b>K4</b>
UNIT-I	R Basi	ics				Perio	ds: 12			
-		ath operations in R, Vector , working	g with null va	alues, In	nport &	Export	files ir	n R, Data-	frame, Joins	
One-way and Ty	wo way ta	ables, Vectors, Matrices								CO1
UNIT-II	Python	Rasies				Perio	ds: 12			
	ictions, Id	lentifiers, Variables and Datatypes, ( ption Handling , Iterators, Generator			ow, Fur	nction A	rgume	ents, Recu	sive	CO2
UNIT-III	Mather	matics for Data science				Perio	ds: 12			
Probability, Stat	istics, Li	near Algebra, Gradient Descent, Cal	culus for dat	a scienc	e, ANO	VA, Hy	pothes	sis testing.		CO3
UNIT-IV	Numn	v and Pandas				Perio	ds: 12			<u>i</u>
	Vectoriz	zation, Boolean Indexing, Matrix mu Data frame, Reading data, Handling r			oin/Mer	ge data	, Unico	ode strings	etc.	CO4
UNIT-V	Explor	atory Data Analysis				Perio	ds: 12			i
		GGPLOT2 and Matplotlib, Data Pred d Multi-variate analysis.	e-processing,	Data T	ransform	nation,	Data R	eduction,	Feature	CO5
Lecture Perio	ds: 60	Tutorial Periods: -	Practica	al Perio	ds: -		T	otal Perio	ds: 60	
Text Books										
2. ReemaThare First edition, 20	ja, "Pytho 17. cience: In	thon The Complete Reference", McC on Programming Using Problem Sol mport, Tidy, Transform, Visualize, a	ving Approa	ch", ISE	3N:9780	)199480	173, C			ress, Release

## **Reference Books**

1. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015.

2. Business Analytics (The science of data driven decision making)- U Dinesh Kumar

3. "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", 2nd Edition by Wes McKinney.Publisher: O'Reilly Media, Inc. Release Date: October 2017.

#### **COs/POs/PSOs Mapping**

COs		Progr	am Outcomes (PC	Ds)			ram Spe comes (P	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	2	3	3	3	3	2	2	2
2	3	3	2	3	2	3	3	2
3	2	2	3	3	2	3	3	2
4	3	3	2	2	2	3	3	3
5	2	2	2	3	3	3	2	2

#### Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Method**

		Contir	nuous Ass	essment Marks	(CAM)	End	
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Semester Examination (ESE) Marks	Total Marks
Marks	1	0	5	5	5	75	100

Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

\*

Department	-÷	utational Studies				nputer Sciei			
Semester	Secon	d		Catego			nd Semest		
Course Code	A23PC	PT205	Peri	ods / W		Credit		ximum Ma	
			L	T	P	C	CAM	ESE	TM
Course Name	NO SQ	L with MONGO DB	4	-	-	4	25	75	100
Prerequisite	Basic l	nowledge in Database	I					<u> </u>	
	On co	mpletion of the course, the	students will I	be able	to			BT Ma	pping
C								(Highes	
Course Outcome	<b>CO1</b>	Explain and compare differe						К	3
Outcome	CO2	Compare and contrast RDBI	MS with differe	nt NoSC	QL datak	bases		К	3
	СО3	Demonstrate the detailed a oriented NoSQL databases	rchitecture and	l perfori	mance t	une of Docu	ument-	к	3
	CO4	Explain performance tune o	of Key-Value Pa	ir NoSQI	L databa	ases.		к	3
	CO5	Apply Nosql development to	ols on differen	t types o	of NoSO	L Databases	5	К	3
UNIT-I						Periods: 1	2		
oatabase.						Periods: 1	2		
	ralation	al databases to new NoSQL st	arac MangaDE		adra II				+ ~~
•		proach, Challenges NoSQL ap							
••		nted Databases. Replication							- I
		Master-Slave Replication, Pe	-	•					э,
UNIT-III						Periods: 1	2		
loSQL Key/Va	lue data	abases using MongoDB, Do	cument Datab	ases, D	ocumei	nt oriented	Database	e Feature	s,
Consistency, Ti	ransactio	ons, Availability, Query Fea	tures, Scaling,	Suitab	le Use	Cases, Eve	nt Loggin	g, Conter	nt CO
Aanagement Sy	ystems,	Blogging Platforms, Web Anal	ytics or Real-Tir	ne Anal	ytics, E-	Commerce A	Applicatior	ns, Comple	x
ransactions Sp	anning I	Different Operations, Queries	against Varyin	g Aggreg	gate Str	ucture			
UNIT-IV						Periods: 1	2		l
Column- orient	ted Nos	QL databases using Apach	e HBASE, Colu	umn-ori	ented I	NoSQL data	ıbases usi	ng Apach	e <b>CO</b>
assandra, Arch	nitecture	of HBASE, Column-Family Da	ita Store Featur	es, Cons	sistency	, Transactio	ns, Availab	oility, Quer	Ŋ
	ig, Suita	ble Use Cases, Event Logging	, Content Mana	agement	t Systen	ns, Blogging	Platforms	, Counters	s,
eatures, Scalin									
xpiring Usage.						Periods: 1	2		
xpiring Usage. UNIT-V Graph NoSQL	databa	ses using Neo4,NoSQL datal abase. Features, Consistency,				programmi	ng langua		
Expiring Usage. UNIT-V Graph NoSQL Databases, Gra Cases.	databa aph Data acebook,		Transactions, A		ity, Que	programmi ry Features,	ng langua	uitable Us	

**Text Books** ((Minimum 2 and maximum 3 – Latest editions to be given)

1. Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications,1st Edition ,2019.

Reference Books (Minimum 5– Latest editions to be given)

1.Shashank Tiwari, Professional NoSQL, Wrox Press, Wiley, 2011.

2.Pramod Sadalage and Martin Fowler, NoSQL Distilled, Addison-Wesly Professinal 2012.

3.Dan McCreary and Ann Kelly, Making Sense of NoSQL, Maning Publications 2013.

4.Gaurav Vaish, Getting Started with NoSQL, Packet Publishing ,2018

5.NoSQL Theory and examples, Early Access Version, Edition 1.0 October 2021

## COs/POs/PSOs Mapping

COs		Progr	am Outcomes (PC	Ds)			ram Spe comes (P	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	2	3	3	3	3	2	2	2
2	3	3	2	3	2	3	3	2
3	2	2	3	3	2	3	3	2
4	3	3	2	2	2	3	3	3
5	2	2	2	3	3	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

#### **Evaluation Method**

		Contir	nuous Asse	essment Marks	(CAM)	End	
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Semester Examination (ESE) Marks	Total Marks
Marks	1	0	5	5	5	75	100

Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

\*

	Compu	utational Studies	······································			puter Scie			
Semester	Second	k				DSE *End			
Course Code	A23PC	PF204	Perio	ods / We		Credit		ximum l	
			L	T	P	C	CAM	ESE	TM
Course Name		Computing	3	0	0	3	25	75	100
Prerequisite	Basic k	nowledge in Supervised and Unsu	pervised						
	After co	mpletion of the course, the studen	ts will be able t	to					apping
Course Outcome	<b>CO1</b>	Acquire knowledge to adopt g impacts on the environment.	reen computir	ng pract	ices to	minimize	negative	(Highes K	st Level (2
	CO2	Enhance the skill in energy savi	ng practices in	their use	e of har	dware.		K	(2
	СОЗ	Evaluate technology tools that the stakeholders.	can reduce pa	per wast	te and o	carbon foo <sup>.</sup>	tprint by	K	(3
	CO4	Understand the ways to minimi	ze equipment	disposal	require	ements		K	(4
UNIT-I									
Green IT Fund - Green IT Stra	amentals:	AMENTALS Business, IT, and the Environmer rivers, Dimensions, and Goals – E				•	scoop oi		
Green IT Fund	amentals: ategies: D	Business, IT, and the Environmer				foot print,	scoop oi olicies, Pi		
Green IT Fund - Green IT Stra nd Metrics. <b>UNIT-II</b>	amentals: ategies: D GREEN	Business, IT, and the Environmer rivers, Dimensions, and Goals – E	nvironmentall	y Respo	nsible B	foot print, susiness: Po <b>Periods: 0</b>	scoop oi olicies, Pi <b>19</b>	ractices,	со
Green IT Fund Green IT Stra Ind Metrics. UNIT-II Green Assets: Optimization, a	amentals: ategies: D <b>GREEN</b> Buildings, and Collat	Business, IT, and the Environmer rivers, Dimensions, and Goals – E ASSETS AND MODELING	nvironmentall vices – Green ecture – Enviro	y Respon	nsible E	foot print, susiness: Po <b>Periods: 0</b> ss Manage	scoop of olicies, Pr <b>19</b> ment: M	odeling,	со со2
Green IT Fund Green IT Stra nd Metrics. <b>UNIT-II</b> Green Assets: Optimization, a Green Inform	amentals: ategies: D <b>GREEN</b> Buildings, and Collat nation Sys	Business, IT, and the Environmer rivers, Dimensions, and Goals – E A ASSETS AND MODELING Data Centres, Networks, and De poration – Green Enterprise Archite	nvironmentall vices – Green ecture – Enviro	y Respon	nsible E	foot print, susiness: Po <b>Periods: 0</b> ss Manage ence – Gre	scoop of olicies, Pr <b>99</b> ment: M en Suppl	odeling,	со со2
Green IT Fund Green IT Stra nd Metrics. UNIT-II Green Assets: Optimization, a Green Inforn UNIT-III	amentals: ategies: D <b>GREEN</b> Buildings, and Collat nation Sys <b>GRID F</b>	Business, IT, and the Environmer rivers, Dimensions, and Goals – E A ASSETS AND MODELING Data Centres, Networks, and De poration – Green Enterprise Archite stems: Design and Development N	nvironmentall vices – Green ecture – Enviro lodels.	y Respon	nsible B s Proce Intellig	foot print, susiness: Po Periods: 0 ss Manage ence – Gre Periods: 0	scoop or plicies, Pr 99 ment: M en Suppl 99	odeling,	со со2
Green IT Fund Green IT Stra and Metrics. UNIT-II Green Assets: Optimization, a Green Inforn UNIT-III /irtualization o	amentals: ategies: D Buildings, and Collat nation Sys GRID F of IT syste	Business, IT, and the Environmer rivers, Dimensions, and Goals – E ASSETS AND MODELING Data Centres, Networks, and De poration – Green Enterprise Archite stems: Design and Development N RAMEWORK	nvironmentall vices – Green ecture – Enviro lodels. commuting, te	y Respon Business nmental	nsible B s Proce Intellig	foot print, susiness: Po Periods: 0 ss Manage ence – Gre Periods: 0 and telepo	scoop or plicies, Pr 99 ment: M en Suppl 99	odeling,	CO CO2
Green IT Fund Green IT Stra nd Metrics. UNIT-II Green Assets: Optimization, a Green Inforn UNIT-III (irtualization of Materials recy	amentals: ategies: D GREEN Buildings, and Collat nation Sys GRID F of IT syste cling – Be	Business, IT, and the Environmer rivers, Dimensions, and Goals – E ASSETS AND MODELING Data Centres, Networks, and De poration – Green Enterprise Archite tems: Design and Development M RAMEWORK ms – Role of electric utilities, Tele	nvironmentall vices – Green ecture – Enviro lodels. commuting, te	y Respon Business nmental	nsible B s Proce Intellig	foot print, susiness: Po Periods: 0 ss Manage ence – Gre Periods: 0 and telepo	scoop of olicies, Pr <b>19</b> ment: M en Suppl <b>19</b> orting –	odeling,	, CO2
Green IT Fund Green IT Stra Ind Metrics. UNIT-II Green Assets: Optimization, a Green Inform UNIT-III (irtualization of Aaterials recy UNIT-IV	amentals: ategies: D Buildings, and Collat nation Sys GRID F of IT syste cling – Be	Business, IT, and the Environmer rivers, Dimensions, and Goals – E ASSETS AND MODELING Data Centres, Networks, and De poration – Green Enterprise Archite stems: Design and Development M RAMEWORK ms – Role of electric utilities, Tele st ways for Green PC – Green Data	nvironmentall vices – Green ecture – Enviro lodels. commuting, te a centre – Gree	y Respon Business nmental Pleconfer	nsible B s Proces Intellig rencing ramewo	foot print, susiness: Po Periods: 0 ss Manage ence – Gre Periods: 0 and telepo ork. Periods: 0	scoop of olicies, Pi 99 ment: M en Suppl 99 orting –	odeling, y Chains	, CO2
Green IT Fund Green IT Stra nd Metrics. UNIT-II Green Assets: Optimization, a Green Inforn UNIT-III Virtualization of Aaterials recy UNIT-IV ocio-cultural	amentals: ategies: D Buildings, and Collat nation Sys GRID F of IT syste cling – Be GREEI aspects of	Business, IT, and the Environmer rivers, Dimensions, and Goals – E ASSETS AND MODELING Data Centres, Networks, and De poration – Green Enterprise Archite tems: Design and Development N RAMEWORK ms – Role of electric utilities, Tele st ways for Green PC – Green Data	nvironmentall vices – Green ecture – Enviro lodels. commuting, te a centre – Gree	y Respon Business nmental eleconfer en Grid f	nsible B s Proces Intellig rencing ramewo	foot print, susiness: Po Periods: 0 ss Manage ence – Gre Periods: 0 and telepo ork. Periods: 0	scoop of olicies, Pi 99 ment: M en Suppl 99 orting –	odeling, y Chains	CO2
Green IT Fund or Green IT Stra and Metrics. UNIT-II Green Assets: Optimization, a or Green Inform UNIT-III (irtualization of Aaterials recy UNIT-IV ocio-cultural tandards, and UNIT-V	amentals: ategies: D Buildings, and Collat nation Sys GRID F of IT syste cling – Be GREEI aspects of d Audits –	Business, IT, and the Environmer rivers, Dimensions, and Goals – E ASSETS AND MODELING , Data Centres, Networks, and De poration – Green Enterprise Archite tems: Design and Development N RAMEWORK ms – Role of electric utilities, Tele st ways for Green PC – Green Data N COMPLIANCE f Green IT – Green Enterprise Tran Emergent Carbon Issues: Technol	invironmentall vices – Green ecture – Enviro lodels. commuting, te a centre – Gree sformation Ro ogies and Futu	y Respon Business nmental eleconfer en Grid f	nsible B s Proces Intellig rencing ramewo	foot print, susiness: Po Periods: 0 ss Manage ence – Gre Periods: 0 and telepo ork. Periods: 0 Compliance	scoop or plicies, Pr 99 ment: M en Suppl 99 prting – 99 ce: Proto	odeling, y Chains cols,	CO2
Green IT Fund Green IT Stra and Metrics. UNIT-II Green Assets: Optimization, a Green Inform UNIT-III /irtualization of Aaterials recy UNIT-IV Gocio-cultural Standards, and UNIT-V The Environme	amentals: ategies: D Buildings, and Collat nation Sys <b>GRID F</b> of IT syste cling – Be <b>GREEI</b> aspects of d Audits – <b>CASE S</b> entally Re	Business, IT, and the Environmer rivers, Dimensions, and Goals – E ASSETS AND MODELING , Data Centres, Networks, and De poration – Green Enterprise Archite tems: Design and Development N RAMEWORK ms – Role of electric utilities, Tele st ways for Green PC – Green Data N COMPLIANCE f Green IT – Green Enterprise Tran Emergent Carbon Issues: Technol STUDIES sponsible Business Strategies (ERE	invironmentall vices – Green ecture – Enviro lodels. commuting, te a centre – Gree sformation Ro ogies and Futu	y Respon Business Inmental Pleconfer en Grid f Padmap - Ire.	nsible B s Proces Intellig rencing ramewo - Green	foot print, susiness: Po Periods: 0 ss Manage ence – Gre Periods: 0 and telepo ork. Periods: 0 Compliance Periods: 0 Trial Runs -	scoop or plicies, Pr 99 ment: M en Suppl 99 porting – 99 ce: Proto 99 ce: Proto	odeling, y Chains cols, udies –	CO2
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Green IT Fund Green IT Stra and Metrics. UNIT-II Green Assets: Optimization, a Green Inform UNIT-III /irtualization of Aaterials recy UNIT-IV Gocio-cultural Standards, and UNIT-V The Environme	amentals: ategies: D Buildings, and Collab nation Sys GRID F of IT syste cling – Be GREEI aspects of d Audits – CASE S entally Re n IT Strate	Business, IT, and the Environmer rivers, Dimensions, and Goals – E ASSETS AND MODELING , Data Centres, Networks, and De poration – Green Enterprise Archite tems: Design and Development N RAMEWORK ms – Role of electric utilities, Tele st ways for Green PC – Green Data N COMPLIANCE f Green IT – Green Enterprise Tran Emergent Carbon Issues: Technol STUDIES sponsible Business Strategies (ERE	invironmentall vices – Green ecture – Enviro lodels. commuting, te a centre – Gree sformation Ro ogies and Futu BS) – Case Stud Hospital, Pack	y Respon Business Inmental Pleconfer en Grid f Padmap - Ire.	rencing ramewo - Green	foot print, susiness: Po Periods: 0 ss Manage ence – Gre Periods: 0 and telepo ork. Periods: 0 Compliance Periods: 0 Trial Runs - and Teleco	scoop or plicies, Pr 99 ment: M en Suppl 99 porting – 99 ce: Proto 99 ce: Proto	odeling, y Chains cols, udies –	CO2 CO3 CO4

1. Bhuvan Unhelkar, —Green IT Strategies and Applications-Using Environmental Intelligence (, CRC Press, June 2014.

2. Woody Leonhard, Katherine Murray, —Green Home computing for dummies||, August 2012.

## **Reference Books**

- 1. Alin Gales, Michael Schaefer, Mike Ebbers, —Green Data Center: steps for the Journey ||, Shroff/IBM rebook, 2011.
- 2. John Lamb, —The Greening of IT∥, Pearson Education, 2009.
- 3. Jason Harris, —Green Computing and Green IT- Best Practices on regulations & industry||, Lulu.com, 2008
- 4. Carl speshocky, —Empowering Green Initiatives with IT||, John Wiley & Sons, 2010.
- 5. Wu Chun Feng (editor), —Green computing: Large Scale energy efficiency , CRC Press

## **COs/POs/PSOs Mapping**

COs		Progr	am Outcomes (Po	Ds)			ram Spe comes (F	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	2	3	3	3	3	2	2	2
2	3	3	2	3	2	3	3	2
3	2	2	3	3	2	3	3	2
4	3	3	2	2	2	3	3	3
5	2	2	2	3	3	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

## **Evaluation Method**

		Contir	nuous Asse	essment Marks	(CAM)	End	
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Semester Examination (ESE) Marks	Total Marks
Marks	1	0	5	5	5	75	100

Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department		utational Studies				puter Scien			
Semester	secon	d			y Code:	i	d Semeste		
Course Code	A23P	CPE205		ods / We	7	Credit		kimum N	
			L	T	Р	C	CAM	ESE	TM
Course Name	MOBIL	E COMPUTING	3	0	0	3	100	-	100
Prerequisite	Basic l	nowledge in mobile computing							
	After	completion of the course, the stud	lents will be a	ble to				BT Mapp	oing
								(Highest L	evel)
Course	CO1	To understand the basics of obje	ct oriented a	nalysis a	nd desig	zn		K2	evely
Outcome	CO2	To learn UML models and tools		-		-		К2	
	CO3	To apply design patterns to vario	ous application	ns.				К3	
	CO4	Recognize Design patterns using	UML					К3	
	CO5	To Apply design patterns to vario	ous applicatio	ns				К4	
UNIT-I			and abburgers			Periods: 6	<u>l</u>		
ommunication etworks – Ope <b>UNIT-II</b>	eration of WIRE	es of Wireless Transmission - least systems - Multiplexing - FDM of cellular networks - Frequency R LESS NETWORKS	IA, TDMA and leuse - Tessel	CDMA -	Cellular Handoff	organization – Capacity I Periods: 6	n of mobile mproveme	e telepho ent	one co
Communication networks – Ope <b>UNIT-II</b> EEE 802.11 Wi Bluetooth netw UMTS and IM <sup>-</sup>	eration of wire less L rorks - G	cast systems - Multiplexing - FDM of cellular networks - Frequency R	IA, TDMA and Reuse - Tessel peration - CSI Overview of G	CDMA - lation - MA/CA SM - GF	Cellular Handoff and its v PRS Netv	organization – Capacity I <b>Periods: 6</b> variants - W vork Archite twork - LTE	n of mobile mproveme ireless LAI	e telepho ent N securit Operatic	ene CO ay - CO ons
communication etworks – Ope UNIT-II EEE 802.11 Wi luetooth netw UMTS and IM <sup>-</sup> lane. UNIT-III	eration of wireless L orks - G T 2000	cast systems - Multiplexing - FDM of cellular networks - Frequency R LESS NETWORKS AN - Architecture - Modes of Op eneration of cellular networks - C · Packet Switching Domain - Core D L4 WIRELESS PROTOCOLS	IA, TDMA and Reuse - Tessel peration - CSI Dverview of G Network - R	CDMA - lation - l MA/CA SM - GF adio Act	Cellular Handoff and its PRS Netv cess Net	organization – Capacity I <b>Periods: 6</b> variants - W vork Archite work - LTE - <b>Periods: 6</b>	n of mobile mproveme 'ireless LAI ecture and - Control P	e telepho ent N securit Operatic Plane - Us	y - CO ser
Communication Networks – Ope <b>UNIT-II</b> EEE 802.11 Wi Bluetooth netw UMTS and IM Plane. <b>UNIT-III</b> Mobile IP - Mc imitations of T	Broad Bration d WIRE ireless L orks - G T 2000 L3 AN obility fo radition	cast systems - Multiplexing - FDM of cellular networks - Frequency R L <b>ESS NETWORKS</b> AN - Architecture - Modes of Op eneration of cellular networks - C · Packet Switching Domain - Core	IA, TDMA and Reuse - Tessel Deration - CSI Dverview of G Network - R reactive ad P improveme	CDMA - lation - l MA/CA SM - GF adio Acc noc rout nts for	Cellular Handoff and its PRS Netw cess Net ting pro	organization – Capacity I <b>Periods: 6</b> variants - W vork Archite work - LTE - <b>Periods: 6</b> tocols - DSI	n of mobile mproveme 'ireless LAI ecture and - Control P DV, DSR a	e telepho ent N securit Operatic Plane - Us nd AOD	vne CO ry - CO ons ser
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Text Books	
1. Asoke Talukder, Hasan Ahmed, Rupa Yavagal, "Mobile Computing: Technology	
Applications and Services Creation", Second Edition, TMH, 2010.	
2. William Stallings, "Wireless Communication and Networks", Pearson, 2009.	
2. William Stallings, "Wireless Communication and Networks", Pearson, 2009.	
<ol> <li>William Stallings, "Wireless Communication and Networks", Pearson, 2009.</li> <li>Reference Books</li> </ol>	
Reference Books	

# COs/POs/PSOs Mapping

COs		Program Specific Outcomes (PSOs)								
	PO1	PO1 PO2 PO3 PO4 PO5								
1	2	3	3	2	2	2				
2	3	3	2	3	2	3	3	2		
3	2	2	3	3	2	3	3	2		
4	3	3 3 2 2 2								
5	2	2	2	3	3	3	2	2		

## Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Method**

		Contir	nuous Asse	End			
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance Examination (ESE) Marks		Total Marks
Marks	1	0	5	5	5	75	100

Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

\*

Department	Com	outational	Studies		Programme: <b>M.Sc Computer Science</b> Course Category Code: <b>SEC</b> *End Semester Exam Ty						
Semester	Seco	nd			Course	Categor	y Code:	SEC *I	End Semes	ter Exam <sup>-</sup>	Гуре: <b>ТЕ</b>
Course Code	4330	CPE206			Perio	ods / We	eek	Credit	M	aximum N	larks
course coue	AZSP	CPEZUO			L	Т	Р	С	CAM	ESE	TM
Course Name	Client	Server Co	omputing		4	0	0		100	-	100
Prerequisite	Basic	knowledg	e in cloud					<u>.</u>			
	After	completio	n of the course, the	e students	will be a	ble to				BT Map	ning
Course	CO1	Compare	the strengths and	limitation	ns of Clie	nt Serve	er comp	uting		(Highest I <b>K2</b>	ever
Outcome	CO2	Identify t	the architecture, in	frastructu	re and d	elivery	models	of Client se	rver	К2	
	CO3		discern and appro			-				К3	
	CO4	Recogniz	e the Energy Efficie	ent and M	arket Or	iented (	Client m	odels.		К3	
	CO5	Compret	nend the need of Cl	lient Serve	er Compi	ıting in	integrat	ing IoT wit	n Client	К4	
UNIT-I		duction			er compt		incegi at	Periods: (			
-			ng forces – major is	sues in inf	ormatio	n techno	ology –	<u> </u>	-	f host & no	on-
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Implementation UNIT-II Understanding	<b>OPEN</b> Client /	<b>SYSTEM S</b> Server co		LIENT/SER	VER COI			Periods: (	5		CO2
Implementation UNIT-II Understanding	<b>OPEN</b> Client / ng orga	SYSTEM S Server co nizations-	TANDARDS FOR CI	LIENT/SER	VER COI			Periods: (	5		CO2
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Implementation UNIT-II Understanding Standards settin TWO – TIER CO Introduction clic Server Tier – Ty UNIT-III Introduction an Software requin MIDDLEWARE: Hardware and S Standards UNIT-IV Overview – Ben THIN CLIENT CC Introduction to UNIT-V Overview – The Account and Fin Lecture Period	OPEN Client / ng orga MPUTI ent Tien /pes of THRE nd com rement: Softwar Goftwar MUL efits – OMPUT compu Client nancial	SYSTEM S Server conizations- NG: r – Hardwa Server-Eig E-TIER CC parison o s – Transa re requirer TI – TIER ( Disadvant ING: ting mode T END TC componer	TANDARDS FOR Cl mputing – Dispellin Factors for success are and Software re ght layers of Software <b>MPUTING:</b> f two and three ti ction servers – TP I ments – Netware co <b>COMPUTING:</b> ages – Component els - Comparison – C <b>DOLS:</b> mts – Essential featu	LIENT/SER ng the My s. equiremer are. ier- Client ite Vs TPH onnectivity s – Tier se Componer ures of a find	EVER COI ths – Ob hts opera : side, se leavy. y – Type: paration hts – env ront end	stacles - ating sys erver sid s of Mid s and in ironme tools. C	– Upfroi stem sei de andr Idleware iteractic nts. Case Stu	Periods: ( ntand Hidd rvices – Typ Periods: ( niddleware e – Data Ba Periods: ( on Periods: ( dies –	5 en – es of Clien 5 side – Ha se middlev 5	ardware a vare –	nd CO3
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Implementation UNIT-II Understanding of Standards settin TWO – TIER CO Introduction clic Server Tier – Ty UNIT-III Introduction an Software requin MIDDLEWARE: Hardware and S Standards UNIT-IV Overview – Ben THIN CLIENT CC Introduction to UNIT-V Overview – The Account and Fin Lecture Period Text Books	OPEN Client / ng orga MPUTI ent Tien /pes of THRE nd com rement: Softwar Goftwar MUL efits – OMPUT compu Client nancial Is: 45	SYSTEM S Server conizations- NG: r – Hardwa Server-Eig E-TIER CC parison o s – Transa re requirer TI – TIER ( Disadvant ING: ting mode NT END TC componen system, S	TANDARDS FOR Cl mputing – Dispellin Factors for success are and Software re ght layers of Software MPUTING: f two and three ti ction servers – TP l nents – Netware co COMPUTING: ages – Component els - Comparison – C DOLS: nts – Essential featu ales automation ar	LIENT/SER ng the My s. equiremer are. ier- Client ite Vs TPH onnectivite s – Tier se Componer ures of a find coursev	EVER COI ths – Ob hts opera side, se leavy. y – Type: paration hts – env ront end ware syst <b>Practic</b>	stacles - ating sys erver sid s of Mid s and in ironme tools. C	– Upfroi stem sei de andr Idleware iteractic nts. Case Stu	Periods: ( ntand Hidd rvices – Typ Periods: ( niddleware e – Data Ba Periods: ( on Periods: ( dies –	5 en – es of Clien 5 side – Ha se middlev 5	ardware a vare –	nd CO3

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 Robert Orfali, Dan Harkey and Jeri Edwards, "Essential Client/Server Survival Guide", Galgotia Publications, New Delhi, 2001.

2. Joel P Kaster, "Understanding Thin Client/Server Computing", Prentice Hall of India, New Delhi,2001.

3. Jein Edwards, "3 tier Client/server at Work", Wiley Computer Publishing, USA, 1999.4. Ashhofaiol TomyMartin,

"Building N-tier Applications with COM and VB 6.0", Wiley Computer Publishing, Singapore, 1999.

5. Travis Derive D, "Second-Generation Client/Server Computing" McGraw Hill, New Delhi, 1997.

## **COs/POs/PSOs Mapping**

COs		Program Specific Outcomes (PSOs)								
	PO1	PO1 PO2 PO3 PO4 PO5								
1	2	3	3	3	3	2	2	2		
2	3	3	2	3	2	3	3	2		
3	2	2	3	3	2	3	3	2		
4	3	<u> </u>								
5	2	2	2	3	3	3	2	2		

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Method**

Assessment		Internal	Marks	End Semester Examination (ESE) Marks	Total Marks
	Model Exam	Record	Attendance	50	100
Marks	30	10	10	50	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	· •	utational Studies				puter Scien				
Semester	Secon	d			ry Code:	<u>i</u>		ter Exam	·····	
Course Code	A23PC	PL204		ods/We	·····	Credit		aximum M		
Course Name		L with MONGO DB LAB	L 0	Т О	P 4	C 2	I M 50	ESE <b>50</b>	TM <b>100</b>	
Prerequisite		(nowledge in database	•			-		50	100	
rerequisite	Dasie i	nowiedge in database								
	After completion of the course, the students will be able to (Highest									
Course Outcome	CO1	Learn basic MongoDB functions an	d it implement	ation.					K3	
	CO2	Implement various types of operat	ions in Mongol	OB.				I	K3	
	CO3	CO3 Implement the concepts of limit records and sort records.								
	CO4	Implement Indexing, Advanced Ind	lexing and Hasł	ning usir	ng Mongo	DB.			K4	
	CO5	Analyze and apply aggregation and	l Map Reductio	n in Mo	ngoDB.			1	K4	
List of Experin	nent									
1. Installation o	f Mong	oDB on Windows .								
		nds of MongoDB and operations and Projection.	in MongoDB	: Insert	•/					
4. Implementat	ion of \	Where Clause, AND,OR operatior	ns in MongoD	В.						
5. Implementat	ion of I	NongoDB count() cursor method	l.							
6. Execute Aggr	egatior	Pipeline and its operations.								
7. Execute Limit	Recor	ds and Sort Records operation in	MongoDB.							
8. Implementat	ion of A	Aggregation and Map Reduce fur	nctions in Mor	ngoDB.						
9. Implementat	ions of	Indexing, Advanced Indexing usi	ng MongoDB.							
10. Implementa	itions o	f Hashing using MongoDB.								
LecturePeriod		TutorialPeriods:-	Pract	icalPer	iods:30		TotalPe	riods:30		
ReferenceBook	S									
1. Mongo DB: T	he Defi	nitive Guide: Powerful and Scala	ble Data Stora	age 4th	Edition	2019				
2.Dan McCreary	y and A	nn Kelly, Making Sense of NoSQL	., Maning Pub	licatior	ns 2013.					
3.Gaurav Vaish,	Gettin	g Started with NoSQL, Packet Pu	2018, blishing	8.						

# COs/POs/PSOs Mapping

COs		Program Specific Outcomes (PSOs)							
	PO1	PO1 PO2 PO3 PO4 PO5							
1	2	3	3	3	3	2	2	2	
2	3	3	2	3	2	3	3	2	
3	2	2	3	3	2	3	3	2	
4	3	3	2	3	3	3			
5	2	2	2	3	3	3	2	2	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Method**

Assessment		Internal	End Semester Examination (ESE) Marks	Total Marks	
	Model Exam	Record	Attendance	50	100
Marks	30	10	10		100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Comp	outational Studies				MPUTER S			
Semester	Secon	nd	Course	e Catego	ry Code	<b>DSC</b> *Er	nd Semeste	r Exam	Туре: <b>І</b>
Course Code	A23PC	205303	Per	iods / W	eek	Credit	Maxi	mum N	1arks
			L	Т	Р	С	CAM	ESE	TM
Course Name	Web P	rogramming	4	0	0	4	25	75	100
Prerequisite	Basic	knowledge about Web							
	_	_				-			
		tudy the fundamentals of we	••		•				
Course		inderstand the design compo			-				
Objectives	1	earn the concepts JavaScript			g tundar	nentais.			
-		inderstand the working proc							
		inderstand the concept and p	•					1	
	After th	e completion of this course, the	students v	vill be abl	e to:				lapping
								· · · ·	est Leve
Course	CO1	The fundamentals of web a	• •	•	ment.				K2
Outcome	CO2	The design components an		•					КЗ
	CO3	Concept of JavaScript and F	•	•		ls			КЗ
	CO4	The Working Procedure of	XML Com	ponents					К4
	CO5	The concept and Principle of							К4
UNIT-I		DDUCTION TO INTERNET BAS				Periods:		-	
Definition - IP Ac	ddress - Doc –	ections – Applications and D – TCP/IP Protocol – User D HTML Development process Documents.	Datagram	Protocol	– HTN	1L - HTM	L Tags –	c	01
UNIT-II	CASS	TYLE SHEET				Periods:	12	-	
Colors and propert	ties – C	d for CSS– Basic syntax and reating Style sheet rules - Sty - Margins, padding lists, pos	/le sheet p	propertie	s - Mani	pulating te	exts using	C	:02
UNIT-III	JAVAS	SCRIPTS				Periods:	12	<u>.</u>	
JavaScript- JavaS	cript in \	Neb Pages – The Advantages	s of JavaS	Script –W	riting Ja	vaScript i	nto HTML		
- Syntax - Operat	tors and	I Expressions –Constructs an	nd conditio	onal cheo	cking - L	OOPS -	Functions	c	:03
- Placing text in a	browse	r– Dialog Boxes – Form obje	ct's metho	ods – Bu	ilt in obj	ects – use	er defined		
objects - Page Va	lidation	<ul> <li>Reporting.</li> </ul>							
UNIT-IV	XML					Periods:	12	-	
key components – of XML – XSL, XS	XML Va D and 2	atures of XML – Uses of XML alidation – DTD and Schemas XSLT – XQuery – XQuery Fe	s – Well-fo	rmed XN	/L docu	ment – Ap	plications	C	:04
Nodes – XQuery v UNIT-V	7	٦.				Dariada	17		
		Dacia syntax of DUD Dacia	ion and k	oning		Periods:			
atraduction East		ol – String - Form processing	g – Handli	ng HTM	L Form	with PHP	- Working	C	:05
Functions – Browse vith files and Direc		- Session and Cookie – Dat							
	ctories -	- Session and Cookie – Dat Tutorial Periods: -		al Perio	ds: -		Tota	al Perio	ds: 60

3. Ralph Moseley and M. T. Savaliya, Developing Web Applications, Wiley-India Private Limited, 2011.

- 4. Robert W.Sebesta, Programming the World Wide Web, 7th edition, Pearson Education, 2013.
- 5. P.J. Deitel AND H.M. Deitel," Internet and World Wide Web How to Program", Pearson Education, 2009.

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- Yakov Fain, Victor Rasputnis, Anatole Tartakovsky and Viktor Gamov, "Enterprise Web Development ", O'Reilly Media, 2014.
- Steven Suehring, Janet Valade, "PHP, MySQL, JavaScript& HTML5 All-in-One", John Wiley & Sons, Inc, 2013.
- 3. UttamK.Roy, "Web Technologies", Oxford University Press, 2010.
- 4. Rajkamal, "Web Technology", Tata McGraw-Hill, 2009.
- 5. Shklar, Leon, Rosen, Rich, "Web Application Architecture: Principles, Protocols and Practices", Wiley Publication, 2009.

#### Web References

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- 2. https://www.geeksforgeeks.org/web-technology/
- 3. https://www.guru99.com/cakephp-tutorial.html
- 4. https://www.ithands.com/blog/cms-or-php-framework-which-technology-is-better-for-my-business
- 5. http://Oriel.ly/learning-web-app

### \* TE – Theory Exam, LE – Lab Exam

#### COs/POs/PSOs Mapping

COs		Program Specific Outcomes (PSOs)								
	PO1	PO6	PSO1	PSO2	PSO3					
1	3	3 2 3 3 2 2								
2	3	2	2	2	2					
3	2	2	2	2	3	3	3	2	2	
4	3	3	2	2	2	3				
5	2	3	2	2	3	3	3	3	3	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

**Evaluation Method** 

		Contin	nuous Ass	End	_		
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Semester Examination (ESE) Marks	Total Marks
Marks	1	0	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus