# Dr. Ambedkar Institute of technology, Bengaluru-56 Department of Computer Science & Engineering

The enclosed documents are verified & approved.

Prof & Head

Dr. Siddaraju

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Department of Computer Science & Engineering

Professor & Head Department of Computer Science & Engineerin Dr. Ambediear Institute of Technology Bangalore-560 056.

(An Autonomous Institute affiliated to VTU, Accredited by NAAC with 'A' grade)

**Department of Telecommunication Engineering** 

SCHEME OF TEACHING AND EXAMINATION I SEMESTER (Autonomous) 2020-21, 2021-22

M. Tech in Computer Science & Engineering

I semester

				Teach	ing hours per	week	Maximur	s allotted		
Sl. No.	Sub Code	Subject Title	Teaching Department	Lecture	Tutorial/ Seminar/ Assignment	Practic al / Project	CIE	SEE	Total	Examination Credits
1	20SCS11	Probability Statistics and Queueing Theory (Maths)	MAT	4	-	-	50	50	100	3
2	20SCS12	Cloud Computing Theory and Practices	CSE	4	-	-	50	50	100	3
3	20SCS13	Internet of Things	CSE	4	-	-	50	50	100	3
4	20SCS14	Soft Computing	CSE	4	-	-	50	50	100	3
5	20SCS15X	ELECTIVE – I	CSE	4	-	-	50	50	100	3
6	20SCS16X	ELECTIVE – II	CSE	4	-	-	50	50	100	3
7	20SCSL17	IoT Laboratory	CSE	-	-	3	50	50	100	2
8	20SCSS18	Technical Seminar	CSE	-	4	-	50	-	50	2
9	20SCSM19	Minor project	CSE	_	-	6	50	-	50	2
		Total					450	350	800	24

Technical Seminar: Seminar on Advanced topics from refereed journals by each student.

		ELECTIVE - I	ELECTIVE - II				
Sl .No	Sub Code	Subject title	Subject Code	Subject title			
1	20SCS151	Advanced Operating System	20SCS161	Introduction to Blackchain Technology			
2	20SCS152	Advances in Computer Network	20SCS162	Advanced Algorithms and Data structure			
3	20SCS153	Artificial Intelligence and Prolog	20SCS163	Cyber Security and Cyber Laws			
		Programming					
4	20SCS154	Parallel Computing with GPU Architecture	20SCS164	Computational Intelligence			

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**Department of Telecommunication Engineering** 

SCHEME OF TEACHING AND EXAMINATION II SEMESTER (Autonomous) 2020-21, 2021-22

M. Tech in Computer Science & Engineering

II semester

				Teac	hing hours pe	r week	Ma	ximum M allotted	larks	
Sl. No.	Sub Code	Subject Title	Teaching Department	Lecture	Tutorial/ Seminar/ Assignment	Practical / Project	CIE	SEE	Total	Examination Credits
1	20SCS21	Managing Big Data	CSE	4	-	-	50	50	100	3
2	20SCS22	Advanced Database Systems	CSE	4	-	-	50	50	100	3
3	20SCS23	Cryptography & Network Security	CSE	4	-	-	50	50	100	3
4	20SCS24	Data Science and Machine Learning Techniques	CSE	4	-	-	50	50	100	3
5	20SCS25X	ELECTIVE – III	CSE	4	-	-	50	50	100	3
6	20SCS26X	ELECTIVE – IV	CSE	4	-	-	50	50	100	3
7	20RM27	Research Methodology	CSE	2		-	50	50	100	2
8	20SCSL28	Data Science and Machine Learning Laboratory	CSE	-	-	3	50	50	100	2
9	20SCSP29	Project Phase - I	CSE	-	-	6	50	-	50	2
		Total					450	400	850	24

		ELECTIVE - III		ELECTIVE - IV
Sl .No	Sub Code	Subject title	Subject Code	Subject title
1	20SCS251	Natural Language Processing	20SCS261	Business Analytics
2	20SCS252	Industry Elective (TCS)	20SCS262	Deep Learning
3	20SCS253	Agile Methodologies	20SCS263	Storage Area Network
4	20SCS254	Wireless Networks & Mobile Computing	20SCS264	Intelligent Systems

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#### SCHEME OF TEACHING AND EXAMINATION III SEMESTER (Autonomous) 2020-21, 2021-22 M. Tech in Computer Science & Engineering

#### **III** semester

SI				Теа	Teaching hours per week				Maximum Marks allotted			
51. No.	Sub Code	Subject Title	Department	Lecture	Tutorial/ Seminar/ Assignment	Practical / Field Work	CIE	SEE	Total	Credits		
1	20SCS31	Self Study – Massive Open Online Course (MOOC)	CSE		8		50	50	100	4		
2	20SCSI32	Internship	CSE			16	50	50	100	8		
3	20SCSS33	Technical Seminar	CSE	-	4	-	50	-	50	2		
4	20SCSP34	Evaluation of Project Work Phase I	CSE	-	-	12	50	50	100	6		
		Total	l				200	150	350	20		

\* List of MOOC course shall be decided in the Board of Studies meeting Students shall register for NPTEL-MOOC during 2<sup>nd</sup> semester and shall be completed before the last working day of the 3<sup>rd</sup> semester. The certificate and assignment and examination scores should be submitted to the examination section.

\* The student shall make a midterm presentation of the activities undertaken during the first 8 weeks of internship to a panel comprising Internship Guide, a senior faculty from the department and Head of the Department.

The College shall facilitate and monitor the student internship program.

The internship report of each student shall be submitted to the Institute.

(An Autonomous Institute affiliated to VTU, Accredited by NAAC with 'A' grade) Department of Computer Science & Engineering SCHEME OF TEACHING AND EXAMINATION IV SEMESTER (Autonomous) 2020-21, 2021-22 M. Tech in Computer Science & Engineering

IV se	emester									
C1				Tea	Teaching hours per week			aximun allot	Fyamination	
51. No.	Sub Code	Subject Title	Teaching Department	Lecture	Tutorial/ Seminar/ Assignment	Practical / Field Work	CIE	SEE	Total	Credits
1	20SCSP41	Project Phase – II Midterm Internal Evaluation	CSE	-	-	8	100	-	100	2
2	20SCSP42	Project Work Evaluation and Viva Voce	CSE	-	4	24	100	100	200	18
		Tota	l				200	100	300	20
Grand Total (I to IV Semester) : 2300 Marks ; 88 Credits										

- \* The student shall make a midterm presentation of the activities undertaken during the first 8 weeks of internship to a panel comprising Internship Guide, a senior faculty from the department and Head of the Department.
- # The College shall facilitate and monitor the student internship program.

#### The internship report of each student shall be submitted to the Institute.

#### Note:

- 1) Project Phase I: 6 weeks duration shall be carried out during III Semester. Candidates in consultation with the guides shall carryout literature survey / visit to Industries to finalize the topic of dissertation.
- 2) Project Phase II: 16 weeks duration during IV Semester. Evaluation shall be taken during the IV Semester. Total Marks shall be 100.
- 3) Project Work Evaluation and viva-voce: 24 weeks duration in IV Semester. Project Work Evaluation shall be taken up at the end of the IV Semester. Project Work Evaluation and Viva-Voce Examinations shall be conducted. Total Marks shall be 200 (Phase –II Evaluation: 100 Marks, Project Evaluation marks by Internal Examiner (guide): 50, Project Evaluation marks by External Examiner: 50, and 100 for viva-voce).

#### Marks of Evaluation of Project:

- 1. During Project Phase I, finalise titles and submit synopsis to the Institute along with Project Work report at the end of the Semester.
- 2. During the final viva, students have to submit all the reports.
- 3. The Project Valuation and Viva-Voce will be conducted by a committee consisting of the following:
- a) Head of the Department (Chairman)
- b) Internal examiner (Guide)
- c) External examiner proposed by the Chairman, BoE (PG)

## **SEMESTER -1**

## **Dr. Ambedkar Institute of Technology**



## M.Tech Computer Science & Engineering 2021-2022

AND THE OF REAL OF REA	Course Title: : PR	<b>OBABILITY STATISTICS</b>	AND QUEUEING TH	HEORY				
ANDHE HARD AND	BOOGY - REAL	Course Code: 20SCS11	No. of Credits: 3 : 0 : 0 (L-T-P)	Number of lecture hours/week : 4	es			
Aided By	Govt. of Karnataka	Exam Duration : 3 hours	CIE + SEE = 50+50	Total Number of Hours : 52	Contact			
	urse		Description					
Obje	ctives:	<ol> <li>To develop analytic Probability, Statist</li> <li>The application of</li> <li>Students acquire kand their application world problems.</li> </ol>	ical capability and to impart ics and Queuing. f above concepts in Enginee knowledge of Hypothesis tes ons so as to enable them to	knowledge of ring and Technology. sting and Queueing me apply them for solvin	ethods g real			
Unit No.		S	Syllabus Content		No of Hours			
1	Proba Baye's Contin Distrib comm	Probability: Axioms of Probability, Conditional probability, Total probability, Baye's theorem, Discrete Random variable, Probability mass function, Continuous Random variable. Probability density function, Cumulative Distribution Function, and its properties, Engineering Application: Optical communication system.11						
2	<b>Standard Probability Distributions:</b> Discrete distributions: Binomial, Poisson, Geometric and their properties. Continuous distributions: Normal, exponential Weibull distributions and their properties. Two-dimensional Random variables, Joint pdf / cdf and their properties, Engineering Application: Entropy and Source coding.							
3	Testin critica signifi F-dist	ng Hypothesis: Testing of I 10 Hours region, lev cance for Large and Sma ribution, its properties a	of Hypothesis: Formulation el of significance, errors i Il Samples, t-distribution, its nd uses, Chi-square distribu	of Null hypothesis, n testing, Test2s of properties and uses, tion.	10			
4	Rando Avera Proce prope	om Processes: Classifica ge values of Random P ss, Auto correlation Fund rties, Ergodicity, Poissor	ation, Methods of descript rocesses, Analytical repres ction, Cross-correlation func process, Markov Process, I	ion, Special classes, entation of Random tion and their Markov chain.	10			
5	<b>Queu</b> Queu The M with F	<b>Queueing Theory:</b> Symbolic Representation of a Queuing Model, Poisson Queue system, Little Law, Types of Stochastic Processes, Birth-Death Process, The M/M/1 Queuing System, The M/M/s Queuing System, The M/M/s Queuing with Finite buffer						
Cou Outco	rse omes							
(		O1Students will demonstrate knowledge & use of probability and will be able to characterize probability models using probability mass (density) functions & cumulative distribution functions.						
(	CO2 S	<b>D2</b> Students will be introduced to the techniques of developing discrete & co probability distributions and its applications.						
(	CO3	O3 Students will be able to describe a random process in terms of its mean and correlation functions.						

<b>CO4</b>	Stud	ents wil	l be intr	oduced	l to met	hods o	f Hypo	thesis t	esting	for good	Iness of	fit.		
CO5	Stud quei quei	tudents will be able to understand the terminology & nomenclature appropriate queuing theory and also demonstrate the knowledge and understand the various queuing models												
CO-PO Mapping	PO 1	PO2	PO3	PO4	PO5	P06	<b>PO</b> 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2		
C01	2	3	3											
CO2	3	2	2											
CO3	3	2	3											
CO4	3	3	2											
CO5	2	3	2											
TEXT BOO 1. Proba Lear	<b>DKS:</b> ability rning	, Statisti Pvt. Ltd,	ics and ( , 2009. F	Queuing Publishe	g Theory ed by PH	r, V. Su Il Learn	ndarap iing, N	oandiar ew Del	n, Easte hi (200	rn Econ 9)	omy Edit	ion, PH		
REFEREN	CE B	OOKS:	:											
<ol> <li>Probability and Random Processes, Scott L.Miller and Donald Childers, Sixth indian reprint,2018</li> <li>Probability &amp; Statistics with Reliability, Queuing and Computer Applications, 2nd Edition by Kishor. S. Trivedi, Prentice Hall of India, 2004. ISBN: 978-0-471-33341-8.</li> <li>Probability ,Queing theory and Engineering Reliability, Haribhaskaran, First Edition ,Laxmi Publication 2005.</li> </ol>														
COURSE (	2001	RDINA	FOR:		Prof. Sl	niva Pr	asann	a (Mat	ths Dep	ot)				

		Course Title: Clo	ud Computing							
OT THE OTHER PARTY OF THE OTHER	THE STREET	CourseCode:20SCS12	No. of Credits: 3 : 0 : 0 (L-T-P)	No. of lecture h	ours/week :					
Aided By Gor	THE WELFARE TRUS	Exam Duration : 3 hours	CIE + SEE = 50+50	Total No. of Contact Hours : 52						
	urse		Description							
Obje	ctives:	1. To learn ho	w to use Cloud Services.							
		2. To implement Virtualization								
		3. To implement Task Scheduling algorithms.								
		4. Apply Map	4. Apply Map-Reduce concept to applications.							
		5. To build Private Cloud.								
		6. Broadly educate to know the impact of engineering on lega								
		societai isst	ies involved.							
Unit No		Syllabus Content								
1	Intro	10								
	Peer-t	whose time has								
	come, Cloud Computing delivery models & Services, Ethical issues,									
	Cloud	I vulnerabilities, Cha	llenges. nazon Google Azure & onli	ne services onen						
	source	e private clouds. Sto	rage diversity and vendor lo	ck-in, intercloud,						
	Energ	y use & ecological	impact of data centers, s	ervice level and						
	compl	iance level agreeme	nt, Responsibility sharing, us	er experience,						
2	Softw	are licensing.	insting & Davidiana Ch		10					
2	and r applic based progra applic resear <b>Cloud</b> Applic	Computing: Appl new application of ations, Workflows co on a state machine amming model, Apa ation, High performa ch, Social computing <b>I Applications:</b> Scie cation	allenges, existing styles of cloud ties, Coordination The Map Reduce the GrepTheWeb oud for biological computing. and consumer	10						
3	Cloud and te Virtua suppo paravi vBlad perfor virtua	11								

4	Clo med allo Coo bas con que <b>Pyt</b> Clo	bud chanis chanis ocation ordina ed m nbinat cuing, chon fo bud pla	Resour ams for archit tion of nodel f orial au borrow or Clou	ce M resourc ecture, specia for clo actions ed virtu ud: Python	anager ce mana Feedba lized a oud-bas for clo hal time non for	nent agemer ack cor utonor ed we ud resc e. Amazo indows	and nt, Stal ntrol b nic pe beb ser purces, on Wel Azure	Sched bility of ased co rform rvices, fair co b servi e, pyth	luling: of a two on dyna ance n Reso jueuing ces, Py on for	Poli o-leve amic t nanage ource g, Star /thon f map F	icies a I resour hreshold ers, utili bundlir t time fa for Goog Reduce	nd 1 ce ls, ity ng, air gle	11	
5	Sel:	f Stud	ly Com ecurity	ponent Cloud	t: d Annl	lication		lonm	ent S	torage	system	ns· 1	10	
5	Sto syst data Clo	rage 1 tem, 0 abases	models GFS, A s, Bigda curity	, file s Apache Ita, Meg Risks,	ystems Hadoo ga store Securi	b, datat op, Lo e. ty, Priv	bases, cks & vacy, T	DFS, Chu	Gene bby, 7 Securit	ral par TPS &	rallel F NOS( S, VM,	ile )L	LU	
	V IV.	IIVI, SI	M, Shared Image, Management OS, Xoar.											
Cour Outco	:se ome		Description											T Levels
C	201	Ana	lyze the	Cloud	compu	iting se	tup wi	th it's	vulner	abilitie	es and	]	L1,	L3
		appli	cations	using	differer	nt archi	tecture	es.						
C	202	Desi	<b>gn</b> diffe raduce	erent w	orkflov	vs acco	rding	to requ	iireme	nts and	d Apply		L4,	
C	203	App	ly and	Design	suitabl	le Virtu	alizati	ion co	ncept,	Cloud	Resource	ce l	L5	
		Man	agemer	nt and d	esign s	cheduli	ing alg	gorithn	ns.					
C	204	Crea	ate com	binator	ial auc	tions fo	or clou	d reso	urces a	und <b>De</b>	sign	]	L6	
C	<u>'05</u>	sche	duling a	algorith	ms for	compu	ting cl	louds		no mialz	0		1.2	
C	.05	invol	lved, its	s impac	t and d	evelop	cloud	applic	ation	IC IISK	5	1		
C	206	Broa	dly Ed	ucate to	o know	the im	pact o	f engi	neering	g on le	gal and	1	L1,	L2
		socie	etal issu	es invo	lved in	addres	sing th	he sec	urity is	sues o	f cloud			
		com	outing.											
СО-Р	0	РО	PO2	PO3	PO4	PO5	P06	PO	PO	PO	PO1	POI	1	PO12
Марр	oin	1						7	8	9	0	1		
g														
C	201	1 2 1 1												
C	202	2	1	2										
C	203	2	2	2										
C	204	2	2	1		1							$\neg$	
C	205	2	2			1							$\neg$	
C	206	2	1				2				1			

Strong -3 Medium -2 Weak -1

#### **TEXT BOOKS:**

1. Dan C. Marinescu, Cloud Computing: Theory and Practice, Elsevier Science, 2013, 1st Edition, Print Book ISBN :9780124046276, eBook ISBN :9780124046412

#### **REFERENCE BOOKS:**

**1.** Rajkumar Buyya , James Broberg, Andrzej Goscinski: Cloud Computing Principles and Paradigms, Willey 2014.

#### SELF STUDY REFERENCES/WEBLINKS:

- 1. Cloud Computing : A hands on Approach, Arshdeep Bagha Vijay Bagha Madisetti , 2013, ISBN/EAN13: 1494435144 / 9781494435141.
- 2. https://nptel.ac.in/content/syllabus\_pdf/106104182.pdf
- 3. https://nptel.ac.in/content/syllabus\_pdf/106105167.pdf

COURSE	Dr. SIDDARAJU
<b>COORDINATOR:</b>	

NAR INSTITU	UTE OF TRO	Course Title: Inte	rnet Of Things						
Dr. AMBE	AMOLOGY	Course Code:	No. of Credits: 3 = 3 : 0 : 0	No. of lecture hou	rs/week				
Non Contraction of Contraction		20SCS13	(L-T-P)	: 4					
Aided By Goy	A WELFARE TRUS	Exam Duration :	CIE + SEE = 50+50	Total No. of Cont	act				
		3 hours		Hours: 52					
<u> </u>									
Cou Obie	urse ective	1 Inforth	Description	al dasian in IsT to a	lanlari				
	s	1. Infer the	ions at different levels	cal design in 101 to c	leploy				
	:	2 Interpre	t the vision of IoT from a global	context					
		3 Underst	and the IoT Market perspective	and discover the IoT	<b>ب</b>				
		architec	tural standards.						
		4. Identify	the specifications involved in d	esigning IoT applica	ations.				
		5. Classify the Real-World Domain specific IoT applications.							
Unit			Syllabus Content		No of				
NO 1	Intro	duction and Conco	nta Definition & Changetonistic	a of LaT Dhard and	Hours				
1	Intro	n of IoT. Things in	LOT LOT Protocols Logical C	esign of IoT: IoT	11				
	Functi	ional Blocks IoT Co	cks, IoT Communication Models, IoT Communication APIs.						
	I of E	Cnabling Technolog	ies: Wireless Sensor Networks.	Cloud Computing.					
	Big I	Data Analytics, Con	nmunication Protocols, Embed	ded Systems, <b>IoT</b>					
	Level	s and Deployment	Femplates: IoT Level-1, IoT Le	vel-2, IoT Level-3,					
	IoT L	evel-4, IoT Level-5,	IoT Level-6.						
2	M2M	to IoT: The Vision-	Introduction, From M2M to Io7	10					
	IoT-th	ne global context, A	use case example, Differing Cha	aracteristics.					
3	M2M	to IoT: A Market I	Perspective- Introduction, Some	Definitions, M2M	10				
	Value	Chains, Io1 Value	Chains, An emerging industria	l structure for IoT,					
	mono	noties M2M to I	o <b>T-An Architectural Overv</b>	iew. Building an					
	archite	ecture. Main design	principles and needed capability	es. An IoT					
	archite	ecture outline, standa	ards considerations.						
4	IoT A	rchitecture-State o	f the Art – Introduction, State c	of the art, SDN and	11				
	NFV	for IoT: Softw	are Defined Networking, N	Network Function					
	Virtua	alization, <b>IoT Des</b>	sign Methodology: Purpose	& Requirements					
	Specif	fication, Process	Specification, Domain Mod	lel Specification,					
	Inform	nation Model Spe	ecification, Service Specification	tions, IoT Level					
	Specif	tication, Function	al View Specification, C	perational View					
	Specif	opment	omponent integration and Appl	ication					
5	Devel	opment. in Specific IoTs.	Home Automation Smart	10					
	Appli	ances. Intrusion D	etection. Smoke/Gas Detecto	rs. Cities: Smart	Ĩ				
	Parkir	ng, Smart Lighting	, Smart Roads, Structural H	lealth Monitoring.					
	Surve	illance, Emergency I	gency Response, Environment: Weather Monitoring, Air						
	Pollut	ion Monitoring, Noi	se Pollution Monitoring, Forest	Fire Detection,					

Riv Pro Ver Tra Sm Pro Fitr <b>Set</b>	Tiver Floods Detection, Energy: Smart Grids, Renewable Energy Systems, rognostics, Retail: Inventory Management, Smart Payments, Smart Vending Machines, Logistics: Route Generation & Scheduling, Fleet Tracking, Shipment Monitoring, Remote Vehicle Diagnostics, Agriculture: mart Irrigation, Green House Control, Industry: Machine Diagnosis & rognosis, Indoor Air Quality Monitoring, Health & Lifestyle: Health & Titness Monitoring, Wearable Electronics.													
Course Outcome s	Description													
CO1	Exa app leve	Examine the Physical design and Logical design required to enable IoT applications and employ technologies to deploy applications at different levels.												
CO2	Exp glol	Express the vision of M2M and IoT to satisfy the requirements of a global market.												
CO3	Det IoT	Determine the architectural principles and standards for structuring the IoT applications.												
CO4	Cor Mar	Compare and Contrast the use of Devices, Gateways and Data Management in IoT.												
CO5	Arti desi	iculate ign me	the nee thodolo	ed for S ogies in	DN, N volved	FV froi in buil	n IoT J ding th	perspec e IoT a	tive and pplicat	d analy ions.	ze the	L3		
CO6	Illu Wo	strate tl rld Des	he appl sign Co	ication nstrain	s of Io] ts.	Γ in dif	ferent c	lomain	s and ic	lentify	Real	L2		
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO12		
CO1	3	3	3	3	3	-	-	-	-	-	-	-		
CO2	2	2	2	2	2	-	-	-	-	-	-	-		
CO3	3	3	2	2	2	-	-	-	-	-	-	-		
CO4	2	2	2	2	2	-	-	-	-	-	-	-		
CO5	3	3	3	3	3	-	-	-	-	-	-	-		
CO6	3	3	3	3	3	-	-	-	-	-	-	-		
Strong -3	Me	edium -	2	Weak -1	1									
TEXT BO	OKS	:												
1. Ars	shdeep	o Bahga Orient	a, Vijay Blackov	y Madis wan Pr	setti, "]	[ <b>nterne</b>	et of Th	ings: A	<b>A Hand</b>	ls-on A	Approa	<b>ich'',</b> 1 <sup>st</sup>		
2. Ian Ka Da	Holle rnousl	er, Vlas kos, oyle, "l	ios Tsi From I	atsis, C Machin	Catherin	e Mull	igan, S e to the	tefan A	vesand	l, Stam	atis <b>: Intro</b>	, duction		

to a New Age of Intelligence", 1st Edition,	Academic Press,	, 2014. (ISBN-13: 97	8-
0124076846)			

#### **REFERENCE BOOKS:**

- 1) Cuno Pfister, **"Make: Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to the Cloud",** 1<sup>st</sup> Edition, O'Reilly Publishers, 2011. (ISBN-13: 978-9350234136)</sup>
- 2) Adrian Mcewen, Hakin Cassimally, **"Designing the Internet of Things"**, 1<sup>st</sup> Edition, Wiley Publishers, 2015. (ISBN-13: 978-8126556861)
- Raj Kamal, "Internet of Things", 1<sup>st</sup> Edition, McGraw Hill Education Publishers, 2017. (ISBN-13: 978-9352605224)
- David Hanes, et al., "IoT Fundamentals: Networking Technologies, Protocols and Use Cases for the Internet of Things", 1<sup>st</sup> Edition, Pearson Education, 2017. (ISBN-13: 978-9386873743)
- 5) Rahul Dubey, "An Introduction to Internet of Things: Connecting Devices, Edge Gateway, and Cloud with Applications", 1<sup>st</sup> Edition, Cengage India Learning Pvt Ltd, 2019. (ISBN-13: 978-9353500931)

COURSE	
COORDINATOR	Dr.Gowrishankar S.
:	

		<b>Course Title: Soft</b>	Computing					
STAR INSTITUTION	UTE OF FLOOTINGLOGY -	Course Code: 20SCS14	No. of Credits: 3 : 0 : 0 (L-T-P)	No. of lecture l	nours/week :			
Aided By Gov	HA WELFARE TRUE	Exam Duration : 3 hours	CIE + SEE = 50+50	Total No. of Co Hours :	ontact			
Co	urse		Description	-				
Obje	ctives:	1. To learn the	e key aspects of Soft comput	ing				
		<ol> <li>To know ab Genetic algorithm.</li> <li>To gain inside</li> </ol>	out the components and built ght onto Neuro Fuzzy mode	ding block hypothe ling and control.	esis of			
		machines		unougn support v				
Unit No			No of Hours					
1	Introd algorit of AN MP m	y logic, Genetic mental concept ies used in ANN,	11					
2	Supervised Learning: Perceptual Network, Adaptive linear neuron, Multiple adaptive linear neurons, Back propagation Network,         Associative Memory Network: introduction, training algorithms for pattern association, associative memory network, hetero-associative memory network bidirectional associative memory.							
3	Classi of mer value fuzzy	cal sets and Fuzzy S mbership functions, assignment. Defuzzi sets.	ets – classical and Fuzzy Re Fuzzification and methods o fication lambda cuts for fuzz	ations – Features f membership cy relations and	10			
4	Fuzzy makin makin	Decision Making: in g, multiperson Decis g, multiattribute dec	ntroduction, individual decis sion making, multiobjective ision making,	ion decision	11			
	fuzzy introd systen	Bayesian decision m uction, control system ns, FLC system Mod	aking, Fuzzy logic control s m design, architecture and og els, Applications of FLC sys	ystems: peration of FLC stems				
5	Self S	tudy Component			10			
	Genet optimi search progra	ic algorithms: Introd ization and search te space, Operators of mming	uction - Basic operations - T chniques. Genetic algorithm genetic algorithms – Geneti	raditional s and c				

Course Outcome		Description														
CO1	Unde	Understand the basics of soft computing, ANN and Terminologies <b>R2 R3</b>														
	to re	to relate and understand the real time problems														
CO2	Solv	e the r		R3 R4												
CO3	Anal	Analyze and adopt fuzzy logic in designing and implementing soft														
	comp	computing applications.														
CO4	Anal	yze ar		R3 R4												
	prob	problems														
	DO	PO PO2 PO3 PO4 PO5 P06 PO PO PO PO1 PO1 PO12														
CO-PO Monnin	1	P0	PO12													
a																
<u>s</u> CO1	3															
CO2	3	3	2													
CO3	3	3 3 3 2 2														
COA	3	3		2												
Strong -3	 Me	dium	-2 V	<sup>2</sup> Veak -1	<u>-</u>											
TEXT BO	OKS:				-											
1. Principl ISBN	es of \$ 13: 97	Soft co 88126	omputing 58744-5	g, S N S 5, 2019	Sivanar	ndam, a	and S	N Dee	pa, Wi	iley Indi	.a, 3 <sup>rc</sup>	<sup>1</sup> edition				
REFEREN	ICE B	OOKS	5:													
1. Ne edi 2. Tir	uro-fu tion), nothy	zzy ai 2012, J. Ros	nd soft c ISBN 0 ss, "Fuzz	omputi -13-26 zy Logi	ng, J.S. 1066-3 ic with	.R. Jan Engine	ig, C.7 eering	Г. Sun, Appli	E. Mi	zutani, l s", Thirc	Phi (l l Edi	EEE tion				
WEBLINH	KS:															
<ul> <li>WEBLINKS:</li> <li>1. Introduction to Soft Computing by Prof. Debasis Samanta NPTEL course</li> <li>2. L. A. Zadeh, "Fuzzy Algorithms", Information and Control, vol. 12, pp. 94-102, 1968. CrossRef Google Scholar</li> <li>3. 2. L. A. Zadeh, "A Rationale for Fuzzy Control", J.Dynamic Systems Measurement and Control, vol. 94, pp. 3-4, 1972. CrossRef Google Scholar</li> <li>4. 3. L. A. Zadeh, "Outline of a New Approach to the Analysis of Complex Systems and Decision Processes", IEEE Trans. Systems Man and Cybernetics, vol. SMC-3, pp. 28-44, 1973</li> </ul>																
COORDIN	<b>JATO</b>	R:		JJ•												

NAR INSTITUTION	TUTE OF THE	C	Course Title: INTERNET OF THINGS LABORATORY												
- Dr. Allec	inology.	C	ourse (	Code:	No	o. of Cr	edits:	2 = 0:	0:2						
Same of the second		20	SCSL	17	(L	-T-P)				No. o	f Pract	tical			
Aided By Go	THA WELFARE TRUS	E	kam Du	uration	i: CI	E + SE	$\mathbf{EE} = 50$	)+50		hours	s/week	:3			
Anded by Go	vi. of ramataka	31	hours												
Co	urse						De	scriptio	on						
Obje	ctives	1.	Deve	lop IoT	applic	ations	using s	ensing	devices	s, actua	tion, pi	ocessi	ng and		
			comn	nunicat	ions th	rough I	oT dev	elopme	ent kits.	•	1		U		
		2.	Illust	rate the	proces	ss of bu	ilding,	testing	and w	orking	of IoT	applica	ations		
			throu	gh prot	otyping	g and p	rogram	ming.							
<b>T</b> T •/															
Unit						Sy	llabus	Conter	nt						
1.	Writ	e a R	aspher	rv Pi ba	ased pr	ogram	to make	e eight	LEDs t	to blink	as floy	ving w	vater.		
2.	Illus	trate	ate the process of turning an LED ON or OFF using a button on a Raspberry Pi.										erry Pi.		
3.	Desi	gn ar	gn and develop a heart monitoring system using Arduino/Raspberry Pi.												
4.	Dev	Develop a home security system using Raspberry Pi/Arduino and PIR Sensor.													
5.	Writ	e P	ython	progr	am to	o moi	nitor	the e	nvironr	nental	temp	erature	e using		
	Ardu	uino/l	Raspbe	rry Pi.		1.		• •	•	11 1	•. 1	D	1		
6.	Devi	ise a j	prograi	n to co	nnect c	or disco	nnect a	circuit	t using	slide sv	vitch of	n a Ra	spberry		
7.	Dev	elop a	a Raspl	perry Pi	based	progra	m to gi	adually	v increa	se or d	ecrease	the lu	iminance		
	of ar	ı LEI	D with 1	Pulse V	Vidth N	/Iodulat	tion to	simulat	e huma	an breat	hing.				
8.	Writ	e a pi	rogram	using	Arduin	o/Rasp	berry P	'i to dis	play th	e chara	cters of	n a LC	D		
	mod	ule.													
Cou	rse					D	escript	ion					RBT		
Outco	omes												Levels		
CC	)1	Exa	mine th	ne key	compo	nents th	nat mak	te up ar	n IoT sy	ystem.			L3		
	20	Exp	erimen	t with	various	sensor	modul	les like	enviro	nmenta	l, healt	h and	1.2		
	)2	pro	cess of	IoT ap	plicatio	ons.	llow the	ey m m	uie ov	ciali uc	velopi	lient	L3		
CC	)3	Dev	velop h	ands-or	n skills	by pro	totypin	g and h	uilding	y IoT ar	oplicati	ons.	L3		
CC	)4	Det	ermine	how th	e IoT o	concept	t fits wi	ithin th	e broad	ler ICT	indust	ry.	L3		
CO-I Mapp	PO oing	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO12		
CO	1	3	3	3	3	3	-	-	-	-	-	-	-		
СО	2	3	3	3	2	3	-	-	-	-	-	-	-		
СО	3	3	3	3	3	3	-	-	-	-	-	-	-		
CO	4	2	2	2	2	2	-	-	-	-	-	-	-		
Stron	g -3	Me	dium -	2 V	Veak -1	l									

#### **TEXT BOOKS:**

#### **Conduct of Practical Examination**

- All the laboratory programs are to be included for practical examination.
- The instructions and breakup of marks printed on the cover page of the answer script are to be strictly adhered by the examiners.
- Students are allowed to pick any one program randomly from the lot.
- Change of program is allowed only once and the marks will be deducted as per the Dr.AIT Autonomous/Examination rules and regulations.

COURSE	
COORDINATOR	Dr.Gowrishankar S.
:	

		Course Title: Adv	anced Operating System								
SOLUR INSTITU	TE OS IKOMMOL	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture h	ours/week :						
Dr.A	OGY • stars										
Aided By Govt.	WELFARE TRUE	Exam Duration : 3 hours	CIE + SEE = 50+50	Total No. of Co Hours :	ontact						
Cou	ırse		Description								
Objec	ctives:	1. To learn the fur	damentals of Operating Sys	stems.							
		2. To learn the mechanisms of OS to handle processes and threads and their communication									
		3. To learn the mechanisms involved in memory management in contemporary OS									
	4. To gain knowledge on distributed operating system concepts t includes architecture, Mutual exclusion algorithms, deadlock of the architecture and accurate and the second system of the second syst										
	<ul><li>algorithms and agreement protocols</li><li>5. To know the components and management aspects of concurrency management</li></ul>										
	<ul><li>concurrency management</li><li>6. To learn programmatically to implement simple OS mechanis</li></ul>										
Unit No			No of Hours								
1	Opera Syster Major Syster Proces UNIX Text H	n Objectives and Fun Achievements, De ns: What is a Pro- ss Control, Execution SVR4 Process Man Book 2: Chapter 2 &	ew, Process description & C nctions, The Evolution of Op evelopments Leading to M cess?, Process States, Proc on of the Operating System, agement 3	ontrol: Operating perating Systems, lodern Operating cess Description, , Security Issues,	10						
2	Thread Multip Manag Opera Text F	ds, SMP, and Micro processing (SMP), gement, Virtual M ting System Softwar Book2: Chapter 4 &	okernel, Processes and Thre Microkernel, Solaris Thr emory: hardware and con e, UNIX and Solaris Memor 8	ads, Symmetric read and SMP ntrol structures, ry Management.	11						
3	Multin Real-T Distril OS, N Text H	processor and Real-T Fime Scheduling, Li buted Operating System fetwork structure, Book 1: Chapter 10 T	Time Scheduling: Multiproce nux Scheduling, UNIX pro- stem: Motivation, Types of Text Book 2: Chapter 16	essor Scheduling, cess Scheduling, f Network-based	10						
4	Distril Remo Synch Concu Reach	buted File system: E te File Access, State ronization: Event O urrency Control, Dea ing agreement	Background, Naming and tra full and Stateless services. ordering, Mutual Exclusion, dlock Handling, Election alg	ansparency, Distributed Atomicity, gorithm and	11						
	1 ext E	sook I: Chapter I / &	7 I X								

Fi	le Man	agemer													
m	anagen	ient, Fi													
Ca	ase Stu	dy: Lin	ux syste	em, De	sign Pr	inciple	es, ker	nel mo	dules,	process	5				
m	anagen	nent, sc	hedulin	ig, men	nory ma	anager	nent, f	ïle sys	tem, ir	iput and	l				
ou	tput, ir	nter pro													
Τe	ext Boo														
Τe	Text book 2: Chapter 12														
NOTE:															
1. Includ	e Self s	study co	mpone	ent in a	ny one	of the	Unit.								
2. Total n	umber	of CO	s is dec	ided by	, conce	rned (	Course	Coord	linator	•					
Course					Desc	riptior	ı					RB	T Levels		
Outcome															
<u>,</u> <u>CO1</u>	Und	derstand the structure and components of OS and their working <b>R1 R2 R3</b>													
COI	mecl	nderstand the structure and components of OS and their working R1 R2 R3 echanism													
		rechanism													
CO2	Ana	Analyze and design the applications to run in parallel using OS <b>R3 R4</b>													
	mod	modules													
CO3	Ana	lyze and	d imple	ment tl	he mec	hanisn	ns invo	olved f	for sha	ring		R2 R4			
	reso	urces in	distrib	uted ar	nd times	sharing	g envii	ronme	nts						
CO4	Con	ceptuali	ize the	compoi	nents in	volve	d in de	signin	g a			R3			
	cont	empora	ry OS												
CO-PO	PO	PO2	PO3	PO4	PO5	<b>P06</b>	PO	PO	PO	PO1	PC	)1	PO12		
Mappin	1						7	8	9	0	1				
g															
CO1	3	2													
CO2	3	3	3		2										
<u> </u>	2	2	2	2	2										
003	3	3	3	2	2										
CO4	3	3	2	2											
Strong -3	M	edium -	2 V	Veak -1					•						
TEXT BO	OKS:														

- 1. Avi Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Concepts, 9<sup>th</sup> Edition, John wiley & Sons, Inc. ISBN: 978-1-118-09375-7, ©2013
- 2. William Stallings, Operating Systems: Internals and Design Principles, 8<sup>th</sup> edition Pearson Education Limited, 2014 ISBN: 1292061944, 9781292061948

#### **REFERENCE BOOKS:**

- 1. D.M Dhamdhere: Operating systems A concept based Approach, 3rd Edition, Tata McGraw- Hill, 2012.
- 2. P.C.P. Bhatt: Introduction to Operating Systems Concepts and Practice, 3rd Edition, PHI, 2010.
- 3. Harvey M Deital: Operating systems, 3rd Edition, Pearson Education, 2011.

#### SELF STUDY REFERENCES/WEBLINKS:

1.	<b>Operating Sys</b>	stem By Prof. Sorav Bansal, IIT Delhi,										
	https://swayam.gov.in/nd1_noc20_cs04/preview											
2.	2. Linux Kernel Programming - IPC b/w Userspace and KernelSpace by udemy											
	<u>https://www.u</u>	Idemy.com/course/netlinksockets/										
3.	Introuction to	Operating Systems from Udemy										
	https://classro	om.udacity.com/courses/ud923/lessons/3056258560/concepts/3306199014										
	<u>0 923</u>											
COUR	SE	Dr. K R Shylaja										
COOR	<b>RDINATOR:</b>											

OVAR INSTITUTION	TUTE OF IFE	Course Title: Advances in Computer Networks										
Ancore Contraction of the second seco		Course Code: 20SCS152	No. of Credits: 3 : 0 : 0 (L-T-P)	Number of lect hours/week : 4	ure							
Aided By Go	THA WELFARE TRU	Exam Duration : 3 hours	$\mathbf{CIE} + \mathbf{SEE} = 50 + 50$	Total Number Contact Hours	of : 52							
Co	urse		Description									
Obje	ctives	1. Discuss wit	h the basics of Computer Ne	tworks.								
		2. Compare va	arious Network architectures.									
		3. Discuss var	ious fundamental network pr	otocols								
		4. Define and	analyze network traffic, Con	gestion Control								
		and Resour	ce Allocation.									
Unit			Svllahus Content		No of							
No			Synabus Content		Hours							
1	<b>Foundation:</b> Building a Network, Requirements, Perspectives, Scalable Connectivity, Cost-Effective Resource sharing, Support for Common Services, Manageability, Protocol layering, Performance, Bandwidth and Latency, Delay X Bandwidth Product, Reliable Transmission, Exercise Problems Stop-and-Wait Protocol, Sliding Window protocol.											
2	<b>Internetworking I:</b> Switching and Bridging, Datagram's, Virtual Circuit Switching, Source Routing, Bridges and LAN Switches, Basic Internetworking (IP), Exercise Problems. What is an Internetwork?, Service Model, Global Addresses, Datagram Forwarding in IP, subnetting and classless addressing, Address Translation (ARP), Host											
3	Inter State	<b>rnetworking- II:</b> Net (OSPF), Metrics, Th	work as a Graph, Distance V e Global Internet, Routing A ms (BGP), IP Version 6 (IPv	ector (RIP), Link reas, Routing 6).	10							
4	End Strea Estal Tran Quer Mult	<b>-to-End Protocols:</b> am(TCP), Endto- E blishment and Termin smission, Adaptive Ro ung, TCP Congestion ciplicative Decrease, S	Simple Demultiplexer (UDI End Issues, Segment Form nation, Sliding Window Rev etransmission, Queuing Disci Control, Additive Increase/ Blow Start, Fast Retransmit ar	P), Reliable Byte mat, Connecting isited, Triggering plines, FIFO, Fair nd Fast Recovery	10							
5	Con	gestion Control and	<b>Resource Allocation</b> Cong	estion-Avoidance	10							
	Mec Con Mail Man	hanisms, DEC bit, Ra gestion Avoidance. T (SMTP, POP, IMAP agement (SNMP)	andom Early Detection (REI he Domain Name System ( , MIME), World Wide Web	D), Source-Based DNS), Electronic (HTTP), Network								
Corr			Description									
Outco S	ome		Description									
C	201	List and classify network services, protocols and architectures, expla										
(	202	Compare various netv	vork architectures									
(	:03	Analyze various Netw	vork protocols and their appli	cations								
	' <u>04</u>	Explain develop effec	tive communication mechani	isms liging technici	165							
		like connection establ	ishment, queuing theory, rece	overy etc.	<b>10</b> 0							

CO5	Defi	ne and	analyze	e netwo	rk traff	ïc, cor	ngestio	on cont	rol and	d resour	ce alloc	cation
CO-PO Mappin g	PO 1	PO2	PO3	PO4	PO5	P06	<b>PO</b> 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	3	2										
CO2	3	2			1							
CO3		3			2							
CO4			3	2	1							
CO5	3	2										
Strong -3	m	edium -	2 v	veak -1								
TEXT BO	OKS:											
1.	Larry 5th E	y Peters Edition,	on and Elsevie	Bruce er -2014	S Davi 4	s "Cor	nputei	r Netw	orks :A	A Syster	n Appro	oach"
2.	Doug Arch	glas E C	Comer, 2" 6th E	"Intern dition,	etwork PHI - 2	ing wi 2014	th TC	P/IP, P	rincip	les, Pro	tocols a	nd
REFEREN	ICE B	OOKS:										
1.	Uyle Editi	ss Blac on -PH	k, "Cor I.	nputer	Netwo	rks Pro	otocols	s , Star	Idards	and Inte	e rfaces <sup>:</sup>	" 2 <sup>nd</sup>
2.	Behr	ouz A l	Forouza	ın, "TC	P/IP P	rotoco	l Suit	e" 4 th	Editio	n – Tat	a McGr	aw-Hill
COURSE COORDINATOR: SHAMSHEKHAR PATIL												

		Course Title: Artificial Intelligence and Prolog Programming									
SOUR INSTITUTION	TUTE OF TROTING	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture h	ours/week :						
Dr. Al	OGY ·	20SCS153	(L-T-P)	4 hrs							
Aided By Go	HA WELFARE THE	Exam Duration : 3 hours	CIE + SEE = 50+50	Total No. of Co Hours : 52	ontact						
Co	urse		Description								
Obje	ctives:	<ol> <li>To understand uncertainty and Problem solving techniques.</li> <li>To understand various symbolic knowledge representation to specify domains and reasoning tasks of a situated software agent.</li> <li>To understand different logical systems for inference over formal domain representations, and trace how a particular inference algorithm works on a given problem specification.</li> <li>To understand how to write a Prolog programs for Artificial Intelligence</li> </ol>									
	6. Analyzing and Solving Artificial Intelligence programs by usi Backtracking methods										
Unit No				No of Hours							
1	What assum for such the price charac search Intelli enviro Text F	The Underlying ne model, Criteria search: Defining, ystems, Problem as in the design of ne nature of Chapter 1 & 2	10								
2	Heuri search Know Appro repres simple Comp	limbing, Best-first ean-ends analysis. and mappings, s in knowledge ogic: Representing ISA relationships,	10								
3	Symbol reason Bread Theor Text	o non-monotonic mentation Issues, ility and bayes yesian Networks	10								
		Book 1. Chapter / & 6 Text Book 2. Chapter 15									

4         P.           A         P.           qq         M           qq         M           m         an           5         L           Ii         P.           al         T           ba         an           (1         S           In         re	rolog Pr in exam rogram uestions feaning neaning nd banar rolog ar fext Boo ists, Op rograms bstractic he eigh acktrack nd negat rext Boo elf-Stuc polemen easoning	rogramm ple proj by rule , Decla of Proj of Proj na, Ordend logic ok 3: Cl erators, perator s, Retrie on, Simm nt quee king, Ex- tion, Inj ok 3: Cl <b>ly Com</b> nt progr	ming for gram: c es, A f rative a olog P log pro- er of cla hapters Arithn notati eving st ulating ens pro- camples put and hapter f hapter f amples	or Artifi defining recursiv and pro Programs, auses and auses ause	icial Int g family ve rule cedural ns, Dat Procee nd goal cepreser rithmet d infor determi cut, Ne t, Com & 6) buildin	relliger defin defin mean a obj dural s, Ren ntatior is, Ren ntatior ic, U matior inistic olling gation munic	nce, A ions, F ition, ing of ects, J meanin narks of of list sing from autom , Bacl as fail ation v	n Over Extendi How progra Matchi ng, Ex on the r ts, Son Strucl a datab aton, T ktracki ure, Pr with fil	view of ing the Prolog ams; S ing D ample relation ne oper ures: base, D Fravel ng, P oblem es.	of Prolo e examp g answe yntax an eclarativ : monko n betwee rations o Examp Doing da plannin reventin s with c	g, le rs nd ve ey en n le ta g, ng ut	11	
NOTE: 1. Includ	le Self s	tudy co	ompone	ent in a	ny one	of the	Unit.						
2. Total	number	of CO	s is dec	ided by	conce	rned (	Course	Coord	inator				
Course					Desc	riptio	1					RB	T Levels
CO	l Acqu solvi abilit	Acquire knowledge and understand AI agents with problem solving, reasoning, planning, decision making, and learning abilities											
CO2	2 Anal	Analyze the real time problems to represent it in AI framework											
	and t	and techniques											
	Use ]	Design and implement AI applications in prolog to solve real time											
	prob	gn and : lems	mpiem	ient Al	applica	auons	m proi		sorve r	ear time	;		
	r-00												
CO-PO Mappin g	PO 1	PO         PO2         PO3         PO4         PO5         P06         PO         PO         PO1         PO1										)1	PO12

CO1	3	3	2								2
CO2	3	3	3	2							3
CO3	3	3	3	3	3						3
CO4	3	3	3	3	3	3					3
Strong -3	M	edium -	2	Weak -	1	I	1	1	1	1	 1

**TEXT BOOKS:** 

1. Elaine Rich, Kevin Knight, Shivashanka B Nair: Artificial Intelligence, Tata CGraw Hill 3rd edition. 2013, ISBN 10: 0070087709 ISBN 13: 9780070087705

2. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, Pearson 3rd edition 2013, ISBN: 0-13-604259-7

3. Ivan Bratko Prolog Programming for Artificial Intelligence , (International Computer Science Series) 4th Edition, Publisher: Pearson Education Canada; 4th edition, 2011, ISBN-10: 0321417461; ISBN-13: 978-0321417466

#### **REFERENCE BOOKS:**

 Nils J. Nilsson: "Principles of Artificial Intelligence", Elsevier, ISBN-13: 9780934613101

#### SELF STUDY REFERENCES/WEBLINKS:

- 1. An Introduction to Artificial Intelligence By Prof. Mausam , IIT Delhi https://swayam.gov.in/nd1\_noc20\_cs42/preview
- W3schools online tutorials <u>https://www.tutorialspoint.com/prolog\_in\_artificial\_intelligence/index.asp</u>
   <u>https://lpn.swi-prolog.org/lpnpage.php?pageid=online</u>

COURSE COORDINATOR:

Dr. K R Shylaja

		Course Title: Parallel Computing with GPU architecture.										
SOLAR INSTI	TUTE OF IE GE	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture h	ours/week							
a · Dr. AM	STORA -	20SCS154	(L-T-P)	: 4								
Aided By Go	23 5 THE FARE TRUE	Exam Duration : 3 hours	CIE + SEE = 50+50	50 Total No. of Co Hours : 52								
Co	urse		Description									
Obje	ctives:	<ol> <li>Understand the ne</li> <li>Decomposition str</li> <li>Knowledge about</li> <li>Study applications</li> <li>Understanding the</li> </ol>	ed of parallel algorithms. rategies of problem. the measure the performance of of parallel computing. programming with MPI, OpenN	parallel algorithm. 1P.								
Unit No			Syllabus Content		No of Hours							
1.	Introduction to Parallel Computing: Implicit Parallelism, Limitations of Memory, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs in Parallel Machines, Routing Mechanisms for Interconnection Networks, Impact of Process-Processor Mapping and Mapping Techniques											
2.	Desig Mapp Overh to-All Reduc	ing the Happing Teen ing Techniques for Lo heads, Parallel Algorith Broadcast and All-to- ction, All-Reduce and I	iniques: Characteristics of Tasks ad Balancing, Methods for Cont m Models Basic Communication One Reduction, All-to-All Broad Prefix-Sum Operations, Scatter a	s and Interactions, taining Interaction of Operations One- cast and of Gather.	10							
3.	Perfor Mapp metric minin	rmance Metrics for par ing on Performance. 7 c of scalability, sources num cost-optimal exect	callel systems. The effect of Gra The Scalability of parallel system of parallel overhead, Minimum ention time.	nularity and Data ems, Isoefficiency execution time and	10							
4.	Dense Multi Netwo	e Matrix Algorithms: M plication, Solving a Sys orks, Bubble Sort and i	latrix-Vector Multiplication, Ma stem of Linear Equations Sorting ts Variants, Ouicksort, Bucket ar	trix-Matrix : Issues, Sorting ad Sample Sort.	10							
5.	Networks, Bubble Sort and its Variants, Quicksort, Bucket and Sample Sort.Self Study Components:OpenMP, MPI, CUDA/OpenCL, Chapel, etc. Thread basics, Work Sharing constructs, Scheduling, Reduction, Mutual Exclusion Synchronization & Barriers, The MPI Programming Model, MPI Basics, Global Operations, Asynchronous Communication, Modularity, Other MPI Features Basic of GPGPU, CUDA Programming model, CUDA memory type Performance Issues.											
Сош	rse		Description									
Outco	ome		Description									
s C	201 8	Students are able to des	thm design.									
0	<b>CO2</b> S	Students are able to ana nodels for shared- and	lyze analytical modeling of paral distributed-memory systems.	llel programs, progr	amming							
0	CO3 8	Students are able to ana	lyze performance evaluation of I	Prallel algorithms.								
0	Students are able to design parallel algorithms for matrix, graph and sorting operations.											

CO5	Stude	ents are	able to	explore	how to	use a C	SPU as	a gene	ral pro	ceesing	device.	
CO-PO Mappin g	PO 1	PO2	PO3	PO4	PO5	P06	<b>PO</b> 7	PO 8	PO 9	PO1 0	PO1 1	PO1
C01	3	3	2	2	2	-	-	-	-	-	-	-
CO2	3	3	3	2	2	-	-	-	-	-	-	-
CO3	3	3	3	3	2	-	-	-	-	-	-	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-
CO5	3	3	3	2	2	-	-	-	-	-	-	-
Strong -3 medium -2 weak -1												
TEXT BO	TEXT BOOKS:											
2. High Per Buyya Raij 3. CUDA H <b>REFEREN</b> 1. Intr wel f	<ul> <li>and Vipin Kumar.</li> <li>2. High Performance Cluster Computing: Programming and Applications, Volume 2 By Buyya Raijkumar.</li> <li>3. CUDA Programming: A Developer's Guide to Parallel Computing with GPUs by shane cook.</li> <li><b>REFERENCE BOOKS:</b> <ol> <li>Introduction to High-Performance Scientific Computing, Victor Eijkhout, 2011. http://taccweb.austin.utexas.edu/staff/home/veijkhout/public_html/Articles/EijkhoutIntroToHPC.pd</li> </ol> </li> </ul>											
2. High	o://cnx	ormanc .org/cor	tent/col	uung, C 11136/1	latest/	Severar	ice, 19	98.				
3. MF Wa and	I: The lker, Jack	Compl	ete Refe a, 1996	rence, N . <u>http://v</u>	Marc Sn	ir, Stev tlib.org	ve Otto g/utk/p	o, Steve	n Huss n <u>pi-boc</u>	-Lederm	an, Dav	id <u>1</u>
<ol> <li>MPI: The Complete Reference, Marc Snir, Steve Otto, Steven Huss-Lederman, David Walker, and Jack Dongarra, 1996. <u>http://www.netlib.org/utk/papers/mpi-book/mpi-book.html</u></li> </ol>												
5. Designing and Building Parallel Programs, Ian Foster, 1995. http://www.mcs.anl.gov/~itf/dbpp/												
6. Par	allel P	rogram	ning in	C with	MPI and	d Open	MP, M	lichael	J. Quir	n, McG	raw-Hill	•
COURSE COORDIN	COURSE Dr. Prabha R COORDINATOR:											

		Course Title: Intr	oduction to Blockchain Tech	nology					
OUR INSTI	TUTE OF TRCL	<b>Course Code:</b>	No. of Credits: 3 : 0 : 0	No. of lecture h	ours/week :				
· Dr. AMBE	NOLOGY -	20SCS161	(L-T-P)	4					
Aided By Go	THA WELFARE TRUE	Exam Duration : 3 hours	CIE + SEE = 50+50	Total No. of Co Hours : 52	Contact				
Co	urse		Description						
Obje	ctives:	1 To learn fur	adamentals of Blockchain Tec	hnology					
		2. To apply th	e cryptographic primitives in 1	making the Block	chain model				
		robust.		C					
		3. To be famil	iar with Consensus Algorithm						
		4. To learn and	d apply concept of Decentraliz	zed in real life app	olications.				
<b>T</b> T •/	1				NT O				
Unit No			Syllabus Content		No of Hours				
1	Intro	duction to Blockcha	in		11				
	What	is Blockchain, Real	ity about Blockchain and He	ow Block chain					
	works	, Blockchain Arch	itecture and Platforms(BigC	hainDB, corda,					
	Etheru	im etc.), Digital I	edger Technology, Peer-to	-Peer Network,					
	Centra Block	alized, Decentralize	a and Distributed Networ	Ks, Layers of					
	Block	chain Transaction I	Permission less and Permissio	ned Blockchain					
	Consc	rtium Blockchain. T	he Chain and the Longest Cha	in. Distributed					
	Conse	nsus, Byzantine Fau	lt Tolerant Consensus Method	ls					
2	Crypt	to Primitives			10				
	Crypt	t <b>ographic</b> Hash Fu	nction, Properties of a hash	function, Hash					
	pointe	r and Merkle tree, D	igital Signature, Public Key (	Cryptography, A					
	basic	cryptocurrency.							
	Bitcoi	<b>n:</b> Creation of coins,	Payments and double spendin	ig, FORTH – the					
	precui	sor for Bitcoin scrip	pting, Bitcoin Scripts, Bitcoin	n P2P Network,					
	block	relav	twork, block winning, block	propagation and					
3	Minin	g and Consensus			10				
5	Why (	Consensus, Distribute	ed consensus in open environm	ents. Consensus	10				
	in a B	PoW, Attacks on							
	PoW	and the monopoly p	roblem, Proof of Stake (POS	), Round Robin					
	Conse	ensus Algorithm, Pro	of of Authority, Proof of Burn	(POB), Proof of					
	Elapse	ed Time, Consensus	Comparison Matrix, Ledger C	conflicts and					
	resolu	tion.			10				
4	Priva	cy, Security Issues i	n Blockchain	CNIADUC L	10				
	Pseud	o-anonymity vs.	anonymity, Zeash and Zk	as Subil attacks					
	selfist	mining 51% attack	sadvent of algorand and S	as syon anacks,					
	consensus algorithms to prevent these attcks.								

5 8	Self	-Stuc	ly Con	ponen	t							11		
	DE	CEN	FRALI	ZED A	PPL I	САТІС	)NS (I		S)					
	Арг	olicat	ions - A	Applica	tions o	of Block	chain	in He	ealthca	re, ego	vernanc	ce,		
8	ano	maly	detection	ons, use	e cases	, trends	on bl	ockcha	ains, se	erverle	ss block	κs,		
S	scal	abilit	y issues	s, block	chain o	on clou	ds.							
1	nyp	erled	<b>ger</b> – 1	Fabric	archite	cture, i	mplen	nentati	on, ne	tworki	ng, fab	ric		
t	ran	sactic	ons, der	nonstra	tion, sr	nart co	ntracts							
Course						Desc	rintio	<u> </u>				R	RT Levels	
Outcom	ie					Dese	- puoi	•						
s CO	1	A	uira tha	basiak	mowlo	dag of I	Ploake	hoin t	achnol	ogu		T	112	
	1	Acqu	ine me			ige of i	DIOCK	IIaIII U	ecimor	ogy			L,L/2	
CO	2	Appl	Apply the cryptographic primitives in making the Blockchain											
	2	mode	el robus	st.	inina -	nd Car	anner	0100	ithma	uned in		<u>т</u>	1	
	5	Allar	yze val kchain	ious m	nnng a	nu Con	sensus	argor	iuiiiis	useu II	1		•	
CO	94	Awa	re abou		L2									
CO	)5	Desi	Design and understand various applications using Blockchain.										L5	
CO-PO	)	PO	PO2	PO3	PO4	PO5	P06	PO	PO	PO	PO1	PO1	PO12	
Mappir	1	1						7	8	9	0	1		
g														
CO	01	3		1		1	1							
CO	2	2	1	1	1	1	1							
CO	)3	2	2	2	1	1	1							
CO	94	1	2	1	1	1	1							
CO	95	1	2	2	2	3	1							
Strong -	3	Me	dium -	2 V	Veak -1	-	1	1		1		1		
TEXT E	800	OKS:												
1	Arv	vind N	Jarayan	an, "Bi	tcoin a	nd Cry	ptocur	rency	Techr	nologie	es: A Co	mprehe	ensive	
]	Intr	oduct	tion", P	rinceto	n Univ	ersity P	ress,Ju	ıly 19	, 2016					
2. '	"S.	Shuk	la, M. I	Dhawar	1, S. Sh	arma, S	S. Ven	katesa	n, 'Blo	ockcha	in Tech	nology	:	
REFER	Cry FN	ptocu	Irrency	and Ap	plicati	ons', O	xford	Unive	rsity P	ress, 2	019.			
1.	And	dreas	M. Ant	onopou	ilos. M	astering	g Bitco	oin, O'	Reilly	, 2014				
2. Melanie Swa, Blockchain: Blueprint for a new Economy, O'Reilly, 2015														
3. Antony Lewis, The Basics of Bitcoin and Blockchain.														
4. 1	Bik	rama	ditya Si	inghal,	Gautan	n Dhan	neja, P	riyans	u Sekł	nar Par	ıda, Beg	inning		
]	Blo	ckcha	ain-A B	leginne	r's Gui	de to B	uildin	g Bloc	kchair	n Solut	ions, Al	Press, 2	018	
SELF S	SELF STUDY REFERENCES/WEBLINKS:													

Imran Bashir, Mastering Blockchain, Packt Publishing, Birmingham, UK 2016
 https://swayam.gov.in/ndl\_noc19\_cs63/preview

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	inteps://s/raju					
2.	https://swava	m.gov.in/ndl	nocia	cs6.3/preview		

COURSE COORDINATOR:	Dr. SIDDARAJU
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	Course Title: Advance Algorithms and Data Structure							
SOUR INSTITUTION	TUTE OF TECHNO	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture h	ours/week :			
DI-AN	OGY · · ·	20SCS162	(L-T-P)	04				
And HOTA PEE	HA WELFARE TRO	Exam Duration : 3 hours	CIE + SEE = 50+50	Total No. of Co Hours : 52	Total No. of Contact Hours : 52			
Co	urse		Description					
Obje	ctives:	1. To learn impler	nenting iterative and recursiv	e optimized soluti	ons			
		2. To learn the gra	aph search algorithms.					
		3. To study netwo	rk flow problems.					
		4. To study the wo	orking mechanism of advance	d data structures				
		5. To understand t	the application of hashing tech	nnique				
Unit No			No of Hours					
1	1 <b>Review of Analysis Techniques:</b> Growth of Functions: Asymptotic notations; Standard notations and common functions; Recurrences and Solution of Recurrence equations- The Course substitution method, The recurrence – tree method, The master method; Amortized Analysis:							
2	Grap paths and F	<b>h Algorithms:</b> Belln in a DAG; Johnson's ord-Fulkerson metho	nan - Ford Algorithm; Single s Algorithm for sparse graphs od; Maximum bipartite matchi	source shortest ; Flow networks ng.	10			
3	Hash addre Build heaps	<b>Tables</b> , Direct-addr ssing, Perfect hashi ing a heap, The he s, Fibonacci heaps.	ess tables, Hash tables, Hash ing, Heaps Maintaining the apsort algorithm, Priority q	functions, Open heap property, ueues, Binomial	10			
4	Binar search Red-I Delet	erying a binary ry search trees, ons, Insertion	11					
5	5 Application to Splay Trees. External Memory ADT - B-Trees. Priority Queues, B-Trees, Definition of B-trees, Basic operations on B- trees, Deleting a key from a B-tree, Structure of Fibonacci heaps,							
NOTI 1. Inc	E: clude So	elf study component	in any one of the Unit.	lington	L			
2. 101	rse	ider of CUs is decide	a by concerned Course Coord Description	unator	RBT Levels			
Outco	ome		2 contraction					
C	CO1 A	Analyze and solve the graph based algorithm	, recursive and	R2,R3,R4				

CO2	Interp mecha	oret the anism	e logic a of data	and det	ermine ires for	the su a real	itable -time a	operat applica	tional ations			R2,F	R3,R4
CO3	Invest	tigate a	and An	alyze tl	he opti	mized	operat	tions o	n data	structur	es	<b>R4</b>	
CO4	Imple	ment p	projects	s using	best su	itable	data s	tructur	es for	real		R5	
	time a	applica	tions u	ising m	odern p	orograi	nming	g tool/s	simula	tion.			
<b>GO DO</b>	DO	DOA	DOA	DO 4	<b>DO5</b>	DOC	DO	DO	DO	DO1		4	0010
CO-PO	РО 1	PO2	PO3	PO4	P05	P06	PO 7	PO 8	PO 9	PO1 0	PO   1		PO12
Mappin								0		0	_		
g CO1	3	3	3										
	5	0	5										
CO2	3	3	3	2	2								
C03	3	3	3	3	3								3
	•		•		5								<u> </u>
CO4	3	3	3	3	3							•	3
Strong -3	Mee	dium -	2	Neak -1	L								
TEXT BO	OKS:	~ -					. ~ ~						
1. T. H	I Corm	en, C l	E Leise	erson, R	L Riv	est and	l C Ste	ein: Int	troduct	tion to A	Algor	ithm	s, 3rd
Ed	ition, P	rentice	e-Hall (	of India	a, 2010.	. ISBN	:9780	26203	3848				
REFEREN	ICE BC	OOKS:											
1. Ell	is Hore	owitz, i	SartajS	ahni, S	.Rajase	khara	1: Fun	damen	$\frac{1}{2}$ of $\frac{1}{2}$	Compu	$\frac{126}{6126}$	lgor	ithms,
2no 2. Ho	a Eanne rowitz	on, On Sahar	iversiti 1 Dine	es pres esh Mei	s, 2007 hata —	, ISBN -Funds	n 8173 amenta	0/1012 als of 1	9,978 Data Si	81/3/1 tructure	0120 s in (	]++∥	
Ga	lgotia I	Publisł	ner, ISE	3N: 817	751527	88, 97	88175	15278	6.			, , ,	
<b>3.</b> M	Folk, E	8 Zoell	ick, G.	Riccar	di, —F	ile Str	ucture	es∥, Pea	arson E	ducatio	n, IS	BN:8	31-
77: 4 Det	58- 37-	5	duana	ad Date	Strat	Jurgel	Comb	ridaa I	Inivor	aity Dra		DNI.	078 1
<b>4.</b> Per 10'	ter Бras 7- 4398	ss, — <i>F</i> 32-5	Auvanc	ed Data	i Struci	ures,	Camo	ridge (	Jniver	sity Pres	55, 15	DIN:	9/8-1-
	,,												
SELF STU	DY RE	FERE	ENCES/	WEBL	INKS:								
1. Int	roducti	ion to a	algorith	ims and	l analys	sis By I	Prof. S	ourav	Mukh	opadhya	y   II	Т	
Miaragpur https://swavam.gov.in/nd1_noc20_cs93/preview													
2. Khan Academy course on advanced algorithms and data structure													
COURSE			r. K R	Shylais	<u>1</u>								
COORDIN	NATOR	k:   1		~	-								

	Course Title: Course Title : Cyber Security and Cyber laws								
STAR INST	TUTE OF ILCOM	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture h	ours/week				
• Dr. AMB	OLOGY -	20SCS163	(L-T-P)	: 4					
Aided By Go	The Welf-Fare Table	Exam Duration : 3 hours	CIE + SEE = 50+50	Total No. of Co Hours : 52	ntact				
Co	urse		Description						
Obje	ctives:	1. To provide an ur	derstanding Computer forens	ics fundamentals					
		2. To analyze vario	ous computer forensics techno	logies					
		3. To provide com	outer forensics systems	0					
		4. To identify meth							
		5. To apply the me							
Unit No	Syllabus Content								
1.	Comp	outer Forensics Fun	damentals		10				
	Introd	luction to Computer	Forensics, Use of Computer I	Forensics in Law					
	Enfor	cement, Compute	r Forensics Assistance	to Human					
	Resou	irces/Employment I	Proceedings, Computer For	ensics Services,					
	Dener	enemis of Professional Forensics Methodology.							
2.	Types Types Enford Comp Hidde Encry Comp Techn	s of Computer Fore of Military Comp cement: Computer uter Forensic Tech n Data and How to H ption Methods and romised, Internet ologies ,Avoiding P	nsics Technology puter Forensic Technology, Forensic Technology, Typ mology, Specialized Forens Find It, Spyware and Adware. Vulnerabilities, Protecting I Tracing Methods ,Security itfalls with Firewalls,Biometr	Types of Law es of Business ics Techniques, Data from Being and Wireless ic Security	11				
2	Syster	ns. <b></b>	nging Swatoma		11				
5.	Types of Computer Forensics SystemsInternet Security Systems, Intrusion Detection Systems, FirewallSecurity Systems, Storage Area Network Security Systems, NetworkDisaster Recovery Systems, Public Key Infrastructure Systems, WirelessNetwork Security Systems.Satellite Encryption Security Systems, Instant Messaging (IM) Security								
	.Identi	ity Theft . Biometric	Security Systems, Homeland	Security Systems					
4.	Data Recovery								
	Data Recovery Defined ,Data Backup and Recovery ,The Role of Backup in Data Recovery ,The Data-Recovery Solution ,Hiding and Recovering Hidden Data Self Study component:								
	Self S	tudy component:	D-4- C-						
		Collection and	Data Seizure						
	Why Evide	Collect Evidence?,	, Collection Options ,Obsta	acies , Types of					
		tion and Archiving	Methods of Collection Artef	acts					
5.	Self st	tudy component:			10				
	Dupli	cation and Preserva	ation of Digital Evidence						
l			0						

Pre	reserving the Digital Crime Scene, Computer Evidence Processing Step.											
Co	omputer Image Verification and Authentication Special Needs of											
Evidential Authentication, Practical Considerations.												
Course	Description											
Outcome	2 coordinates											
S												
CO1	To explore the definition of computer forensics fundamentals.											
CO2	Describe the types of computer forensics technology											
CO3	Analyze various computer forensics systems											
CO4	Illustrate the methods for data recovery, evidence collection and data seizure.											
CO5	Summarize duplication and preservation of digital evidence.											
CO-PO	PO	PO2	PO3	PO4	PO5	P06	PO	PO	PO	PO1	PO1	PO1
Mappin	1						7	8	9	0	1	12
g												
CO1	3	3	3	3	3	-	-	-	-	-	-	-
CO2	3	3	2	3	3	-	-	-	-	-	-	-
003												
CO3	3	3	3	3	5	-	-	-	-	-	-	

#### **TEXT BOOKS:**

**CO4** 

**CO5** 

3

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1. John R. Vacca, Computer Forensics: Computer Crime Scene Investigation, 2nd Edition, Charles, River Media, 2005 ISBN-13: 978-1584503897.

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#### **REFERENCE BOOKS:**

#### **REFERENCE BOOKS/WEBLINKS:**

3

2

3

3

2

3

3

2

1. ChristofPaar, Jan Pelzl, Understanding Cryptography: A Textbook for Students and Practitioners, 2nd Edition, Springer's, 2010ISBN 978-3-642-04101-3

2. Ali Jahangiri, Live Hacking: The Ultimate Guide to Hacking Techniques & Countermeasures forEthical Hackers & IT Security Experts, Ali Jahangiri, 2009ISBN-13: 978-0984271504

3. Computer Forensics: Investigating Network Intrusions and Cyber Crime (Ec-Council Press Series:Computer Forensics), 2010ISBN-13: 978-1435483521

COURSE	Dr. Prabha R							
<b>COORDINATOR:</b>								
		Course Title: Wir	eless and Mobile Computin	ng				
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BURY INSTITUTION	TE OF IL OTHOLOGY -	Course Code: 20SCS164	No. of Credits: 3 : 0 : 0 (L-T-P)	No. of lecture he	ours/week			
Aided By Gor	HA WELFARE TRU	Exam Duration : 3 hours	CIE + SEE = 50+50	Total No. of Co Hours : 52	ntact			
Co	urse		Description					
Obje	ctives:	<ul> <li>Course objectives:</li> <li>1. To introduce the concepts of wireless communication</li> <li>2. To understand CDMA, GSM, Mobile IP, WImax.</li> <li>3. To understand Different Mobile OS.</li> <li>4. To learn various Markup Languages and CDC, CLDC, MIDP Programming for CLDC, MIDlet model and security concerns.</li> </ul>						
Unit No	Unit Syllabus Content No							
1.	Mobil tier An Netwo Servic GSM, in GS to SM bearen Archin	Mobile Computing Architecture: Architecture for Mobile Computing, 3- tier Architecture, Design Considerations for Mobile Computing. Wireless Networks : Global Systems for Mobile Communication (GSM and Short Service Messages (SMS): GSM Architecture, Entities, Call routing in GSM, PLMN Interface, GSM Addresses and Identities, Network Aspects in GSM, Mobility Management, GSM Frequency allocation. Introduction to SMS, SMS Architecture, SM MT, SM MO, SMS as Information bearer, applications, GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Billing and Charging in GPRS						
2.	Mobil Mobil applic Regist	le Client: Moving le phones and the ations for handheld tration, Tunneling, C	beyond desktop, Mobile h eir features, PDA, Design devices. Mobile IP: Introduc Cellular IP.	andset overview, n Constraints in tion, discovery,	10			
3.	Registration, Tunneling, Cellular IP.         Self study component:         Mobile OS and Computing Environment: Smart Client Architecture, The         Client: User Interface, Data Storage, Performance, Data Synchronization,         Messaging. The Server: Data Synchronization, Enterprise Data Source,         Messaging. Mobile Operating Systems: WinCE, Palm OS, Symbian OS,         Linux and Proprietery OS							
4.	Buildi client, Wirele Marku Voice	ing, Mobile Internet, Middleware, messa ess Applications Pro up Languages, HDM XML	Applications: Thin client: aging Servers, Processing a btocol (WAP) Overview, Wi L, WML, HTML, cHTML,	Architecture, the Wireless request, reless Languages: XHTML,	11			
5.	<ul> <li>J2ME: Introduction, CDC, CLDC, MIDP; Programming for CLDC,</li> <li>MIDlet model, Provisioning, MIDlet lifecycle, Creating new application,</li> <li>MIDlet event handling, GUI in MIDP, Low level GUI Components,</li> <li>Multimedia APIs; Communication in MIDP, Security Considerations in</li> <li>MIDP.</li> </ul>							

Course Outcome s						Desc	riptior	1				
CO1	To V	Vork o	n state c	of art te	chnique	es in w	vireles	s com	nunica	tion.		
CO2	Expl	ore CI	DMA, G	SM, M	lobile I	P, WiN	Aax.					
CO3	Expl	Explore on Different Mobile OS, Develop program for CLDC, MIDP let										
	mod	model and security concerns.										
COA	Tob	uild M	obilo A	nnligat	iona							
C04 C05	Tob	uild an	oblicatio	ns usin	g J2MI	E techi	nology	/.				
			<u>r</u>		0		01					
СО-РО	PO	PO2	PO3	PO4	PO5	P06	PO	PO	PO	PO1	PO1	PO1
Mappin	1						7	8	9	0	1	2
g CO1	3	3	3	3	3		_	_	_	-	_	
	0	5	5	5	5							
CO2	3	3	2	2	2	-	-	-	-	-	-	-
CO3	3	3	3	2	3	-	-	-	-	-	-	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-
Strong -3	me	edium -	2 v	veak -1								
TEXT BO	OKS:											
1.	Asho	ok Tal	lukder,	Roop	a Yav	agal,	Hasa	n Ah	med:	Mobile	e Com	puting,
	Tech	nology iontion	, a and <b>C</b>	omico (	Tractic	n Ind	Editio	n Tot	o MoC	more Ui	11 2010	
2	Mar	tvn Ma	S anu S Ilik∙ Ma	obile ar	d Wire	il, Zilu Jess D	esign	лі, таі Esseni	tials W	Viley In	dia 2010	13
<i>2</i> .	Martyn Mailik: Mobile and Wireless Design Essentials, Wiley India, 2003.											
REFEREN	INCE BOOKS:											
1. Raj kan	nal: M	obile C	Computi	ng, Ox	ford Ur	niversi	ty Pre	ss, 200	)7.			
2. Iti Saha	2. Iti Saha Misra: Wireless Communications and Networks, 3G and Beyond, Tata McGraw											
Hill, 2009												
COURSE COORDIN	COURSE DR. Prabha R COORDINATOR:											

## **SEMESTER-2**

Dr. Ambedkar Institute of Technology



# M.TECH Computer Science & Engineering 2021-2022

		Course Title: Big	Data					
NUR INST	TUTE OF TRE	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture				
· Dr. AMBE	MOLOGY -	20SCS21	(L-T-P)	hours/week: 4				
Aided By G	THA WELFARE 1800	Exam Duration : 3 hours	CIE + SEE = 50+50	Total No. of Co Hours: 52	ntact			
	urso		Description					
Obje	ctives	1 To Understand	big data for huginaga intelliga	200				
:		2. To Learn busin	ess case studies for big data a	nce. nalytics.				
		<ol> <li>To Understand</li> <li>To understand 1</li> </ol>	NoSQL big data management nap-reduce analytics using Ha	adoop and related	tools.			
			1 7 0	1				
Unit No	Unit Syllabus Content No							
1.	Unde	rstanding Big Data	a: What is big data – why b	oig data – Data!,	10			
	Data S	Storage and Analysi	s, convergence of key trends	unstructured data				
	– 1na marke	ustry examples of ting – fraud and h	ig data – web analytics	- big data and $-$ big data and				
	health	icare – big data in r	nedicine – advertising and bi	g data – big data				
	techno	ologies, Big Data Sta	ck,Case study:weather data a	nalysis.				
2.	2. NoSQL Data Management: Introduction to NoSQL – aggregate data							
	mode	ationships – graph databases – schema less databases – materialized						
	views	– distribution mode	ls – sharding — version – Ma	p reduce –				
	partiti	oning and combining	g – composing map-reduce ca	lculations.				
3.	Basic	sics Of Hadoop: Data format – analysing data with Hadoop – scaling						
	out –	- Hadoop streaming– Hadoop pipes – design of Hadoop distributed						
	Hadoo	stem (HDFS) – HDFS concepts – Java interface – data flow – op I/O – data integrity – compression – serialization – Avro – file-						
	based	data structures.	J					
4.	MapH	Reduce Application	s: MapReduce workflows -	- unit tests with	10			
		nit – test data and l c Map-reduce – Y	ocal tests – anatomy of Mapl ARN – failures in classic	Reduce job run – MapReduce and				
	– job	scheduling – shuffle	and sort – task execution – M	IapReduce types				
	– inpu	it formats – output fo	ormats.					
5.	Self S	tudy component	YYI 1. 11 1.	1	11			
		op Related Tools:	Hbase – data model and in	plementations –				
	mode	– cassandra examr	oles – cassandra clients – Ha	doop integration.				
	Pig –	Grunt – pig data m	odel – Pig Latin – developing	g and testing Pig				
	Latin scripts. Hive – data types and file formats – HiveQL data							
	definition							
	manipulation commands for the following problem							
	Consi	der an example of a	Toy company selling Jigsaws	s. Consider a text				
	file n	amed jigsaw_puszzl	e_info.txt in /home/user dire	ector. The file is				
	text fi	eld with four fields:	Toy-category,toy-id,toy-name	e and Prize in US				
	p as 10 Puzzle	e Garden 10725 fan	tasy 1 35					
	Puzzle-Jungle 31047 animals 2.85							

Puz Ho	Puzzle-School 81049 Nursery 4.45 How will you use (i) LOAD (insert) (ii) ALTER (iii) DROP commands?											
Course Outcom						Desc	ription	L				
CO1	Anal doma	yze ar ains, H	nd interp Iealth C	oret big are, Fra	data an aud Det	nd few ection	of its and A	use ca dverti	ses fro sing.	m selec	ted busi	iness
CO2	Analyze and apply NoSQL in big data.											
CO3	Appl	y map	-reduce	analyt	ics usin	g Had	oop.					
CO4	Anal	yze ar	nd devel	op app	lication	s using	g Hado	oop an	d its re	elated to	ols.	
CO5	Use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data Analytics											
CO-PO Mappin σ	PO 1	PO         PO2         PO3         PO4         PO5         P06         PO7         PO         PO         PO1         PO1         PO1           1         1         2         1         2         1         2         1         1         2										
CO1	3	3	2	2	2	-	-	-	-	-	-	-
CO2	3	3	3	3	3	-	-	-	-	-	-	-
CO3	3	3	3	3	3	-	-	-	-	-	-	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-
Strong -3	me	edium	-2 v	veak -1								
TEXT BO	OKS:											
1. Ar	shdeep	o Bahg	ga and V	'ijay M	adisetti	Big, '	'Data A	Analyt	ics: A	Hands-	On	
Ар	proac	h", 20	19,ISBN	J: 978-	1-9499′	78-00-	1.					
2. To	m Wh	ite, "H	ladoop:	The De	efinitive	Guid	e", Thi	ird Edi	tion, (	D'Reille	y, 2012	
<b>3</b> . Alt	an Gai	les, P	rogramr	ning Pi	Ig <sup>.,</sup> , O'R	lenney	, 2011.					
REFERE	NCE	BOOI	KS:									
1. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging												
World of Polyglot Persistence", Copyright © 2013 Pearson Education, Inc. 2012.												
COURSE Dr. Prabha R COORDINATOR:												

Solu R MST	TUTE OF TROUT	Course Title: Adv	anced Database Managemer	nt Systems					
Allow Allo	OGY - COME	Course Code: 20SCS22	No. of Credits: 3 : 0 : 0 (L-T-P)	Number of lectur hours/week: 4	·e				
Aided By G	iovt. of Karnataka	Exam Duration : 3 hours	CIE + SEE = 50+50	Total Number of Contact Hours: 5	52				
Co	urse		Description						
Obje	ctives	1. Design and implement advanced queries using Structured Ouerv							
:		Language							
		2. To study the usage and applications of Object Oriented database							
		3. To acquire knowledge on variety of NoSQL databases 4. To attain inquisitive attitude towards research topics in NoSQL							
		4. To attain inquisitive attitude towards research topics in NoSQL databases							
Unit			Svllabus Content		No of				
No		Synabus Content							
1 Data		ase System Conce	nts and Architecture: Data	Models Schemes	11				
-	and I	nstances, Three-Sch	ema Architecture and Data I	ndependence, The					
	Relat	ional Data Mode	el and Relational Databa	ase Constraints:					
	Relati	onal Model Concepts, Relational Model Constraints and Relational							
	Datab	ase Schemas, Upda	te Operations, Transactions	and Dealing with					
2	Constraints Violations. Basic Queries and Commands in SQL.								
2	PL/SU Iterati	ve Processing with	Loops String Datatypes Wor	equential Control,	11				
	Speci	fving String Co	onstants. Using Nonprint	able Characters.					
	Conca	atenating Strings,	Dealing with Case, Tradi	tional Searching,					
	Extrac	cting, and Replacing, Date time Datatypes, Getting the Current Date							
	and T	ime, Date time Conversions, From Strings to Date times, From Date							
2	times	to Strings.	Not Just/No SOL (NoSOL)	Databagag Variatu	10				
3	of No	SOL Databases D	not just/no SQL (noSQL) Data Management with Distr	buted Databases	10				
	ACID	) and BASE Four Types of NoSOL Databases Introduction to							
	Key-V	Value Databases: F	from Arrays to Key-Value Da	atabases, Essential					
	Featu	res of Key-Value	Databases, Keys: More T	han Meaningless					
	Identi	fiers, Values: Storin	g Just About Any Data You	Want. Key-Value					
	Datat	base Terminology:	Key-Value Database Data	Modeling Terms,					
4		ment Datahases. It	ntroduction to Document Dat	ahases What Is a	10				
-	Docui	nent? Avoid Expli	cit Schema Definitions. Bas	tic Operations on	10				
	Docui	nent Databases, Do	cument Database Terminolo	gy: Document and					
	Collec	ction Terms, Type	s of Partitions, Data Mod	eling and Query					
	Proce	ssing, Introduction	n to Column Family Da	tabases: In the					
	Begin	ning, There Was Go	bogle Biglable, Differences a	Ind Similarities to					
	Famil	value allu Docume v Databases Protoc	n Databases, Atchitectures cols When to Use Column 1	Family Databases					
	Colur	nn Family Databas	se Terminology: Basic Comp	onents of Column					
	Famil	<sup>v</sup> Databases, Structures and Processes: Implementing Column							
Family Databases, Processes and Protocols									
5	Intro	duction to Graph I	<b>Databases:</b> What Is a Grap	h?, Graphs and	10				
	Netwo	ork Modeling, Advar	ntages of Graph Databases, G	raph Database					

Ter Gra	erminology: Elements of Graphs, Operations on Graphs, Properties of raphs and Nodes, Types of Graphs. Choosing a NoSQL Database.											
I												
Course Outcom e s						Desc	ription	l				
C01	Acqu	uiring t	he basi	es of SO	QL.							
CO2	Cons	Construct queries using Pl/SQL efficiently for developing database applications.										
CO3	Choo	Choosing appropriate NoSQL and Developing NoSQL application databases										
CO4	Criti	Critically analyze and evaluate variety of NoSQL Databases.										
CO5	Demonstrate the knowledge of Key-Value databases, Document based Databases, Column based Databases and Graph Databases.											
						1		1		1		1
CO-PO Mappin g	РО 1	PO2	PO3	PO4	PO5	P06	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	3	2										
CO2		3	2		1							
CO3	3 2											
CO4		3	1									
CO5			3	1								
Strong -3	me	edium -	2 v	veak -1								
TEXT BO	OKS:											
<ol> <li>Ramez Elmasri, Shamkant B Navathe," Database Systems: Models, Languages, Design and Application Programming", 6<sup>th</sup> Edition, Pearson Education, 2013. (ISBN-13:978-8131792476).</li> <li>Steven Feuerstein, "Oracle PL/SQL Programming", 6<sup>th</sup> Edition, O'Reilly Media, 2014. (ISBN-13: 978-1449324452).</li> <li>Dan Sullivan, "NoSQL for Mere Mortals", 1<sup>st</sup> Edition, Pearson Education, 2015. (ISBN-13: 978-9332557338).</li> </ol>												
			1.1			1/	<u> </u>		<u> </u>	•	99 1 et T	7 1.4.
I. Mi	chael Graw	McLau	ghlin,'' ducatio	Oracle	e Datat 1 (ISB	Dase L N_13.	20 PL/ 978_0	/SQL   07181	Progra 2436)	amming	g'', 1° 1	dition,
2 Pra	mod	-mi E I Sadal	lage M	artin F	owler "	'NoSC	976-0 )L. Dis	tilled:	2430). A Bri	ef Guid	le to th	e
Emerging World of Polyglot Persistence", 1 <sup>st</sup> Edition, Pearson Education, 2012. (ISBN-13: 978-8131775691)												
COURSE	COOF	RDINA	FOR:	SI	IAMSH	IEKH	AR PA	TIL				

Star INSTITUTE OF I COLUMN	Course Title: Cry	ptography and Network	Security							
ALANDER MARTINE AND		Course Code: 20SCS23	No. of Credits: 3 : 0 : 0 (L-T-P)	Number of lecture hours/week: 4	es					
Aided By	Govt. of Karnataka	Exam Duration : 3 hours	CIE + SEE = 50+50	Total Number of ( Hours: 52	Contact					
Co	urse		Description							
Obje	ctives	1 Explain standard	algorithms used to provid	le confidentiality int	teority and					
:		authenticity.								
		2. Distinguish key distribution and management schemes.								
		3. Deploy encryption	5. Deploy encryption techniques to secure data in transit across data networks							
		data networks. 4 To be Familiar w	. To be Familiar with security mechanisms with different applications.							
		4. To be Familiar with security mechanisms with different applicat								
Unit		Syllabus Content								
No.			U		Hours					
1	Classi	cal Encryption Techni	iques: Symmetric Cipher M	Iodel, Cryptography,	11					
	Crypta	nalysis and Brute-Fo	rce Attack, Substitution	Techniques, Caesar						
	Cipher	• One Time Pad	ier, Playfair Cipner, Hill Ci	pner, Poly alphabetic						
	Block	Siphers and the data encryption standard: Traditional block Cipher								
	structu	re, stream Ciphers and	, stream Ciphers and block Ciphers, Motivation for the feistel Cipher The feistel Cipher. The data encryption standard, DES encryption							
	DES d	lecryption The strength	The data encryption standa	Keys The nature of						
	the DE	ES algorithm, Timing att	acks, Block cipher design p	rinciples, number of						
	rounds	, design of function F, k	ey schedule algorithm							
2	Public Public	-Key Cryptography an -key cryptosystems	Applications for public	c-key cryptosystems.	11					
	require	ements for public-key cryptosystems. Public-key cryptanalysis. The								
	RSA	lgorithm, description of the algorithm, computational aspects, the								
	securit	y of RSA. Other Public-Key Cryptosystems: Diffichellman key								
	Elgan	al Cryptographic sy	stems, Elliptic curve a	arithmetic, abelian						
	group	s, elliptic curves ov	er real numbers, elliption	c curves over Zp,						
	ellipti	c curves overGF(2m)	, Elliptic curve cryptograph	y, Analog of Diffie -						
	exchar	n key nge Elliptic curve encry	ption/ decryption							
3	Key I	Management and Dis	stribution: Symmetric key	y distribution using	10					
	Symm	etric encryption, A key	distribution scenario, Hier	archical key control,						
	Session contro	n key lifetime, A tran I Controlling key usag	sparent key control scheme e Symmetric key distributi	e, Decentralized key on using asymmetric						
	encryp	tion, Simple secret k	ey distribution, Secret ke	ey distribution with						
	confid	entiality and authentic	ation, A hybrid scheme, D	istribution of public						
	keys, I	Public announcement of thority public keys cert	t public keys, Publicly availities (	able directory, Public Certificates X-509						
	version	n 3, public key infrastru	cture.	Continuatios, 72-307						
4	User	Authentication: Ren	note user Authentication	principles, Mutual	10					
	Auther	ntication, one way Au	thentication, remote user A	Authentication using						
	Web S	Security Consideration	<b>is:</b> Web Security Threats, <sup>1</sup>	Web Traffic Security						
	Appro	aches. Secure Sockets Layer: SSL Architecture, SSL Record Protocol,								
	Chang	e Cipher Spec Protocol,	Alert Protocol, and shake P	rotocol,						
	Lerypic	Brupine Computations.								

5 El de S/I en arc Se Rc ap	<ul> <li>5 Electronic Mail Security: Pretty good privacy, notation, operational; description, S/MIME, RFC5322, Multipurpose internet mail extensions, S/MIME functionality, S/MIME messages, S/MIME certificate processing, enhanced security services, Domain keys identified mail, internet mail architecture, E-Mail threats, DKIM strategy, DKIM functional flow. IP Security: IP Security overview, applications of IPsec, benefits of IPsec, Routing applications, IPsec documents, IPsec services, transport and tunnel modes,</li> </ul>											
Course		Description										
Outcome s												
C01	Anal	yze the	vulnera	bilities	in any c	omputi	ng sys	tem				
CO2	Awa	re of va	arious s	ecurity	y algori	thms ι	ised ir	n Crypt	ograp	hy		
CO3	Ident	Identify the security issues in the network and resolve it.										
CO4	Able	Able to Propose/ design a security solution.										
C05	Eval	Evaluate security mechanisms using rigorous approaches, including theoretical.										
CO-PO Mappin g	1 1	PO2	PO3	PO4	PO5	P06	РО 7	8 8	9 9	0 0	POI   1	2 2
CO1	3	2										
CO2	3	2										
CO3	3		1									
CO4			3		2							
C05			3	2								
Strong -3	m	edium -	2 v	veak -1								
IEXI BC	OKS:											
1. W 2. V.	illiam S K. Pac	Stallings hghare	s, Crypto , Crypto	ography graphy	y and Ne and info	etwork ormatic	Securit n secu	ty, Pear rity PH	rson 6th II 2nd I	n edition Edition.		
REFERE	NCE B	OOKS	:									
<ol> <li>Behrozn A Forozen and Debdeep Mukhopadhyay, Cryptography and Network Securty. McGrawHill Education Indian Pvt Ltd</li> <li>Bruuice Schmeier, Applied Cryptography 2<sup>nd</sup> Edition Wiley India Edition</li> </ol>												
COURSE COORDINATOR: SHAMSHEKHAR PATIL												

		Course Title: Data	Science and Machine Learn	ning Techniques						
OUR INST	TUTE OF TECH	Course Code:	No. of Credits: 3 : 0 : 0	Number of lectu	ire					
a + Dr. AMB	NOLOGY - m	20SCS24	(L-T-P)	hours/week: 4						
AMOCHANING NOTA	THA WELFARE TRUE	Exam Duration : 3 hours	CIE + SEE = 50+50	Total Number o Hours: 52	f Contact					
Alded by G	ovi, or Kamalaka									
Co	urse		Description							
Obje	ctives:	1. To understand the	ne significance of data analyti	cs						
		2. To analyze the real time data and come out with preprocessing techniques								
		suitable for preparing correct data set								
		3. To analyze the real world data to implement a learning model								
		4. To design different learning models for real world problems to arrive at the solution								
		5. To implement and test different learning models to improve the accuracy								
	-									
Unit No			Syllabus Content		No of Hours					
1	Learn	ing – Types of Ma	chine Learning – Supervise	d Learning – The	10					
	Brain	and the Neuron – Design a Learning System – Perspectives and								
	Issues	in Machine Learning	g – Concept Learning Task –	Concept Learning						
	as Sea	rch								
	– Fino Candi	idate Elimination Algorithm (chapter 1&2 Textbook 3)								
2	Corre	lation and Simple L	10							
	Introd	uction, Correlation, T								
	Least-	Squares Coefficients.								
	Multi	ple Regression Introd	duction, The Multiple Regress	sion Model,						
2	Conto	unding and Collinear	ity, Model Selection( chapter	/ textbook 2)	11					
3	Regree	ssion? The Logistic	Model Estimating the Regre	why Not Linear	11					
	Makin	g Predictions, Multip	ble Logistic Regression, Logis	tic Regression for						
	>2 R	esponse Classes, L	inear Discriminant Analysi	s, Using Bayes'						
	Theore	em for Classification	, Linear Discriminant Analys	s for $p = 1$ , Linear						
	Discri	minant Analysis for	p > 1, Quadratic Discriming Mathematics	nant Analysis, A						
1	Tree 9	arison of Classification and Probabilistic Mo	on Methods (chapter 4 of text)	DOOK 1)	11					
	Decisi	on Tree Learning:			11					
	Decisi	on tree representation	ion, Appropriate problems	for decision tree						
	learnir	ng, Basic decision tre	e learning algorithm, hypothe	sis space search in						
	decision tree learning, Inductive bias in decision tree learning, Issues in									
	decision Duch	on tree learning.	as Davas Theorem Car	agent Lagrania						
	Maxin	num Likelihood – M	ig. dayes meorem, – Col finimum Description Length	Principle – Raves						
	Optim	nal Classifier – Gibbs Algorithm –Naïve Bayes Classifier – Bayesian								
	Belief	Network (chapter 6 o	of Textbook 3)	,						

5	Self	f-Stud	Idy Component: Dimensionality Reduction Models10											
	Sub	set Se	lection,	Best S	ubset S	election	n, stepv	wise So	electior	n, Choo	osing the	e		
	Opt	imal N	Aodel, S	Shrinka	ge Met	hods, R	idge R	egress	ion, Th	e Lass	0,			
	Sele	ecting	the Tur	ning Par	ameter	, Dimer	ision R	leducti	ion Met	thods,	Principa	ıl		
	Cor	npone	nts Reg	ression	, Partia	l Least	Square	s (cha	pter 6 c	of text	bookl)			
	Cro Val	ss-Val	Idation	, The Va	alidatio	n Set A	pproac	h, Lea	ve-One	e-Out (	cross-			
	van	ation	l, <i>к</i> -гоі		- vanua	tio (cha	ipter 5	of lexi	L DOOK	()				
Cours	e l					Desc	rintior	1					RF	ST Levels
Outcon	nes					2000		-						
C	01	Anal	vze and	unders	tand th	e correc	etness	of data	set col	lected	using		R1	R2 R3
		vario	various mathematical models										, 102,103	
C	02	Appl	Apply various mathematical approaches to solve the learning problem R4 and R5											
C	03	Anal	yze and	infer tl	ne stren	gth and	weak	ness of	f differe	ent ma	chine		R3	
		learn	ing mo	dels		<u> </u>								
C	04	Imple	ement s	uitable	supervi	ised and	l unsup	pervise	ed mach	ine lea	arning		R5	
		algorithms for real time applications.												
CO-PC	)	POI	PO2	PO3	PO4	P05	P06	PO 7	PO8	PO9	PO10	PC	)11	PO12
Маррі	ng							/						
C	01	3	3											
C	02	3	3	2										
C	03	3	3		2	2								2
C	04	3	3	3	3	3	2	2						2
Strong	-3	Me	dium -2	W	eak -1	-	-		-	-				
TEXT	BOC	OKS:												
<ol> <li>Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani, An Introduction to Statistical Learning with Applications in R, ISSN 1431-875X,ISBN 978-1-4614-7137-0 ISBN 978-1-4614-7138-7 (eBook), DOI 10.1007/978-1-4614-7138-7,2015,Springer Publication</li> <li>Statistics for Engineers and Scientists, William Navidi.3 rd edition, McGraw Hil Education, India, 2013</li> <li>Machine Learning, Tom M. Mitchell, Indian Edition, 2013, McGraw-Hill Education, ISBN 978-1-25-909695-2</li> </ol>														
REFEF	REN	CE BC	OOKS:											
<ol> <li>Ethem Alpaydin "Introduction To Machine Learning" 2nd Edition PHI Learning Pvt. Ltd- New Delhi. (6<sup>th</sup> Chapter)</li> <li>Ian H. Witten &amp; Eibe Frank, Data Mining: Practical Machine Learning Tools and Tracknings 2nd Edition. Elements Keyler and Public Learning Tools and</li> </ol>														
	Techniques, 2nd Edition, Elsevier Morgan Kaufmann Publishers, 2005, ISBN: 0-12- 088407-0													

<ol> <li>Python Machine Learning: Machine Learning and Deep Learning with Python, sciki learn, and TensorFlow 2, 2<sup>nd</sup> Edition ISBN-10: 9781787125933.ISBN-13: 978- 1787125033</li> </ol>							
1	1/8/125933. Nina Zumal an	d John Mount Practical data asianaa with D. Manning Dublications					
4.	March 2014 I	SBN 9781617291562					
5.	<ol> <li>Pattern Recognition (An Introduction), V SusheelaDevi, M Narsimha Murthy, 2011, Universities Press, ISBN : 978-81-7371-725-3</li> </ol>						
EXTE	RNAL REFERE	ENCES/WEBLINKS:					
1.	Data Science f IIT Madras htt	for Engineers By Prof. Ragunathan Rengasamy, Prof. Shankar Narasimhan tps://swayam.gov.in/nd1_noc20_cs28/preview_					
2.	https://www.co	oursera.org/professional-certificates/ibm-data-science?authMode=signup					
3.	Machine Learn	ning course from coursera by Andrew Ng					
	https://www.coursera.org/learn/machine-learning/home/welcome						
COURSE COORDINATOR:		Dr. K R Shylaja					

		Course Title: Data	Science and Machine Learni	ng Lab							
JOUR INS	A LEAST CONTROL OF CON	Course Code:	No. of Credits: 3 : 0 : 0	Number of lecture							
s + Dr. All8	OLOGY +	20SCSL27	(L-T-P)	hours/week :							
Aided By C	Sovt. of Karnataka	Exam Duration : 3 hours	CIE+ SEE = 50+50	Total Number of Contact Hours :							
Cou Obje	urse ctives:	1 5 4	Description	• • •							
		<ol> <li>1. To give practical exposure to work on real time data sets</li> <li>2. To enable them to analyze the data sets for its correctness</li> </ol>									
		3. To give exposure to machine learning models									
		4. To enable them to analyze the data and arrive at appropriate learning models to improve the accuracy									
		5. To enable them to build efficient learning models for real time problems									
				I							
		(	Part A Data Preprocessing)								
1	Given	a data set generate si	immary and do the following n	reprocessing							
	i.	Print datatype o	f each column in dataset	reprocessing.							
	ii.	<ul><li>11. Check the null values</li><li>iii. Use appropriate method to populate null values</li></ul>									
	iv. Describe the dataset and analyze										
2	Given	a dataset write pytho	n code for statistical analysis to	o determine							
	lineari model	ty of features with th is suitable	e target value? Write your anal	ysis about what							
3	Given	a data set plot the bo	x-plot and histogram to analyz	e the data							
4	Given	ution	f dimensionality raduation is n	account and also							
-	use Pr	incipal Component A	nalysis (PCA) to determine the	e first principle							
5	Implei	ment linear discriminat	nts Analysis on a given data set								
			Part B								
			(Machine								
1	Given	data set implement a	linear regression model for pro	ediction							
2	Given	a dataset implement	multiple linear regression								
3	Given a dataset implement logistic regression for classification										
4	Implement a non linear regression model for classification on a given data set.										
5	Implei	ment any classification	on model for an image data set								
	Part C (Mini Project)										

	<ul> <li>A team of two students can be formed to implement a mini project on real time data set using any machine learning technique</li> <li>Design an appropriate user interface for the project either using</li> </ul>												
	W	eb inter	face or	android	l app pl	atform	•						
NOTE: The studer Demonstra	nt has ite the	to exect mini p	ute one roject a	from F and ans	Part A a wer the	nd one viva-v	e from voce	Part B	1				
Course Outcomes		Description         RBT Levels											
C01	Able func	Able to analyze the dataset for its correctness using mathematical R4 Functions											
CO2	Dem relat	emonstrate the ability to analyze the dataset by generating R5 elations among the properties											
CO3	Desi data	Design both linear and non-linear learning models based on the R5											
CO4	Com	pare di	ifferent	t learni	ng mod	lels for	r a giv	en data	ı set		R	5	
CO5	Buile tech	d real t niques	ime ap	plicatio	ons usin	ıg vari	ous m	achine	learni	ng	R	5	
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	<b>PO</b> 7	PO8	PO9	PO10	PO11	PO12	
CO1	3	3	3	3	3							3	
CO2	3	3	3	3	3							3	
CO3	3	3	3	3	3							3	
CO4	3	3	3	3	3	3			3	3	3	3	
Strong -3	Me	dium -2	W	eak -1									
REFEREN	REFERENCE BOOKS:												
1. Gareth . Learnin 7138-7	<ol> <li>Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani, An Introduction to Statistical Learning with Applications in R, ISSN 1431-875X, ISBN 978-1-4614-7137-0 ISBN 978-1-4614- 7138-7 (eBook) DOI 10 1007/978-1-4614-7138-7 2015 Springer Publication</li> </ol>												

2. Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow 2, 2nd Edition ISBN-10: 9781787125933.ISBN-13: 978-1787125933.

3. Data Analytics With Spark Using Python by Jeffrey Aven, PEARSON INDIA ISBN: 9789353068455

SELF STUDY REF	ERENCES/WEBLINKS:										
1. Data Science Madras <u>https</u>	<ol> <li>Data Science for Engineers By Prof. Ragunathan Rengasamy, Prof. Shankar Narasimhan   IIT Madras <u>https://swayam.gov.in/nd1_noc20_cs28/preview</u></li> </ol>										
2. <u>https://www.</u>	coursera.org/professional-certificates/ibm-data-science?authMode=signup										
3. Machine Lea learning/hon	arning course from coursera by Andrew Ng <u>https://www.coursera.org/learn/machine-</u> ne/welcome										
COURSE COORDINATO	COURSE Dr. K R Shylaja										
R:											

		Course Title: Nat	ural Language Processing								
Star INST	TITUTE OF IFG	<b>Course Code:</b>	No. of Credits: 3 : 0 : 0	No. of lecture							
a + Dr. AMB	IOLOGY -	20SCS251	(L-T-P)	hours/week: 4							
Aided By G	ETHA WELFARE TRIS	Exam Duration : 3 hours	Total No. of Co Hours: 52	ontact							
Con Object :	urse ctives	<ol> <li>Learn the techn</li> <li>Be familiar wit</li> <li>Be exposed to 7</li> <li>Analyze the inf</li> </ol>									
Unit No	nit Syllabus Content Io										
1	1 Overview And Language Modeling: Overview: Origins and challenges of NLP Language and Grammar-Processing Indian Languages- NLP Applications-Information Retrieval. Language Modeling: Various Grammar- based Language Models-Statistical Language Model.										
2	Word Expre Error Taggin Parsin	Level And Syntac ssions-Finite-State Detection and corre ng. Syntactic Ana ag-Probabilistic Pars	ctic Analysis: Word Level A Automata-Morphological ction-Words and Word class lysis: Context free Gramn ing	Analysis: Regular Parsing-Spelling es-Part-of Speech nar-Constituency-	10						
3	Parsing-Probabilistic ParsingExtracting Relations from Text: From Word Sequences to11Dependency Paths: Introduction, Subsequence Kernels for RelationExtraction, A Dependency-Path Kernel for Relation Extraction andExperimental Evaluation. Mining Diagnostic Text Reports by Learningto Annotate Knowledge Roles: Introduction, Domain Knowledge andKnowledge Roles, Frame Semantics and Semantic Role Labeling,Learning to Annotate Cases with Knowledge Roles and Evaluations.Self-Study Component:A Case Study in Natural Language Based Web Search: InFact										
	Imple	ment a CNN model	for word prediction								
4	Evalu Seman Systen Identi Cohes Appro Result Comb Mode Separa	ating Self-Explana ntic Analysis, and T ms, iSTART: Evalua fying Text-Types Us ion of Text Struct baches to Analyzing ts of Experiment ination of Probabil ling: Introduction, T ation as a Sequer	ations in iSTART: Word opic Models: Introduction, is tion of Feedback Systems, Te sing Latent Semantic Analys etures: Introduction, Cohes Texts, Latent Semantic Ana ts. Automatic Document istic Classification and Fini Related Work, Data Prepara nce Mapping Problem, Re	Matching, Latent START: Feedback extual Signatures: is to Measure the ion, Coh-Metrix, lysis, Predictions, Separation: A teState Sequence ation, Document esults. Evolving	11						

Ex Re	Explanatory Novel Patterns for Semantically-Based Text Mining: Related Work, A Semantically Guided Model for Effective TextMining.													
5 IN Inf Sy Re val	5 INFORMATION RETRIEVAL AND LEXICAL RESOURCES: Information Retrieval: Design features of Information Retrieval Systems- Classical, Non classical, Alternative Models of Information Retrieval – valuation Lexical Resources: World Net-Frame NetStemmers-POS Tagger- Research Corpora													
Image: Tagger- Research Corpora.         NOTE:         1. Include Self study component in any one of the Unit.         2. Total number of COs is decided by concerned Course Coordinator														
Course Outco m es		Description												
C01	Anal natur	Analyze and understanding the mathematical modeling techniques in <b>R2, R3</b> atural language text processing.												
CO2 CO3	Gene	Generate the natural language using semantic analysis of languages.R4Construct Text mining models using tools available.R3												
CO4	Apply information retrieval techniques for real-time applications												R4	
CO-PO Mappin	PO 1	PO2	PO3	PO4	PO5	P0 6	<b>PO</b> 7	PO 8	PO 9	PO1 0	PC 1	)1	PO12	
CO1	3	3	2	2										
CO2	3	3	3	3										
CO3	3	3	3	3	3								3	
Strong -3	N	ledium	n -2	Weal	k -1								•	
TEXT BO	OOKS	:												
<ol> <li>TEXT BOOK:</li> <li>1. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.</li> <li>2. Anne Kao and Stephen R. Poteet (Eds), "Natural Language Processing and Text Mining", Springer- Verlag London Limited 2007.</li> <li>REFERENCE BOOKS:</li> </ol>														
1. Da int Re 2. Jan pu 3. Ge	niel . roduct cognit mes A blishir erald . stems"	Jurafsky ion to ion", 2 llen, "I ng comp J. Kow Kluwy	y and Natura nd Edit Natural pany, 19 valski a er acad	James l Langu ion, Pro Langu 995. and M emic Pro	H M uage Pr entice I age Ur ark.T. ublishe	artin, cocess Hall, 2 ndersta Mayb	"Spee ing, Co 2008. anding oury, "	ech ar omputa ", 2nd 'Inforr	nd Lar ational editio nation	nguage Linguis n, Benji Storage	Pro- stics amin e ar	cess and n/Cu nd I	sing: An d Speech ummings Retrieval	

- 4. Steven Bird, Ewan Klein, Edward Loper, "Natural Language Processing with Python," Publisher: O'Reilly Media, June 2009
- 5. Christopher D.Manning and HinrichSchutze, "Foundations of Statistical Natural Language Processing", MIT Press, 1999.

#### SELF STUDY REFERENCES/WEBLINKS:

- 1. Natural Language Processing from coursera https://www.coursera.org/learn/language-processing
- 2. Any relevant course from top international universities on NLP can be referred to implement

COURSE	Dr. K R Shylaja
COORDINATOR	
:	

OUR INS	STITUTE OF TRES	Course Title: Agile Methodology										
A NULL + DI- AND	COP	Course Code: 20SCS253	No. of Credits: 3 : 0 : 0 (L-T-P)	Number of lectures hours/week: 4								
Aided By	BEETHA WELFARE TRUS	Exam Duration : 3 hours	CIE + SEE = 50 + 50	Total Number of Co Hours: 52	ontact							
Coi	urse		Description									
Objec	ctives:	1. To understand how an it	terative, incremental develop	ment process leads to f	aster							
		delivery of more useful	software									
		2. To understand the essen	ce of agile development met	hods								
		3. To understand the princ	iples and practices of extrem	e programming								
		4. To understand the roles	of prototyping in the softwar	re process								
		5. To understand the conce	ept of Mastering Agility									
Unit No.	Unit     Syllabus Content     I       No.     I											
1	Why Agile?: Understanding Success, Beyond Deadlines, The Importance of Organizational Success, Enter Agility, How to Be Agile?: Agile Methods, Don't Make Your Own Method, The Road to Mastery, Find a Mentor10											
2	Under	rstanding XP: The XP Lifecy	ycle, The XP Team, XP Co	ncepts, Adopting XP:	10							
	Is XP	Right for Us?, Go!, Assess	Your Agility									
3	Pract	icing XP: Thinking: Pair	· Programming Energized	Work Informative	11							
	Work	space. Root-Cause Analys	is. Retrospectives. Collal	borating: Trust. Sit								
	Toget	her. Real Customer Inv	olvement. Ubiquitous L	anguage. Stand-Up								
	Meeti	ngs, Coding Standards, It	eration Demo, Reporting	<b>Releasing:</b> "Done								
	Done <sup>3</sup>	", No Bugs, Version Contr	col, Ten-Minute Build, Co	ntinuous Integration,								
	Colle	ctive Code Ownership,	Documentation. Planning	g: Vision, Release								
	Plann	ing, The Planning										
	Game	, Risk Management, Iteratio	n Planning, Slack, Stories,	Estimating.								
4	Mast	ering Agility Values and	I Principles: Commonali	ties, About Values,	10							
	Princi	ples, and Practices, Furthe	r Reading, Improve the	Process: Understand								
	Your	Project, Tune and Adapt, Br	reak the Rules, Rely on Pe	ople :Build Effective								
	Relati	onships, Let the Right Peo	ple Do the Right Things, I	Build the Process for								
	the P	eople, Eliminate Waste	Work in Small, Reversib	ole Steps, Fail Fast,								
	Maxii	mize										
	Work	Not Done, Pursue Throughp	out									
5	Deliv	er Value: Exploit Your Ag	ility, Only Releasable Cod	e Has Value, Deliver	11							
	Busin	ess Results, Deliver Frequ	ently, Seek Technical Ex	cellence : Software								
	Doesr	n't Exist, Design Is for Un	derstanding, Design Trade	coffs, Quality with a								
	Name	, Great Design, Universal D	esign Principles, Principles	in Practice, Pursue								
	Maste	ery										
Cour Outco	rse mes		Description									
(	C <b>O1</b> [	Understand The XP Lifecycle,	, XP Concepts, Adopting XF	)								

CO2	Work Requ	Work on Pair Programming, Root-Cause Analysis, Retrospectives, Planning, Incremental Requirements, Customer Tests												
CO3	Imple	Implement Concepts to Eliminate Waste												
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		
CO1	2	3	3		1									
CO2	3	1	2	2	1	1								
CO3	3	2	1	2		1								
Strong -3	mec	lium -2	we	ak -1		-	-							
TEXT BOO	OKS:													

1. The Art of Agile Development (Pragmatic guide to agile software development), James shore, Chromatic, O'Reilly Media, Shroff Publishers & Distributors, 2007 ISBN 978-159-904-68-39

#### **REFERENCE BOOKS:**

1. Agile Software Development, Principles, Patterns, and Practices, Robert C. Martin, Prentice Hall; 1<sup>st</sup> edition, 2002

2. , "Agile and Iterative Development a Manger's Guide", Craig Larman Pearson Education, First Edition, India, 2004.

COURSE COORDINATOR.	Dr.
COURSE COORDINATOR:	

r. Siddaraju

		Course Title: Wir	eless and Mobile Computin	ıg								
SOUR INST	Course Code: No. of Credits: 3 : 0 : 0 No. of lecture											
ALL AND	QLOGY · ·	20SCS254	(L-T-P)	hours/week: 4								
Aided By Ge	THA WELFARE TRUE	Exam Duration : 3 hours	CIE + SEE = 50+50	Total No. of Con Hours: 52	ntact							
Co			Description									
Obje	urse ctives	1 To introduce the concepts of wireless communication										
:		2. To understand	CDMA, GSM, Mobile IP, W	Imax.								
		3. To understand I	Different Mobile OS.									
		4. To learn various	s Markup Languages and CL or CLDC MIDlet model and	DC, CLDC, MIDP,								
	Togramming for CDDC, withfer model and security concerns.											
Unit			Syllabus Content		No of							
No					Hours							
1. 2.	Mobile Computing Architecture: Architecture for Mobile Computing, 3- tier Architecture, Design Considerations for Mobile Computing. Wireless Networks : Global Systems for Mobile Communication (GSM and Short Service Messages (SMS): GSM Architecture, Entities, Call routing in GSM, PLMN Interface, GSM Addresses and Identities, Network Aspects in GSM, Mobility Management, GSM Frequency allocation. Introduction to SMS, SMS Architecture, SM MT, SM MO, SMS as Information bearer, applications, GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Billing and Charging in GPRSMobile Client: Moving beyond desktop, Mobile handset overview,											
	applic	cations for handheld	devices. Mobile IP: Introd	uction, discovery,								
2	Regis	tration, Tunneling, C	Cellular IP.		10							
э.	Mobi The Synch Enter WinC	le OS and Computi Client: User Inte pronization, Messag prise Data Source E, Palm OS, Symbia	ing Environment: Smart Cl erface, Data Storage, Pe ging. The Server: Data , Messaging. Mobile Op in OS, Linux and Proprietary	ient Architecture, rformance, Data Synchronization, erating Systems: OS.	10							
4.	Build	ing, Mobile Internet	Applications: Thin client:	Architecture, the	11							
	client Wirel Mark Voice	, Middleware, messa ess Applications Pro up Languages, HI XML	aging Servers, Processing a otocol (WAP) Overview, Wi DML, WML, HTML, cH	Wireless request, reless Languages: ITML, XHTML,								
5.	J2ME: Introduction, CDC, CLDC, MIDP; Programming for CLDC, MIDlet model, Provisioning, MIDlet lifecycle, Creating new application, MIDlet event handling, GUI in MIDP, Low level GUI Components, Multimedia APIs; Communication in MIDP, Security Considerations in MIDP.10											
Cou	rse		Description									

CO1	To Work on state of art techniques in wireless communication.													
CO2	Explore CDMA, GSM, Mobile IP, WiMax.													
CO3	Explore on Different Mobile OS, Develop program for CLDC, MIDP let													
	model and security concerns.													
CO4	To b	To build Mobile Applications.												
CO5	To b	uild ap	oplicatio	ons usir	ng J2M	E tech	nology	у.						
CO-PO	РО	PO PO2 PO3 PO4 PO5 P06 PO PO PO PO1 PO1 PO1												
Mapping	1	7 8 9 0 1 2												
C01	3	3 3 3 3												
CO2	3	3 2 2 2												
CO3	3	3 3 2 3												
CO4	3	3	3	3	3	-	-	-	-	-	-	-		
CO5	3	3	3	3	3	-	-	-	-	-	-	-		
Strong -3	me	dium -	2 w	veak -1										
TEXT BOO	OKS:													
1.	Asho	k Tal	lukder,	Roopa	a Yav	agal,	Hasa	n Ah	med:	Mobile	e			
	Comp	outing	, Techno	ology,										
	Appli	ication	is and So	ervice (	Creation	n, 2nd	Editic	on, Tata	a McG	iraw Hil	1, 2010.			
2.	Mart	yn Ma	ıllik: Mo	obile ar	nd Wire	less D	esign	Essent	ials, V	Viley Ind	dia, 200	3.		
REFEREN	CE B	OOKS	:											
1. Raj kam	al: Mo	obile (	Computi	ng, Ox	ford Ur	niversi	ty Pre	ss, 200	)7.					
2. Iti S	Saha N	Misra:	Wireles	s Com	nunica	tions a	nd Ne	tworks	s, 3G a	and Bey	ond, Ta	ta		
McGraw H	[ill, 20	)09								-				
COURSE		]	DR. Pra	bha R										
COORDIN	ATO	<b>R</b> :												

		Course Title: Busi	ness Analytics								
OUR INST	Course Code: No. of Credits: 3 : 0 : 0 No. of lecture										
a • Dr. AMB	MOLOGY -	20SCS261	(L-T-P)	hours/week: 4							
Aided By G	CALL OF Karnataka	Exam Duration : 3 hours	CIE + SEE = 50+50	Total No. of Co Hours: 52	ntact						
		1									
Con Object	urse ctives		Description								
:	redictive analysis. e. a commitment to he communities th	the ley									
Unit No	nit Syllabus Content o										
1.	Busi	ness Analytics: Ov	verview of Business Analy	ytics, Scope of	10						
	Busin Buisn Busin Satsu revie	ness Analytics, Bu ness Analytics proces ness Analytics. tical Tools: Satstica w of probability distr	siness Analytics Process, s and organization,Competati al Notation, Desvrptive Sta ibution and data modelling.	relationship of ve advantages of astical methods,							
2.	Tren trend Anal solvi	diness and Regress ls in Data. Simple Lin ytics Personal, Data ng, Visualizing and E	<b>Sion Analysis:</b> Modelling R near regression. Important res and Model for Business Ar xploring data, Business Analy	elationships and sources, Business nalytics, problem ysis Technology.	11						
3.	Self : Team Outs Anal Predi	study component: O n Management, Mana ourcing, Ensuring Da ytics, Manging Chang icative Modelling, Pre	rganization Structures of Busi gement Issues, Desiging Infor ta Quality, measuring contribu ges, Descrptive Analytics Prece edictive Analytics analysis.	iness Anlytics: rmation Policy, ution of Business dictive Analytics,	11						
4.	Fore Stast linea forec Mod	<b>casting Techniques</b> ical forecasting Mod r trend. Forecasting T casting with casual els.	• Qualitative and Judgemen els, Forecasting Models for ' ime series with seasonality, re variables, selecting appropr	ntal Forecasting, Time series with egrassion riate Forecasting	10						
<ul> <li>5. Decision Analysis: Formulating Decision Problems, Decision Statergies 1</li> <li>with are without outcome, Probablities, decision trees, The value of Information, Utility and Decision Making.</li> </ul>											
	I										
Cour Outco	rse mes										
(	201	Explore the Concepts, c	lata and models for Business An	alytics.							
	CO2	Analyze various technic	ques for modelling and predictio	n.							
(	CO3	Design the clear and ac	tionable insights by translating c	lata.							

CO4	To d	To design and analyse forecasting models.										
C05	Forn	Formualte decision problems to slove buisness applications.										
CO-PO Mapping	PO 1	PO2	PO3	PO4	PO5	P06	PO7	P 08	PO 9	PO1 0	PO1 1	PO1 2
CO1	3	3	3	2	2	-	-	-	-	-	-	-
CO2	3	3	3	3	3	-	-	-	-	-	-	-
CO3	3	3	3	3	3	-	-	-	-	-	-	-
CO4	3	3	3	3	2	-	-	-	-	-	-	-
CO5 3 3 3 3 2												
Strong -3	me	dium -2	2 w	veak -1								
TEXT BOO	OKS:											
<ol> <li>Busine Schnie 13:978</li> <li>The va sons, I</li> </ol>	ess Ar derjar 3-0133 llue of SBN:9	nalytics ns , Da 989403 `Busine 9781118	Princip ra G. S , ISBN- ss Analy 983881	les, Con Schniede 10: ISB /tics: Id , 1 st Ec	ncepts, erjans, ( N-12. entify th lition 20	and A Christone path 114.	pplication pher M to Profi	ons F . Starl itabilit	Γ Press key, 1 y, Evai	s Analyt st Editi n Stubs,	ics, by on 2014 John Wi	Marc J. 4,ISBN- ley and
REFEREN	CE B	OOKS:										
<ol> <li>Business Analytics, James R. Evans, Pearson education 2nd Edition, ISBN-13:978-032199782, ISBN-10:0321.</li> <li>Predictive Business Analytics Forward looking capabilities to improve Business, Gary Cokins and lawrence Maisel wiley 1st Edition 2014</li> </ol>												
COURSE COORDIN	ATO	R:	Dr. Pr	abha R								

		Course Title: Deep	p Learning				
OURINS	TITUTE OF TROP	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture			
+ Dr. AMB	MOLOGY -	hours/week : 4					
Aided By C	and a state Bern h Well FARE TRUE Govt. of Karnataka	Exam Duration : 3 hours	CIE+ Assignment + SEE = 50+50=100	Total No. of Co Hours : 52	ntact		
Co			Description				
Obje	ctives:	<ol> <li>Enable students</li> <li>Students will ac</li> <li>Enable students learning technic</li> </ol>	epts of deep leanir architectures of A e problems using	ng NN deep			
Unit No			Syllabus Content		No of Hours		
1	Deep Feedforward Networks:Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation.Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging, Dropout.						
2	Optin Pure ( Algori Adapt Opera Infinit Struct Rando Unsup	nization for Trainin Optimization, Challe ithms. Parameter ive Learning Rates. tion, Motivation, ely Strong Prior, V ured Outputs, Data om or pervised Features.	<b>g Deep Models:</b> How Learn enges in Neural Network Opt Initialization Strategies, A Convolutional Networks: 7 Pooling, Convolution and Variants of the Basic Convo Types, Efficient Convolut	ing Differs from timization, Basic Algorithms with The Convolution Pooling as an lution Function, ion Algorithms,	11		
3	Seque Comp RNNs Recurr memo	ence Modelling: F utational Graphs, , Encoder-Decoder rent Networks, Re- ry	Recurrent and Recursive Recurrent Neural Network Sequence-to-Sequence Arcl cursive Neural Networks. I	Nets: Unfolding s, Bidirectional hitectures, Deep Long short-term	10		
4	Autoencoders:       Undercomplete       Autoencoders,       Regularized         Autoencoders,       Representational       Power,       Layer       Size       and       Depth,         Stochastic       Encoders       and       Decoders,       Denoising       Autoencoders,         Contractive       Auto       encoders       Applications of       Autoencoders						
5	StochasticEncodersandDecoders,DenoisingAutoencoders,Contractive Auto encoders, Applications of AutoencodersSelf Study Component:Structured Probabilistic Models For Deep11Learning:The challenge of unstructured modelling, Using graphs to describe model structure:Directed, Undirected, Partition function, Energy-based models, Factor graphs; Sampling from graphical models, Advantages of structured modelling, learning about dependencies, Inference and approximate inference, The deep learning approach to structured probabilistic models						

Course Outcomes			Description     RBT       Levels     P1 P2											
CO1	Und appli	erstand ications	rstand and state basic concepts of neural network, itsR1 R2cations and its learning mechanismsR1 R2rstand and Analyze the requirement of Recurrent, RecursiveR2 and R3											
CO2	Und Nets	erstand and Au	and Ar ito-enc	nalyze t oder m	he requ odels in	uireme n real t	nt of I time aj	Recurr pplicat	ent, Re tions	ecursive		R2 and R3		
CO3	Analyze different Network Architectures, learning tasks, Convolutional networksR3													
CO4	Eval appr	Evaluate and compare the solutions by various Neural Network R4 approaches for a given problem												
CO-PO Mappin g	-PO ppinPO 1PO2 PO3PO3 PO4PO5 PO5P06 PO6 PO 7PO PO PO 8PO1 PO1 PO1 9PO1 PO12 1PO12 PO12													
CO1	3													
CO2	3	3 3 3 2 2 3 3												
CO3	3	3	3	3	2							3		
CO4	3	3	3	3	3	2						3		
Strong -3 TEXT BO	OKS:	aium -	2	veak -1										
1. Ian ( Pre	Goodf ess, 20	ellow, ` 16, 800	Yoshua ) pp, IS	Bengio BN: 02	o, and A 262035	Aaron 618.	Courv	ille: D	eep le	arning: '	The N	ſΙΤ		
REFERE	NCE	BOOK	S:		in Inte	a du ati	an D	a/1 D		006 8-		n Dublich on		
I. Ne	urai T 3N 97	8-3-642	2-6106	ystemat 8-4	le intr	oducti	on, k	aul K	ojas I	990. Sp	ringe	r Publisher		
2. Pat	tern	Recogn r ISBN	ition a	and ma	achine 073-2	Learn	ing,	Christe	opher	Bishop	2007	7. Springer		
3. Ne	ural N	Vetworl	s - A	Comp	rehens	ive Fo	undat	ion, S	imon I	Haykin,	Seco	nd Edition,		
PH	I, 200	5.		• • • • •	1.5.5		~							
$\begin{array}{c c} 4. & \text{Int} \\ 20 \end{array}$	roduci 12 Edi	tion to ition. IS	Artific SBN-13	ial Neu : 978-9	iral Ne 935014	tworks 2967.	s, Gur	ijan G	oswan	nı, S.K.	Katar	ia & Sons;		
5. Fu Alg 149	ndame gorithi 91925	entals o ms, Nil 614.	of Deep chil Bu	o Learr Iduma,	ning: E by O'l	Designi Reilly	ing No Public	ext-Ge cations	eneratio , 2016	on Mac	hine 1 1, ISB	Intelligence N-13: 978-		
WEBLINK	KS:													

1. Deep Learnin	g Specialization. Master Deep Learning, and Break into AI from					
deenlearn ai						
ucepicain.ai						
https://www.c	coursera.org/specializations/deep-learning?					
2 Deen Learnin	g - Part 1 By Prof Sudarshan Ivengar Prof Padmavati IIT Ropar					
2. Deep Leannin	f art i by i for. Sudarshan ryongar, i for. i admavari, i i ropar					
https://swayar	m.gov.in/nd1 noc20 cs50/preview					
COURSE	Dr. K R Shylaja					
COORDINATOR						
COORDINATOR.						

SHAR INST	TUTE OF TREE	Course Tit	le: Stora	ge Area Network			
• Dr. AMB	NOLOGY +	Course	Code:	No. of Credits: 3	:0:0	No. of lecture	
Sunce No.		20SCS263		(L-T-P)		hours/week : 4	
Aided By Go	THA WELFARE TRUS	Exam Dura 3 hours	ation :	CIE + SEE = 50+:	50=100	Total No. of Con 52	itact Hours :
	urse			Des	cription		
	cuves	1. To unde	erstand th	e fundamentals of st	torage centr	ic and server centri	c systems
	• 2. To understand the metrics used for Designing storage area networ 3. To understand the RAID concepts						
		4. To enab	ole the st	udents to understan	d how data	centre's maintain	the data with
		the con	cepts of	backup mainly rem	ote mirrorin	ng concepts for bo	th simple and
		complex	x systems	5.			
Unit No				Syllabus Content			No of Hours
1	Intro	duction: Info	rmation	Storage, Evolution	of Storage A	Architecture, Data	11
	Centre	e Infrastructu	ıre, Virtı	ualization and Clou	id Comput	ing. Data Centre	
	Enviro	onment: App	lication, Drive Pe	DBMS, Host, Conn rformance Host Ac	ectivity, Sto	Dirage, Disk Drive	
	Storag	ge, Storage	Design I	Based on Applicati	on, Disk N	Native Command	
	Queui	ng, Introduct	ion to Fla	ash Drives.			
2	Data	Protection:	RAID	Implementation M	ethods, Ari	ray Components,	10
	Techn	iques, Levels	s, Impact	on Disk Performan	ce, Compar	ison, Hot Spares.	
2	Intelli Eth an	gent Storage	System:	Components, Storag	EC Over	ing, Types.	11
5	Comp	onents FC	Connect	Area Networks:	rc Over	Fabric Services	11
	Login	Types Zon	ing FC	Topologies Virtuali	ization in S	AN IP SAN and	
	FCoE	: iSCSI, FCIF	P, FCoE.				
4	Netwo	ork-Attached	l Storag	e: Benefits, Compo	onents, NA	S I/O Operation,	10
	Imple	mentations, H	File Shar	ing Protocols, I/O C	Operations,	Factors Affecting	
	NAS	Performance	, File-Le	evel Virtualization.	Object Ba	sed and Unified	
	Storag	ge: Object B	ased Stor	rage Devices, Conte	ent Address	ed Storage, CAS	
	Use C	ases, Unified	Storage.	Backup Archive an	d Replicatio	n.	10
5	Self S	<b>tudy Compo</b> vele – Failure	nent: Ini	formation Availabilit	ty, Terminol vsis Challe	ogy, Planning	10
	Consid	erations. Secur	ring the S	torage Infrastructure	e: Framewo	rk, Risk Triad,	
	Doma	ins Managing	g the Stor	age Infrastructure: N	Monitoring,	Management	
	Activi	ttes, Manage	ment Cha	allenges, Information	n Lifecycle	Management,	
	Siorag	se mennig.					
Course Description							<b>RBT</b> Levels
Outco	mes						

CO1	Ident adop	Identify the need for storage centric network and its benefits of its adoption.       L2											
CO2	Desig RAII	AID requirements.											
CO3	Have differ	lave an understanding of the Fiber channel stack and working of theL2ifferent layers.											
CO4	Have recov	Have an understanding of NAS, object oriented storage and backup and L2 recovery.											
C05	Have	a bus	iness cor	ntinuity	plan an	d ILM	of an e	enterpri	se.			L2	
CO-PO	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12	
Mapping		roi roz											
CO1	3	3 2 3 3 .											
CO2	3	3 2 3 3											
CO3	3	2	3	3									
CO4	3	2	3	3									
C05	3	2	3	3									
Strong -3	Mec	lium -2	2 Wo	eak -1									
TEXT BOC	OKS:												
TEXT BO 1. EMC Stor	OKS: Educa cage ar	ation S 1d Mai	Services, nagemen	edited l t"; 2nd	by Some edition	asunda , Wiley	ram G. ⁄ India,	, Alok 2012,	Shriva ISBN	stava "Iı 9788126	nformat 5537501	ion	
REFEREN	CE BO	OKS:											
1. Ulf Edit 2. Rot Hill	<ol> <li>Ulf Troppens, Rainer Erkens and Wolfgang Muller: Storage Networks Explained, 1<sup>st</sup> Edition, Wiley India, 2012.</li> <li>Robert Spalding: Storage Networks, The Complete Reference, 1<sup>st</sup>Edition, Tata McGraw Hill, 2011.</li> </ol>												
SELF STU	SELF STUDY												
Unit 2: D	ata Pr	otecti	0N Suresha	. D									
COORDIN	ATOR	:	Juitona										

		Course Title: Inte	lligent Systems						
SOLAR INSTITUTION	TUTE OF IT GENERAL	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture					
In the second	OGY · ·	20SCS264	(L-T-P)	hours/week:	4				
Address Brand	VI. of Karnataka	Exam Duration : 3 hours	xam Duration :CIE + SEE = 50+50Total No. of Co Hours: 52						
	urse								
Obje	ctives:	<ol> <li>To provide understanding of intelligent systems and the various methods at tools in implementing Intelligent Systems.</li> <li>To demonstrate the implementation of individual methods within the scope Intelligent systems</li> <li>To compare the pros and cons of each method of developing Intelligent System</li> <li>To develop the ability to implement a particular Intelligent system of choic</li> </ol>							
Unit No			Syllabus Content		No of Hours				
1.	Overv Applie Predic Using Applie for st ,Strate Reaso with t	view of Artificial cation areas; Kno cate Calculus :The P Inference Rules t cation: A Logic-Base ate space search: In egies for State Space ning he Predicate Calculu	Intelligence: Artificial Int owledge Representation and propositional Calculus, The P to Produce Predicate Calcu- ed Financial Advisor; Structu- ntroduction, Structures for s e Search, Using the State S as; And/Or Graphs;	elligence and its nd Search: The redicate Calculus, ulus Expressions, ures and strategies tate space search pace to Represent	10				
2.	Heuri Progra Mono Comp Introd Black	istic Search: Intramming, The Be tonicity and Info lexity Issues. Contra- luction, Recursion- board Architecture for	roduction, Hill Climbing st-First Search Algorithm ormedness, Using Heuris ol and Implementation of St Based Search, Production or Problem Solving	and Dynamic n, Admissibility, tics in Games, ate Space Search: n Systems, The	10				
3.	Blackboard Architecture for Problem Solving.Other Knowledge Representation Techniques: Semantic Networks, Conceptual Dependencies, Scripts and Frames, Conceptual Graphs. Knowledge Intensive Problem Solving : Overview of Expert System Technology, RuleBased Expert Systems, Model-Based, Case Based, and Hybrid Systems Planning: Introduction to Planning, Algorithms as State Space Space Planning: State Space Space								
4.	Autor Provin Theor Uncer Bayes Seman Condi Appro	<b>comated Reasoning:</b> Introduction to Weak Methods in Theorem10ving, The General Problem Solver and Difference Tables, Resolution orem Proving; Uncertain Knowledge and Reasoning: Introduction to certainty, Inference using Full-Joint Distribution, Independence, res' Rule and its use. Representing Knowledge in Uncertain Domain: nantics of Bayesian Networks, Efficient Representation of aditional Distributions, Exact Inference in Bayesian Network, proximate Inference in Bayesian Network10							
5.	Approximate Inference in Bayesian Network         Self study component:         Introduction to Learning: Forms of Learning: Supervised learning,         Unsupervised Learning, Semi-Supervised and Reinforcement Learning;         Parametric Models & Non-Parametric Models, Classification and								

Regression problems Artificial Neural Networks: ANN Structures, Single Layer feed-forward neural networks, Multi-Layer feed-forward neural networks, Learning in multilayer networks, networks. Artificial Intelligence Current Trends : The Science of Intelligent Systems, AI: Current Challenges and Future Directions;

Course Outcomes		Description										
CO1	Stude techn	Students are able to Explore various Artificial Intelligence problem solving techniques										
CO2	Stude	ents are	able t	o Ident	ifv and	desc	ribe tl	ne dif	ferent	AI app	roaches	such as
	Know	vledge	represe	entation	1. Sear	ch st	rategi	es. le	earnin	g techr	niques 1	to solve
	uncer	tain im	precise	, stocha	astic an	d non	detern	ninist	ic nati	ure in A	I proble	ms.
CO3	Stud	ents are	able to	) analyz	ze Kno	wledg	e Rep	resen	tation	Technic	ues: Se	mantic
	Netw	orks, C	oncept	ual Der	oendend	cies, S	cripts	and H	rame	s, Conc	eptual C	Braphs.
CO4	Stude	ents are	able to	Apply	the AI	techni	iques	to sol	ve va	rious Al	proble	ms.
CO5	Stude	Students are able to Analyze and compare the relative challenges pertaining to										
	ucsig		cingen	i Syster								
СО-РО	PO1	PO2	PO3	PO4	PO5	PO	PO	PO	PO	PO1	PO1	PO12
Mapping						6	7	8	9	0	1	
C01	3	3	3	3	3	-				_	<u> </u>	_
CO2	3	3	3	3	3	-	-	-	-	-	-	-
CO3	3	3	3	3	3	-	-	-	-	-	-	-
CO4	3	3	2	3	3	-	-	-	-	-	-	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-
Strong -3	medi	um -2	wea	ık -1			1					
TEXT BOO	KS:											
1. Geo	rge F	Luger,	"Artif	icial In	telliger	nce –	Struc	tures	and S	Strategie	es for (	Complex
problem Se	olving'	', 6th	Edition	n, Pea	rson <sup>°</sup> P	ublica	ation,	2009	, ISE	BN-10:	0-321-5	54589-3,
ISBN-13: 9	78- 0-3	21-545	89-3									
2. Stua	rt Rus	ssel, Pe	eter No	orvig, ʻ	"Artific	ial Ir	ntellig	ence	AM	odern A	Approac	2h", 3rd
Edition, Pea	CF BC		on, 20	15, ISB	<u>SN-13: 9</u>	1/8-9:	3-325	-4351	-3.			
	CE DU	JUKS.										
1. Elai	ne Rich	n, Kevii	n Knigl	nt, "Art	ificial l	ntellig	gence	", 3rd	Editio	on, Tata	McGra	w Hill,
2009, ISBN	-10:00	)/008/ ino Ah	/09, 18 rohom	BN-13	: 9/8-01 "Intalli	J/008 Tont S	//05		Madar	n Annr	aaah"	
2. Gros SpringerVer	an, Cr Iag Re	nia, AD rlin He	idelher	Ajiui, 9 2011	ISBN	30111 S 97836	ysten 54226	15-A I 9394	2011	п Аррг	Jacii ,	
					10011		1220	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	<b>2</b> 011			
COURSE		Dr.	Prabha	n R								

COURSE Dr. Prabl COORDINATOR:

(An Autonomous Institute, Affiliated to VTU, Accredited by NAAC with 'A' grade) Department of Computer Science & Engineering

#### SCHEME OF TEACHING AND EXAMINATION I SEMESTER (Autonomous) 2019-20 M. Tech (CSE)

I semester

SI			Teaching	Teac	hing hours p	er week	Max	ximum I allotte	Marks d	– Examination
No.	Sub Code	Subject Title	Departmen t	Lecture	Tutorial/ Seminar/ Assignment	Practical / Project	CIE	SEE	Total	Credits
1.	18SCS11	Probability Statistics and Queueing Theory (Maths)	МАТ	4	-	-	50	50	100	3
2.	18SCS12	Cloud Computing Theory and Practice	CSE	4	-	-	50	50	100	3
3.	18SCS13	Advances in Computer Network	CSE	4	-	-	50	50	100	3
4.	18SCS14	Soft Computing	CSE	4	-	-	50	50	100	3
5.	18SCS15X	ELECTIVE – I	CSE	4	-	-	50	50	100	3
6.	18SCSL16	Cloud Computing Lab	CSE	-	-	3	50	50	100	2
7.	18SCSS17	Technical Seminar	CSE	-	2	-	50	-	50	2
8.	18SCSM18	Mini project	CSE	-	-	6	50	-	50	2
	Total								700	21

Technical Seminar: Seminar on Advanced topics from refereed journals by each student.

#### **ELECTIVE I**

Sl .No	Name of the Subject	Subject Code
1	Advances in Storage Area Networks	18SCS151
2	Software Quality Assurance, Testing and Metrics	18SCS152
3	Artificial Neural Networks	18SCS153
4	Multicore Architecture	18SCS154

(An Autonomous Institute, Affiliated to VTU, Accredited by NAAC with 'A' grade)

**Department of Computer Science & Engineering** 

SCHEME OF TEACHING AND EXAMINATION II SEMESTER (Autonomous) 2019-20

### M. Tech (CSE)

II semester

CI				Teac	hing hours pe	r week	Ma	ximum M allotted	larks	
SI. No.	Sub Code	Subject Title	Teaching Department	Lecture	Tutorial/ Seminar/ Assignment	Practical / Project	CIE	SEE	Total	Examination Credits
1.	18SCS21	Managing Big Data	CSE	4	-	-	50	50	100	3
2.	18SCS22	Advanced Database Systems	CSE	4	-	-	50	50	100	3
3.	18SCS23	Artificial Intelligence and Prolog Programming	CSE	4	-	-	50	50	100	3
4.	18SCS24	Advanced Algorithms and Data structure	CSE	4	-	-	50	50	100	3
5.	18SCS25X	ELECTIVE – II	CSE	4	-	-	50	50	100	3
6.	18SCSL26	Data structure and DBMS Lab	CSE	-	-	3	50	50	100	2
7.	18RM27	Research Methodology	CSE	-	2	-	50	50	100	2
8.	18SCSM28	Mini project/Research Institute Visit	CSE	-	-	6	50	-	50	2
		Total	400	350	750	21				

#### **ELECTIVE-II**

Sl .No	Name of the Subject	Subject Code
1	Digital Image Processing	18SCS251
2	Data Science with R-	18SCS252
	Programming	
3	Cyber Security	18SCS253
4	Sensor Networks Infrastructure	18SCS254

**Chairman-BOS** 

(An Autonomous Institute, Affiliated to VTU, Accredited by NAAC with 'A' grade) Department of Computer Science

#### SCHEME OF TEACHING AND EXAMINATION III SEMESTER (Autonomous) 2019-20 M. Tech (CSE)

#### III semester#: Internship

SI				Tea	ching hours p	er week	Ma	aximun allott	n Marks ted	– Examination
SI. No.	Sub Code	Subject Title	Teaching Department	Lecture	Tutorial/ Seminar/ Assignment	Practical / Field Work	CIE	SEE	Total	Credits
1.	18SCS31	Machine Learning Techniques	CSE	04	-	4	50	50	100	3
2.	18SCS32X	Elective -III	CSE	04	-	4	50	50	100	3
3.	18SCS33X	Elective -IV	CSE	04	-	4	50	50	100	4
4.	18SCS34	Internship Evaluation	CSE	-	-			50	50	8
5.	18SCSS35	MOOCS/SWAYAM/SWEBOK/ NPTEL	CSE	-	-	-	50		50	2
6.	18SCSP36	Project Phase -I	CSE	-	-	-	50	-	50	2
		Total		250	200	450	22			

#### **ELECTIVE III**

Sl .No	Name of the Subject	Subject Code
1	Internet of Things (IoT)	18SCS321
2	Agile Methodologies	18SCS322
3	Network Programming in UNIX	18SCS323
4	Mobile Computing and Wireless Network	18SCS324

#### **ELECTIVE IV**

Sl .No	Name of the Subject	Subject Code
1	Natural Language Processing and Text mining	18SCS331
2	Data ware house and Data mining	18SCS332
3	Cryptography and Network Security	18SCS333
4	Computational Intelligence	18SCS334

\* The student should undergo internship training during the vacation between 2<sup>nd</sup> and 3<sup>rd</sup> semester for 8 weeks and for the same he must make a final presentation of the work carried out during Internship to a panel comprising Internship Guide, a senior faculty from the department and Head of the Department.

\* Student must complete a certification under anyone online course as specified in the scheme for 18SCSS35

# The College shall facilitate and monitor the student internship program.

The internship report of each student shall be submitted to the Institute.

**Chairman-BOS** 

(An Autonomous Institute, Affiliated to VTU, Accredited by NAAC with 'A' grade)

**Department of Computer Science** SCHEME OF TEACHING AND EXAMINATION IV SEMESTER (Autonomous) 2019-20

#### M. Tech in CSE

**IV** semester

SI. No.	Sub Code	Subject Title	Teaching Department	Teaching hours per week		Maximum Marks allotted			Enomination	
				Lecture	Tutorial/ Seminar/ Assignment	Practical / Field Work	CIE	SEE	Total	Credits
2.	18SCSP41	Evaluation of Project Work Phase II	CSE	-	-	6	50	-	50	2
3.	18SCSP42	Project Work Evaluation and Viva –Voce	CSE	-	-	-	100	100	200	22
Total 200 100 250								24		
Grand Total (I to IV Semester) : 2150 Marks ; 88 Credits										

**Chairman-BOS**
- \* The student shall make a midterm presentation of the activities undertaken during the first 8 weeks of internship to a panel comprising Internship Guide, a senior faculty from the department and Head of the Department.
- # The College shall facilitate and monitor the student internship program.

## The internship report of each student shall be submitted to the Institute.

## Note:

- 1) Project Phase I: 6 weeks duration shall be carried out during III Semester. Candidates in consultation with the guides shall carryout literature survey / visit to Industries to finalize the topic of dissertation.
- 2) Project Phase II: 16 weeks duration during IV Semester. Evaluation shall be taken during the IV Semester. Total Marks shall be 100.
- 3) Project Work Evaluation and viva-voce: 24 weeks duration in IV Semester. Project Work Evaluation shall be taken up at the end of the IV Semester. Project Work Evaluation and Viva-Voce Examinations shall be conducted. Total Marks shall be 200 (Phase –II Evaluation: 100 Marks, Project Evaluation marks by Internal Examiner (guide): 50, Project Evaluation marks by External Examiner: 50, and 100 for viva-voce).

## Marks of Evaluation of Project:

- 1. During Project Phase I, finalise titles and submit synopsis to the Institute along with Project Work report at the end of the Semester.
- 2. During the final viva, students have to submit all the reports.
- 3. The Project Valuation and Viva-Voce will be conducted by a committee consisting of the following:
- a) Head of the Department (Chairman)
- b) Internal examiner (Guide)
- c) External examiner proposed by the Chairman, BoE (PG)

		Course Title: Probability Statistics And Queuing Theory								
State INSTITUTE OF ICCI		Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week : 4					
ALE + DI-AM	STORA - 4	18SCS11	(L-T-P)							
Aided By Govt. of Karnataka		Exam Duration : 3 hours	CIE + SEE = 50+50=100	Total No. of Co : 52	ontact Hours					
Course										
Obje	ctives:	1. To develop ana	alytical capability and to imp	oart knowledge o	f Probability,					
		Statistics and Queuing.								
		2. The application of above concepts in Engineering and Technology.								
		<b>3.</b> Students acquire knowledge of Hypothesis testing and Queuing methods and								
		their application	is so as to enable them to app	bly them for solvin	ng real world					
		problems								
Unit No			Syllabus Content		No of Hours					
1	Axion	ns of probability, Con	ditional probability, Total prob	ability, Bayer's	10					
	theore Rando	m, Discrete Random m variable. Probabili	tion, Continuous e Distribution							
	Functi	Function, and its properties, Two-dimensional Random variables, Joint pdf								
	/ cdf a	nd their properties								
2	Probat	oility Distributions / I	Discrete distributions: Binomia	l, Poisson	10					
	Contin	etric and Hyper-geom	niform, Normal, exponential d	istributions and						
	their p	roperties.								
3	Testin	g Hypothesis: Testing	g of Hypothesis: Formulation o	f Null	11					
	hypoth Tests (	nesis, critical 10 Hour	rs region, level of significance,	errors in testing,						
	proper	ties and uses, F-distri	bution, its properties and uses,	Chi-square						
	distrib Indepe	ution, its properties a	nd uses, $\chi 2$ – test for goodness	of fit, $\chi^2$ test for						
4	Rando Avera	m Processes: Classifi ge values of Random	cation, Methods of description Processes, Analytical represen	, Special classes, tation of	11					
	Rando	m Process, Autocorre	tion function and							
	chain.	roperties, Ergodicity,	Poisson process, Markov Proc	ess, warkov						
5	Symbo Little	blic Representation of	a Queuing Model, Poisson Questic Processes Birth Death Pro-	ieue system,	10					
	M/M/1	l Queuing System, Tl	ne M/M/s Queuing System, Th	e M/M/s						
	Queui	ng with Finite buffers								

Course Outcomes				Ι	Descripti	on	RBT Levels			
C01	Demo	Demonstrate knowledge & use of probability and will be able to								
	charac function	haracterize probability models using probability mass (density)								
	Annala	41	4				D4 1 D5			
02	probat	oility c	listribut	ions and i	its applie	cations.	K4 and K5			
CO3	Descri	ibe a	random	process	in term	s of its mean and correlation	R3			
	function	ons.								
CO4	Apply	the m	ethods of	of Hypoth	nesis test	ing for goodness of fit.	R4			
CO5	Under	stand	the ter	minology	« &nom	enclature appropriate queuing	R2,R3			
	theory	and	also de	monstrate	e the k	nowledge and understand the				
	variou	s quet	ing no	ueis.						
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5					
C01	-	-	3	2	3					
CO2	2	-	2	3	2					
CO3	2	2	2	3	3					
CO4	2	-	2	1	2					
CO5	-	-	2	3	3					
Strong -3	Mediur	n -2	Weal	x -1		I				
TEXT BOOK	S:									
1. Probabilit	y, Stati	stics a	nd Queu	ing Theo	ry, V. Sı	undarapandian, Eastern Economy	Edition, PHI			
Learning	Pvt. Lto $0.7881$	1, 2009	). Publis	hed by Pl	HI Learr	ning, New Delhi (2009) ISBN 10	: 8120338448			
1501(15.	770012	20330-	177							
<b>REFERENCI</b>		KS:	with P	eliability	Queuin	g and Computer Applications 2	nd Edition by			
Kishore.	S. Trive	di, Pre	entice H	all of Ind	lia, 2004	. ISBN: 978-0-471-33341-8				
<b>2.</b> Pattern R	ecognit	ion ( A	n Intro	duction).	V Sushe	elaDevi, M Narsimha Murthy. 2	011.			
Universit	ies Pres	s, ISB	N : 978	-81-7371	-725-3	······································	7			
COURSE COORDINA	ГOR:	Dr.	Shivapr	asana						

		Course Title: Clo	oud Computing Theory and P	ractice				
STAR INST	TUTE OF IEG	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture ho	ours/week: 4			
s + Dr. AMB	QLOGY · a	18SCS12	(L-T-P)					
Aided By Govt. of Karnataka		Exam Duration : 3 hours	CIE + SEE = 50+50=100	Total No. of Co : 52	ontact Hours			
Co	urse		Description					
Obje	ctives:	<ol> <li>To provide com service models, providers in the</li> <li>To introduce to analyze and di followed in clou</li> <li>To understand h cloud environme</li> <li>To understand a Industry</li> <li>To understand h computing. To cloud federation</li> </ol>	To provide comprehensive view to different aspects of cloud computing like; service models, challenges & infrastructure with different Cloud Service providers in the market To introduce to cloud virtualization, with different type of virtualization. To analyze and differentiate between cloud architectures and few standards followed in cloud computing To understand how high throughput can be achieved with task computing on cloud environment. To understand and demonstrate different features of cloud platforms used in Industry To understand how energy efficiency achieved in cloud computing using green computing. To also understand technologies used for Cloud federation with cloud federation stack.					
Unit No			Syllabus Content		No of Hours			
1	Cloud Computing at a Glance, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model, Characteristics and Benefits, Challenges Ahead, Historical Developments, Distributed Systems, Virtualization, Web 20, Service-Oriented Computing, Utility-Oriented Computing, Building Cloud Computing Environments, Application Development, Infrastructure and System Development, Computing Platforms and Technologies, Amazon Web Services (AWS), Google AppEngine, Microsoft Azure, Hadoop, Force- com and Salesforcecom, Manjrasoft Aneka10							
2	Virtua Introdu securit technic Virtua Advan	<b>lization</b> uction, Characterist y, Managed execut ques, Execution vi lization and cloud tages of virtualization	ics of virtualized environn ion, Portability, Taxonomy rtualization, Other types o computing, Pros and cons o on, The other side of the coir	nents, Increased of virtualization f virtualization, of virtualization, n: disadvantages,	12			

	Techn Micro	ology examples, Xen par virtualization, VMware: full virtualization, soft Hyper-V					
	Cloud Introd hardw of clo Econo intero trust, a	<b>Computing Architecture</b> uction, The cloud reference model, Architecture, Infrastructure- and are-as-a-service Platform as a service, Software as a service, Types uds, Public clouds, Private clouds, Hybrid clouds Community clouds, omics of the cloud, Open challenges, Cloud definition, Cloud perability and standards, Scalability and fault tolerance, Security, and privacy, Organizational aspects					
3	High- Task of for ta paralle Work: progra task workf	Task computing, Characterizing a task, Computing categories, Frameworks for task computing, Task-based application models, Embarrassingly parallel applications, Parameter sweep applications, MPI applications, Workflow applications with task dependencies, Aneka task-based programming, Task programming model, Developing applications with the task model, Developing a parameter sweep application, Managing workflows					
4	Cloud	Platforms in Industry:	10				
	Amaze service concep Azure applia	on web services: Compute services ,Storage services, Communication es ,Additional services. Google AppEngine : Architecture and core pts, Application life cycle, Cost model Observations Microsoft : Azure core concepts, SQL Azure, Windows Azure platform nce, Observations					
5	Adva	10					
	Energ archite compu suppo Chara Techn servic						
Cou Outc	urse comes	Description	RBT Levels				
	CO1	Obtain knowledge on different aspects of cloud computing like; service models, challenges & infrastructure and different services provided by cloud service providers	R1, R2				
	CO2	Analyze the importance of virtualization and different features of Virtual Machine (VM) in cloud computing and understand cloud architectures and few standards followed in cloud computing.	R3 and R4				

CO3	To ab	le to u	nderstar	nd task co	omputing	on cloud environment.	R5	
CO4	Able platfor	to ur rms us	te different features of cloud	R5				
CO5	Able t federa	Able to understand technologies used for Cloud federation with cloud federation stack.						
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5			
C01	-	-	3	2	2			
CO2	$\overline{O2}$ 2 - 3 3 2							
CO3	-							
CO4	-	2	3	2	3			
CO5		3	2	3	3			
Strong -3	Mediu	m -2	Weal	k -1				
TEXT BOOK	S:							
1.Rajkumar I Vecchiola, C	Buyya, loud co	The U mput	Iniversi ing the	ty of Me ory and p	lbourne practice	and Manjrasoft Pty Ltd, Austra 2 <sup>nd</sup> Edition	llia, Christian	
<ol> <li>REFERENCE BOOKS:</li> <li>Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Kai Hwang, Jack Dongarra, Geoffrey Fox. MK Publishers.</li> <li>Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, McGraw Fill, 2010.</li> <li>Cloud Computing: Theory and Practice, Dan Marinescu, 1<sup>st</sup> edition, MK Publishers, 2013.</li> </ol>								
COURS COORDINA	E TOR:	Dr.	Prakas	sh				

		Course Title: Advances in Computer Networks								
SUBRINST ES	TUTE OF TECH	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture ho	ours/week: 4					
at + Dr. AMBE	MOLOGY · m	18SCS13 (L-T-P)								
Panche a	LEED.	Exam Duration : CIE+ SEE = 50+50=100 Total No. of Co								
Aided By G	OVI. of Karnataka	3 hours		:						
Co	urse		Description							
Obje	ctives:	1. Discuss with	the basics of Computer Netw	orks.						
		2. Compare var								
		Define and analy	and controlling a	nd resource						
		allocation								
Unit			Syllabus Content		No of					
No	_				Hours					
1	Found	lation: Building a N	Vetwork, Requirements, Persp ve Resource sharing Suppo	bectives, Scalable	08					
	Servic	es. Manageability. P	rotocol lavering. Performance	Bandwidth and						
	Latenc	cy, Delay X Bandwi	dth Product, Reliable Transm	ission, Stop-and-						
	Wait,	Sliding Window prot	tocol.	_						
2	Interr	etworking I: Switch	ning and Bridging, Datagram	s, Virtual Circuit	09					
	Intern	ning, Source Rout	ing, Bridges and LAN t is an Internetwork? Servic	e Model Global						
	Addre	sses, Datagram Forwa	arding in IP, subnetting and cla	ssless addressing,						
	Addre	ss Translation (ARP)	, Host Configuration (DHCP)	, Error Reporting						
2	(ICMI	P),			00					
3	State (	<b>etworking- 11:</b> Networking- 11: Networking- 11: Networking (Networking The	Work as a Graph, Distance V Global Internet Routing Area	s Routing among	08					
	Auton	omous systems (BGP	), IP Version 6 (IPv6)	s, Routing among						
4	End-t	o-End Protocols: S	Simple Demultiplexer (UDP	), Reliable Byte	09					
	Stream	n(TCP), Endto- E	nd Issues, Segment Forr	nat, Connecting						
	Establ	ishment and Termin	ation, Sliding Window Revi	sited, Triggering						
	Oueui	ng. TCP Congestion	n Control. Additive Increas	e/ Multiplicative						
	Decre	ase, Slow Start, Fast I	Retransmit and Fast Recovery							
5	Conge	estion Control and	Resource Allocation Cong	estion-Avoidance	08					
	Mecha	anisms, DEC bit, Ra	andom Early Detection (REI	D), Source-Based						
	The D	suon Avoidance. Iomain Name System	(DNS), Electronic Mail (SM	TP. POP. IMAP						
	MIME	E), World Wide Web	(HTTP), Network Managemer	nt (SNMP)						
Cou	ırse		Description		RBT Levels					
Oute	omes									
	CO1	Able to classify netw	vork services, protocols and ar	chitectures,	R3					
	explain why they are layered.									

CO2	their protocols, and apply to	R4 and R6								
	develo	op thei								
	Appli	Applications (e.g. Client Server applications, Web Services) using								
	the so	ckets A	API.							
CO3	Devel	op effe	ective c	ommunic	ation me	chanisms using techniques	R5			
	like co	onnect	ion esta	blishmen	t, queuir	ng theory, recovery Etc.				
CO4	Interp	ret var	ious co	ngestion o	control t	echniques.	R3			
CO5	Analv	se Net	work tr	affic. con	gestion of	control and resource allocation	R4			
	j				8					
~~~~	- Dat			1201		1				
CO-PO	PO1	PO2	PO3	PO4	PO5					
Mapping										
CO1	-	-	3	2	3					
CO2		2				-				
02	-	Z	3	3	2					
CO3	-	-	3	3	1					
<u> </u>			3	3	1	-				
	-	-	5	5	1					
Strong -3	Mediu	m -2	Weal	k -1						
TEXT BOOK	S:									
1. La	arry Pet	terson	and Br	uce S Da	avis "Co	mputer Networks :A System A	pproach" 5th			
Ec	lition, I	Elsevie	er -2014							
2. De	ouglas	E C	omer,	"Internet	working	with TCP/IP, Principles, P	rotocols and			
A	rchitect	$\frac{\text{ure}^{\prime}}{\sqrt{5}}$	th Edition	on, PHI -	2014					
		NO:								
1. U	yless Bl	lack, "	Comput	ter Netwo	orks Prot	ocols, Standards and Inte rfaces	"2 <sup>nd</sup> Edition			
-P	HI.									
2. Be	ehrouz	A For	ouzan, "	TCP /IP ]	Protocol	Suite" 4 th Edition – Tata McG	raw-Hill.			
COURSE		Dr.	Shamsh	ekhar pa	til					
COORDINA	COORDINATOR:									

	Course Title: Soft Computing								
STUR INST	TUTE OF TRCH	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week:4				
a + Dr. Alla	QLOGY + a	18SCS14	(L-T-P)						
Surchy and a second	THE REAL PROPERTY IN THE REAL PROPERTY INTO THE REAL PR	Exam Duration : CIE + SEE = 50+50=100 Total No. of Co							
Aided By G	ETHA WELFARE TRUE	3 hours		: 52					
	urse		Description						
Obje	cuves:	1. To learn the 2 To know ab	key aspects of Soft computing out the components and build	ing block hypothe	sis of Genetic				
		algorithm.	out the components and build	ing block hypothet	sis of Genetic				
		3. To gain insig	ght onto Neuro Fuzzy modelin	g and control.	nachines				
Unit No			Syllabus Content		No of Hours				
1	Intro	luction to Soft comp	outing: Neural networks, Fuz	zy logic, Genetic	11				
	ANN.	Evolution, basic Mo	del of ANN, Terminologies u	ised in ANN, MP					
	model	, linear separability, I	Hebb Network.	,					
2	Super	vised Learning: Perce	ptual Network, Adaptive linear	r neuron, Multiple	11				
	adapti	ve linear neurons, Ba	ck propagation Network,						
	Assoc	iative Memory Netwo	ork: introduction, training algo	rithms for pattern					
	netwo	rk, bidirectional associative	ciative memory.	ociative memory					
3	Classi	cal sets and Fuzzy Se	ts – classical and Fuzzy Relat	ions – Features of	10				
	memb	ership functions, Fu	zzification and methods of n	nembership value					
	assign	ment. Defuzzification	a lambda cuts for fuzzy relation	ns and fuzzy sets.					
4	Fuzzy	Decision Making: in Decision making in	ntroduction, individual decision makir	on making, multi	10				
	decisio	on making, fuzzy B	ayesian decision making, Fu	zzy logic control					
	systen	ns: introduction, cont	rol system design, architecture	e and operation of					
	FLC S	ystems, FLC system	widels, Applications of FLC s	systems	10				
5	Genet	ic algorithms: Intro	oduction - Basic operation chniques. Genetic algorithms	and search space.	10				
	Opera	tors of genetic algorit	hms – Genetic programming	space,					
Cer	Irse		Description		RRT I avale				
Outc	comes								
	CO1	Analyze the basics	of soft computing, ANN and	Terminologies to	R3				
	relate and understand the real time problems.								

CO2	Apply analyz	apply supervised and unsupervised learning representations for R3 and R4 nalyzing real time problems								
CO3	Analyz applica	Analyze and adopt fuzzy logic in implementing soft computing applications.								
CO4	Analyz proble	Analyze and apply genetic algorithms to solve the optimization problems								
CO-PO	PO1	PO2	PO3	PO4	PO5					
Mapping		102	100	101	100					
CO1		-	3	3	3					
CO2		-	3	3	3					
CO3	1	3	3	2	2					
CO4	2	2	3	3	2					
Strong -3	Mediun	n -2	Weal	x -1						
TEXT BOOK	S:									
1. Princi ISBN	ples of 13: 978	Soft c 81265	omputii 58744-5	ng, S N S , 2019	Sivanand	am, and S N Deepa, Wiley Ind	ia, 3 <sup>rd</sup> edition			
<ul> <li><b>REFERENCE BOOKS:</b></li> <li>1. Neuro-fuzzy and soft computing, J.S.R. Jang, C.T. Sun, E. Mizutani, Phi (EEE edition), 2012, ISBN 0-13-261066-3</li> <li>2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Third Edition</li> </ul>										
COURSE COORDINAT	FOR:	Dr.	K R Shy	vlaja						

	Course Title: Cloud Computing Laboratory								
SHAR INST	TTUTE OF ISCU	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture	hours/week :				
a + Dr. AM	NOLOGY + a	18SCSL27	(L-T-P)	4					
Aided By Govt. of Karnataka		Exam Duration : 3 hours	CIE + SEE = 50+50=100	Total No. of Contact Hours : 16					
Co	urse		Description						
Obje	ctives:	1. To Install an	d understand Virtual Box by d	eploving web appl	ication				
		2. To get Hands on with Different Cloud services: Amazon, Google apps and							
		Salesforce and	nd VMware		0 11				
		3. To Create an	d provision VMs on any Cloud	d Simulation enviro	onments, and				
		execute diffe	erent polices to understand the	v ivi reatures					
			Part A						
1	Using Given Data set apply Find-s and Candidate Elimination algorithm to find most specific and Most generic Hypothesis.								
2	Using Boston Data Set implement Linear regression to predict Mean House Value								
3	Using Boston Data Set implement Multiple Linear regression to predict Mean House Value								
4	Using	Stock Market Data, i	mplement logistic regression to	o recognize stock					
	marke with lo	t trends. Implement L ogistic regression	DA for the same data set and g	ive a comparison					
5	Using to pred	Boston data set impl dict the Mean house d	ement regression tree and fit that a lata.	ne regression tree					
			Part B (Mini Project)						
	•	A team of two stude on real time data set	ents can be formed to implement using any machine learning te	nt a mini project chnique					
	•	Design an appropria web interface or and	te user interface for the project lroid app platform.	either using					
NOTI The st viva-v	E: tudent h voce	has to execute one fro	om Part A and Demonstrate th	e mini project and	l answer the				
Cou Outco	irse omes		Description		RBT Levels				
	CO1	Learn about Amazon Amazon Web Service	EC2. Amazon Cloud computines.	ng platform,	R2				
	CO2	Salesforce cloud com applications and serve	puting platform, deploying and	l managing	R1				

CO3	Goog	gle Apps	s: Goog	le Drive,	Google	Docs and Google Slides R4			
CO4	To cr	eate and	d run VI	Ms on an	v Virtua	lization Hypervisors and <b>R3</b>			
	under	standin	g Cloud	Sim	5	5 F			
			8 010						
CO-PO	PO1	PO2	PO3	PO4	PO5				
Mapping									
CO1	2	2	3	2	3				
CO2	-	2	3	2	3				
<u> </u>		2	3	2	3				
003	-	4	3	2	5				
CO4	2	2	3	2	3				
Strong -3	Medi	um -2	Wea	k -1					
TEXT BOC	)KS:								
1. Cloud C	omput	ing: The	eory and	l Practice	e, Dan M	larinescu, 1 <sup>st</sup> edition, MK Publishers, 2013.			
REFEREN	CES:								
1. Distribut	ted and	d Cloud	Comp	uting, Fr	om Para	llel Processing to the Internet of Things, Kai			
Hwang,	Jack D	ongarra	ı, Geoffi	rey Fox.	MK Pub	lishers.			
2. Cloud C	omput	ing: A F	Practical	Approa	ch, Anth	ony T. Velte, Toby J. Velte, Robert Elsenpeter,			
McGraw	Fill, 2	2010.							
3. Case stu	idies: A	AWS, G	loogle a	pp engin	e, Salesf	orce Trailhead			
COURSE		Pro	of Sham	hekar pa	til				
COORDINA	TOR:								

		Course Title: Multi Core Architectures								
SUR INSTITUTE OF TRO		Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week : 4					
A + Dr. AM	DLOGY + a	18SCS154	(L-T-P)							
Surchy Real Party	MEGDA	Exam Duration :	CIE + SEE = 50+50=100	Total No. of Co	ontact Hours					
Aided By G	ETHA WELFARE TRUS	3 hours		: 52						
	urse		Description							
Obje	cuves:	1. To understan	nd the recent trends in the field	of Computer Arch	itecture and					
		2 To approviat	ormance related parameters.	na						
		2. To appreciat	e the need for parallel procession students to the problems related to the pro	lig.	sing - To					
		understand f	he different types of multicore	architectures	sing - 10					
		4. To understar	id the concepts of multicore ar	chitectures						
		<b>5.</b> To understar	nd concepts of multi-threading,	OPENMP						
			¥¥							
Unit No			No of Hours							
1	Introduction to Multi-core Architecture: Motivation for Concurrency in software, Parallel Computing Platforms, Parallel Computing in Microprocessors, Differentiating Multi-core Architectures from Hyper- Threading Technology, Multi-threading on Single-Core versus Multi-Core Platforms Understanding Performance, Amdahl's Law, Growing Returns: Gustafson's Law. System Overview of Threading: Defining Threads, System View of Threads, Threading above the Operating System, Threads inside the OS, Threads inside the Hardware, What Happens When a Thread Is Created, Application Programming Models and Threading, Virtual Environment: VMs and Platforms, Runtime Virtualization, System									
2	Fundamental Concepts of Parallel Programming: Designing for Threads, Task Decomposition, Data Decomposition, Data Flow Decomposition, Implications of Different Decompositions, Challenges You'll Face, Parallel Programming Patterns, A Motivating Problem: Error Diffusion, Analysis of the Error Diffusion Algorithm, An Alternate Approach: Parallel Error Diffusion, Other Alternatives.10Threading and Parallel Programming Constructs: Synchronization, Critical Sections, Deadlock, Synchronization Primitives, Semaphores, Locks, Condition Variables, Messages, Flow Control- based Concepts, Fence,10									
3	Thread	ling APIs : Threadir APIs, Threading AF	ng APIs for Microsoft Windo PIs for Microsoft. NET Framew	ws, Win32/MFC vork.	10					

	Struct Soluti Deper Loop	ures: ( on for ndence, Schedu							
4	Effect sharin No wa Threa Conte	10							
5	Priorit Algor Reclas Librar Conte	Priority Inversion, Solutions for Heavily Contended Locks, Non-blocking Algorithms, ABA Problem, Cache Line Ping-ponging, Memory Reclamation Problem, Recommendations, Thread-safe Functions and Libraries, Memory Issues, Bandwidth, Working in the Cache, Memory Contention, Cache-related Issues, False Sharing, Memory Consistency,							
Cou	irse				I	Description	0 <b>n</b>	<b>RBT</b> Levels	
Outc	omes								
	C01	Identi archit	ify the ectures	e limita s.	ations of	ILP a	and the need for multicore	R1, R2	
	CO2	Analy solve	the iss	paralle ues relat	l program ted to mu	nming te ltiproces	chniques and design issues to ssing.	R3, R4 and R5	
	CO3	Interp how t	bret the hey exp	salient ploit pa	features or rallelism	of differe	ent multicore architectures and	R3	
	CO4	Desig conce	n loop pt.	s in Ope	en MP to	find solu	ations to parallel programming	R5	
	CO5	Analy	ze Thr	eads and	d Reducti	ons in p	arallel programming problems	R4	
			ſ	<b>-</b>	Γ	T	1		
CO-P Mapp	O oing	PO1	PO2	PO3	PO4	PO5			
	CO1	-	-	2	3	1			
	CO2	-	-	2	3	2			
	CO3	-	-	3	3	2			
	CO4	2	-	2	3	3			
	CO5	1	2	2	3	2			

Strong -3	Medium -	2 Weak -1
TEXT BOO	KS:	
1. Mult	icore Prog	amming, Increased Performance through Software, Multi-threading by
Shar	neem Akht	er and Jason Roberts, Intel Press, 2012
DEPENDENC	T DOOMO	
REFERENC	E BOOKS	
COURSE		Dr. M V Vijavakumar
COORDINA	TOR:	

		Course Title: Ac	lvances in Storage Area	Networks					
		Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture ho	ours/week: 4				
		18SCS151	(L-T-P)						
Aided By G	ETHA WELFARE TRIN	Exam Duration : 3 hours	CIE + SEE = 50+50=100	Total No. of Co : 52	ntact Hours				
Co	urse		Description						
Objectives:		<ol> <li>Define and contrast storage centric and server centric systems</li> <li>Define metrics used for Designing storage area networks</li> <li>Illustrate RAID concepts</li> <li>Demonstrate, how data centers maintain the data with the concepts of backup mainly remote mirroring concepts for both simple and complex systems.</li> </ol>							
Unit No			Syllabus Content		No of Hours				
1	Introduction: Server Centric IT Architecture and its Limitations; Storage –11Centric IT Architecture and its advantages. Case study: Replacing a serverwith Storage Networks, The Data Storage and Data Access problem; TheBattle for size and access. Intelligent Disk Subsystems: Architecture ofIntelligent Disk Subsystems; Hard disks and Internal I/O Channels; JBOD,Storage virtualization using RAID and different RAID levels; Caching:Acceleration of Hard Disk Access; Intelligent Disk Subsystems;								
2	I/O T System Storag hardwa	<b>Cechniques</b> : The Phy n; SCSI; Fibre Char e. Network Attached are Architecture, File	ysical I/O path from the CPU nnel Protocol Stack; Fibre C d Storage: The NAS Archite Systems, network file system	J to the Storage hannel SAN; IP cture, The NAS and file servers.	11				
3	StorageVirtualization:DefinitionofStoragevirtualization;10Implementation Considerations;StoragevirtualizationonBlock orfilelevel;Storagevirtualizationonvariouslevels of the storageNetwork;Symmetric and Asymmetric storagevirtualization in the Network.Network.								
4	Network Attached Storage: The NAS Architecture, The NAS hardware10Architecture.Storage Area Network: Architecture Overview: Creating a Network for storage, SAN Hardware devices, Software components.10								
5	Manag manag Interfa Manag	gement of Storage N ement System, Sup ce, Standardized N gement, Out-band ma	Network: System Management oport by Management Syste Aechanisms, Property Mechanagement.	, Requirement of m, Management anisms, In-band	10				

Course Outcomes				]	Descripti	on	RBT Levels			
CO1	Identit it	dentify the need for performance evaluation and the metrics used for t								
CO2	Apply	the te	chnique	s used fo	r data m	aintenance.	R4			
CO3	Realiz	e stroi	ng virtu	alization	concepts		R3			
CO4	Devel	op tec	hniques	for eval	uating p	olicies for LUN masking, file	R5			
	systen	ıs								
					1					
CO-PO	PO1	PO2	PO3	PO4	PO5					
Mapping										
C01	-	-	3	2	2					
CO2	_		3	2	2					
		-	ò	-	-					
CO3	-	1	3	2	2					
CO4	-	2	3	2	-					
Strong -3	Mediur	n -2	Weal	k -1						
<b>TEXT BOOK</b> 1. Ulf Tr India,	<b>S: TEX</b> roppens 2013. I	<b>KT BC</b> , Rain SBN 9	OKS: er Erke 978-81-	ns and W 265-1832	olfgang 2-6	Muller: Storage Networks Expla	ined, Wiley			
REFERENCE	E BOOH	KS: RI	EFERE	NCES:	<b></b>					
I. Rober	t Spald	ing: "S	Storage	Networks	s The Co	implete Reference", Tata McGra	w-Hill, 2011.			
2. Marc	Farlev:	Stora	ge Netv	working l	Fundame	entals – An Introduction to Stor	age Devices.			
Subsy	stems,	Applic	cations,	Manager	nent, an	d File Systems, Cisco Press, 20	11. ISBN-10:			
1-587	05-162	-1ISBI	N-13: 9′	78-1-5870	05-162-3	3				
3. Richa	rd Bark	er and	Paul M	assiglia: '	"Storage	Area Network Essentials "A Co	mplete Guide			
to und	ierstand	ing an	a Imple	ementing	SAINS,	wiley India, 2012. ISBN: 978-0	-4/1-03445-2			
COURSE COORDINAT	FOR:	Pro	f. Shan	nshekar S	S. Patil					

		Course Title: So	ftware Quality Assurance,	Testing and Me	etrics		
A STATUTE OF THE WORK OF THE W		<b>Course Code:</b>	No. of Credits: 3 : 0 : 0	No. of lecture ho	ours/week: 4		
		18SCS152	(L-T-P)				
And HUNA VIDIA	ETHA WELFARE TRUE	Exam Duration : 3 hours	CIE + SEE = 50+50=100	Total No. of Co : 52	ontact Hours		
Co	urse		Description				
Objed	ctives:	<ol> <li>To adapt different product.</li> <li>To Apply SQA and</li> </ol>	methodologies and models for nd SOA function for testing of :	design developme frameworks.	nt of software		
		3. To understand of Industry	lifferent Software testing pro	cess and mechan	isms used in		
		4. To formulate diff	ferent Matrices used for measur	ring software qual	ity		
		5.To compare differe	nt tools used for software quality	Improvement			
I.mit			Syllabus Contont		No of		
No			Synabus Content		Hours		
1	What	is Software Quality?	McCall Model Boehm Model	, FURPS Model,	12		
	Benefi	ts of Software Qualit	Model Who Cares for So y Phases in Software Develo	pment Software			
	Develo	opment Life Cycle M	odels Types of Defects Cost of	of Fixing Defects			
	,Cost o Defini	of Poor Quality tions Used in Soft	ware Quality Engineering S	oftware Quality			
	Assura	ance and Quality Cor	ntrol, Scenarios of Application	of Different QC			
	Activi	ties. Software Confi	guration Management (SCM)	, Challenges in			
2	Developing Quality Software           Benefits of SOA, Role of SOA, SOA Functions SOA People SOA Plan           10						
	What i Sigma	is a Process? Process Test Maturity Mode	Frameworks, ISO 9001:2008, I Integration (TMMi)	SEI's CMMI Six			
3	Softwa	are Testing	~		12		
	Guiding Principles of Testing, Composition of a Testing Team Role of a Test Manager Role of a Tester Essential Skills of a Tester Types of Testing, White Box Testing Integration Testing System Testing Acceptance Testing Re-Testing or Confirmation Testing Regression Testing Positive Testing Negative Testing Error Guessing Exploratory Testing Sanity Testing Database Testing						
1	KISK-E	based 1 esting	lity		12		
4	Catego	ries of Software Mu	ny etrics Metrics Program: Goal	Question Metric	14		
	(GQM Metric Measu Softwa	) Method Types of M s Based on Meth rement Metrics Ba are Metrics Process N	letrics Measurement: Direction of Measurement: Direction of Measurement: Direction of Data Some ( Metrics Product Metrics Metrics Metrics)	t and Indirect Commonly Used for Resources			

5	Tools	for Qu	or Quality Improvement 06								
	Basic Diagra	Quality am) Pa	Quality Control Tools Check Sheet Cause and Effect Diagram (C&E m) Pareto Diagram Histogram Scatter Plot Run Chart Control								
	Chart	Orthog	Orthogonal Defect Classification								
Cou Outco	irse omes				I	Descripti	on	<b>RBT Levels</b>			
	CO1	Able develo	to ad	apt dif t of soft	ferent me ware proc	ethodolo duct.	gies and models for design	R3, R4			
	CO2	Able a	apply S	SQA and	d SOA fu	nction fo	or testing of frameworks.	R3			
	CO3	Able mecha	to u anisms	nderstar used in	nd differ Industry	rent So	ftware testing process and	R1, R3			
	<b>CO4</b>	Able qualit	to form y	nulate o	different	Matrices	used for measuring software	R1, R3			
	CO5	Able Impro	to c vemen	ompare t	differer	nt tools	used for software quality	R2,R3,R4			
					1	1	1				
CO-P Mapp	O ing	PO1	PO2	PO3	PO4	PO5					
	CO1	-	-	3	2	2					
	CO2	-	-	3	2	-					
	CO3	-	2	3	2	-					
	<b>CO4</b>	-	2	3	2	2					
Strong	<b>-3</b>	Mediu	m -2	Weal	k -1						
<b>TEXT</b> Anirba	T <b>BOO</b> an Basu	<b>KS:</b> 1 "Softw	vare Q	uality A	ssurance	, Testing	and Metrics" First Edition, PHI	Publication			
REFE 1. 1 Addiso ISBN:	<b>REFERENCES:</b> 1. Metrics and Models in Software Quality Engineering by Stephen Kan Addison-Wesley Longman Publishing Co., Inc. Boston, MA, USA ©2002 ISBN:0201729156										
COUR COOR	RSE RDINAT	FOR:	Dr.	Prakas	sh						

		Course Title: Artificial Neural Networks							
MILITUTE OF ICAN		<b>Course Code:</b>	No. of Credits: 3 : 0 : 0	No. of lecture ho	ours/week: 4				
		18SCS153	(L-T-P)						
PANCHAJENJA VIDYA	ETHA WELFARE TRUS	Exam Duration : 3 hours	CIE + SEE = 50 + 50 = 100	Total No. of Co : 52	ontact Hours				
Aided By G	ovt. of Karnataka								
Co	urse		Description						
Objee	ctives:	1. To understand a	nd compare the learning algori	thms.					
		2. To understand the	ne perceptron convergence theo	orem, and the relat	ionship				
		between the pero Environment.	ceptron and the Bayes classifier	r operating in a Ga	ussian				
		3 To understand S	OM development which follow	us the principles of	f Self-				
		organization.	Give de velopment which 10110v	s de principies of					
		4.To understand dyn	namical systems and HOPFIEL	D Models					
TT •4									
Unit No			Syllabus Content		No of Hours				
1	INTR	<b>ODUCTION</b> - what	is a neural network? Human B	rain, Models of a	10				
	Archit	ectures, Knowledge	Representation, Artificial	Intelligence and					
	Neural Memo	Networks LEARNI	NG PROCESS 1 – Error Con bbian learning.	rrection learning,					
2	LEAR	NING PROCESS	2: Competitive, Boltzmann	learning, Credit	11				
	Assign LAYE	R PERCEPTRONS	– Adaptive filtering problem	n, Unconstrained					
	Organi	ization Techniques,	Linear least square filters, le	ast mean square					
	-conve	ergence theorem, Re	lation between perception and	Bayes classifier					
	for a Gaussian Environment.								
3	MUL <sup>7</sup>	TILAYER PERCE	PTRON – Back propagation	algorithm XOR	11				
	experiment, feature detection, BACK PROPAGATION - back propagation								
and d		ifferentiation, Hessi rk pruning Techniqu	an matrix, Generalization, C	Cross validation,					
	learning, Accelerated convergence, supervised learning.								
4	SELF	ORGANIZATION	MAPS – Two basic feature	mapping models,	10				
	Self-or simula	ganization map, SON tions, learning vector	ganization map, SOM algorithm, properties of feature map, computer ions, learning vector quantization. Adaptive patter classification						
	Hierar	chal Vector quantiliz	er, contexmel Maps.						

5 Natine	EUI tract etwo aperi	RODY cors, ne rk para ment.	<b>O DYNAMICS</b> – Dynamical systems, stability of equilibrium states, ors, neurodynamical models, manipulation of attractors' as a recurrent k paradigm, HOPFIELD MODELS – Hopfield models, computer nent.						
Course Description Outcomes								RBT Levels	
C	01	Able	to appl	y ANN	concepts	s /techniq	ues for real time applications	R1, R2,R3	
С	02	Able	to desi	gn and	develop	ment of o	codes for different learning	R4,R6	
C	03	Able critica	to leari al think	n multi-	layer per to desig	ceptions n commo	using different techniques for	R2, R	
C	04	Able to solve Engineering problems using various ANN tools and R4, R6         Design techniques for real time applications.						R4, R6	
CO-PO Mapping	ç	PO1	PO2	PO3	PO4	PO5			
CO-PO Mapping		PO1	PO2	PO3	PO4	PO5			
С	01	-	-	3	-	2			
C	02	-	-	3	2	3			
С	03	-	1	-	2	2			
C	04	-	2	3	2	-			
Strong -3		Mediu	m -2	Wea	k -1		•		
<ul> <li>TEXT BOOK:</li> <li>1. Neural networks a comprehensive foundations, Simon Haykin, Pearson Education 2nd Edition 2004 ISBN 10: 0023527617 ISBN 13: 9780023527616</li> <li>REFERENCE BOOKS:</li> <li>1. Artificial neural networks - B.Yegnanarayana Prentice Hall of India P Ltd 2005ISBN:8120312538</li> <li>2. Neural networks in Computer intelligence, Li Min Fu TMH 2003 ISBN 0079118178, 9780079118172</li> <li>3. Neural networks James A Freeman David M Skapura Pearson Education 2004 ISBN 10:</li> </ul>									
0201	3. Neural networks James A Freeman David M Skapura Pearson Education 2004 ISBN 10: 0201513765 ISBN 13: 9780201513769								

Course Co-ordinator	Dr. Siddərəju
Course Co-orumator	Di. Siduaraju

		Course Title: Mar	aging Big data			
OHAR INST	TITUTE OF TR	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week : 4	
		18SCS21	(L-T-P)			
Aided By G	ETHA WELFARE TRUE	Exam Duration : 3 hours	CIE + SEE = 30+50=100	Total No. of Co 52	ontact Hours :	
Co	urse		Description			
Obje	ctives:	1. To Understa	nd big data for business intellig	gence		
		2. To Learn bu	siness case studies for big data	analytics		
		3. To Understa	nd NoSQL big data manageme	nt Hadoon and related	d tools	
		<b>4.</b> To understan			d 10015	
I Init	1		Sullabua Contont		No of Hours	
No			Synabus Content		NO OF HOURS	
1	Under	standing Big Data:	What is big data – why big da	ta – Data!, Data	10	
	Storag	e and Analysis, co	nvergence of key trends uns	tructured data –		
	industri froud	ry examples of big d	ata – web analytics – big data	and marketing –		
	in med	licine – advertising ar	nd big data – big data technolog	lies – Introduction		
	to Hadoop – open source technologies – cloud and big data – mobile					
	busine	ss intelligence – Cro	wd sourcing analytics – inter a	and trans firewall		
2	analyt	ICS I Data Managama	nt. Introduction to NoSOI	aggregate data	10	
2	model	s – aggregates – key-	value and document data mode	ls – relationships	10	
	– graj	ph databases – sch	ema less databases – mater	ialized views –		
	distrib	ution models – shard	ling — version – Map reduce –	- partitioning and		
3	Basics	ning – composing ma of Hadoon: Data fo	ap-reduce calculations ormat – analysing data with Had	oon – scaling out	11	
C C	– Had	oop streaming– Had	loop pipes – design of Hadoo	p distributed file	••	
	system	n (HDFS) – HDFS co	ncepts – Java interface – data fl	ow – Hadoop I/O		
	– data	integrity – compre	ssion – serialization – Avro -	- file-based data		
	Exerc	ires ise 1 HDFS				
	Start b	by reviewing HDFS.	You will find that its composi	tion is similar to		
	your le	ocal Linux file system	m. You will use the hadoop fs	command when		
	interacting with HDFS.					
	1. Review the commands available for the Hadoop Distributed File System: 2. Copy file foo txt from local disk to the user's directory in HDES					
	3. Get a directory listing of the user's home directory in HDFS					
	4. Get	a directory listing of	the HDFS root directory			
	5. Disp	play the contents of the	he HDFS file user/fred/bar.txt			
	6. Mo	ve that file to the loca	ll disk, named as baz.txt			
	7. Cre	ate a directory called	input under the user's home di	rectory		
	8. Delete the directory input old and all its contents					

	9. Verify the copy by listing the directory contents in HDFS	
4	<ul> <li>MapReduce Applications: MapReduce workflows – unit tests with MRUnit – test data and local tests – anatomy of MapReduce job run – classic Map-reduce – YARN – failures in classic MapReduce and YARN – job scheduling – shuffle and sort – task execution – MapReduce types – input formats – output formats</li> <li>Exercise 2 MapReduce</li> <li>1. Create a JOB and submit to cluster</li> <li>2. Track the job information</li> <li>3. Terminate the job</li> <li>4. Counters in MR Jobs with example</li> <li>5. Map only Jobs and generic map examples</li> <li>6. Distributed cache example</li> <li>7. Combiners. Secondary sorting and Job chain examples</li> </ul>	10
5	Hadoop Related Tools: Hbase – data model and implementations – Hbase clients – Hbase examples –praxis. Cassandra – Cassandra data model – cassandra examples – cassandra clients – Hadoop integration. Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts. Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries. <b>Exercise 3 – Extract facts using Hive</b> Hive allows for the manipulation of data in HDFS using a variant of SQL. This makes it excellent for transforming and consolidating data for load into a relational database. In this exercise you will use HiveQL to filter and aggregate click data to build facts about user's movie preferences. The query results will be saved in a staging table used to populate the Oracle Database. The moveapp_log_json table contains an activity column. Activity states are as follows: 1. RATE_MOVIE 2. COMPLETED_MOVIE 3. PAUSE_MOVIE 4. START_MOVIE 5. BROWSE_MOVIE 6. LIST_MOVIE 7. SEARCH_MOVIE 8. LOGIN 9. LOGOUT 10. INCOMPLETE_MOVIE 10. INCOMPLETE_MOVIE 10. INCOMPLETE_MOVIE 10. INCOMPLETE_MOVIE 10. INCOMPLETE_MOVIE 10. INCOMPLETE_MOVIE 11. RATE EXTERNAL TABLE movieapp_log_json ( movield INT, genreld INT, time STRING	11

recommended STRING,	
activity INT,	
rating INT,	
price FLOAT	
ROW FORMAT SER	DE
'org.apache.hadoop.hive.contrib.serde2.JsonSerde'	
LOCATION '/user/oracle/moviework/applog/';	
hive> SELECT * FROM movie app log ison LIMIT 20;	
hive> SELECT MIN(time). MAX(time) FROM movie app log ison	
1. PURCHASE MOVIE	
Hive maps queries into Map Reduce jobs simplifying the process	of
querving large datasets in HDES. HiveOL statements can be manned	l to
phases of the Man Peduce framework. As illustrated in the following figu	lro
solution and transformation operations occur in man tasks wi	hilo
selection and transformation operations occur in map tasks, wh	
aggregation is nancied by reducers. Join operations are flexible: they can	i be
performed in the reducer or mappers depending on the size of the leftm	lost
table.	
1. Write a query to select only those clicks which correspond to start	ing,
browsing, completing, or purchasing movies. Use a CASE statement	tto
transform the RECOMMENDED column into integers where 'Y' is I	and
'N' is 0. Also, ensure GENREID is not null. Only include the first 25 ro	WS.
2. Write a query to select the customer ID, movie ID, recommended st	tate
and most recent rating for each movie.	
3. Load the results of the previous two queries into a staging table. Fi	irst,
create the staging table:	
4. Next, load the results of the queries into the staging table.	
Evenies 4 Extract sessions using Dig	
Exercise 4 Extract sessions using rig	and
while the SQL semantics of HiveQL are useful for aggregation a	anu
projection, some analysis is better described as the flow of data throug	in a
series of sequential operations. For these situations, Pig Latin provide	es a
convenient way of implementing data flows over data stored in HDFS.	Pig
Latin statements are translated into a sequence of Map Reduce jobs on	the
execution of any STORE or DUMP command. Job construction is optimit	zed
to exploit as much parallelism as possible, and much like Hive, tempor	ary
storage is used to hold intermediate results. As with Hive, aggregat	tion
occurs largely in the reduce tasks. Map tasks handle Pig's FOREACH	and
LOAD, and GENERATE statements. The EXPLAIN command will sh	IOW
the execution plan for any Pig Latin script. As of Pig 0.10,	the
ILLUSTRATE command will provide sample results for each stage of	the
execution plan.	
In this exercise you will learn basic Pig Latin semantics and about	the
fundamental types in Pig Latin, Data Bags and Tuples.	
1. Start the Grunt shell and execute the following statements to set u	p a
dataflow with the click stream data. Note: Pig Latin statements	are

	assembled into Map Reduce jobs which are launched at execution of a									
	DUM	P or S	TORE	stateme	nt.					
	2 Gro	oup the	log sa							
	2. Or	d a GF	ROUP	onize nig script to process the						
	click	stream	data in	to user	sessions	00001	someopig script to process the			
Cours	se	Desci	ription					<b>RBT Levels</b>		
Outco	omes		-							
CO1		Learn	n, analy	ze and	interpret	big data	and few of its use cases from	R1,r2		
		select	ed bu	siness	domains,	Health	Care, Fraud Detection and			
		Adve	rtising.							
CO2		Analy	R3,R4							
CO3		Apply map-reduce analytics using Hadoop.						R1,r5		
CO4		Analy	yze and	develo	p applicat	tions usir	ng Hadoop and its related tools.	R4		
CO-P	0	PO	PO	PO3	PO4	PO5		•		
Mapp	oing	1	2							
CO1		1		2	3	2				
CO2		-	-	2	3	3				
CO3		- 2 3 3 2								
CO4		2	3	2	3	3				
Stron	g -3	Med	ium -2	W	eak -1	<b>I</b>	1			

## TEXT BOOKS

1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.

2. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Copyright © 2013 Pearson Education, Inc. 2012.

3. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.

4. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.

#### **REFERENCE BOOKS**

1. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.

2. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.

3. Alan Gates, "Programming Pig", O'Reilley, 2011.

Course Coordinator: Dr. Siddaraju

		Course Title: Advanced Database Systems								
STAR INST	TITUTE OF TEGIN	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture ho	ours/week: 4					
S + Dr.AM	DLOGY - m	18SCS22 (L-T-P)								
Aided By G	ETHA WELFARE TWO	Exam Duration : 3 hours	ontact Hours							
Co	urse									
Obje	ctives:	<ul> <li>Course objectives:         <ol> <li>Design and implement advanced queries using Structured Query Langua</li> <li>To study the usage and applications of Object Oriented database</li> <li>To acquire knowledge on variety of NoSQL databases</li> <li>To attain inquisitive attitude towards research topics in NoSQL databases</li> </ol> </li> </ul>								
Unit No	UnitSyllabus ContentNo ofNoHours									
1.	1.Database System Concepts and Architecture: Data Models, Schemes and Instances, Three-Schema Architecture and Data Independence, The Relational Data Model and Relational Database Constraints: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraints Violations Basic Oueries and Commands in SOI10									
2.	<ul> <li>PL/SQL Language Fundamentals, Conditional and Sequential Control, Iterative Processing with Loops, String Datatypes, Working with Strings, Specifying String Constants, Using Nonprintable Characters, Concatenating Strings, Dealing with Case, Traditional Searching, Extracting, and Replacing, Date time Datatypes, Getting the Current Date and Time, Date</li> </ul>									
3.	NoSQ NoSQ Datab	<b>L:</b> Motivations for N L Databases, Introc ase Terminology.	ot Just/No SQL (NoSQL) Dat luction to Key-Value Datab	abases, Variety of bases, Key-Value	10					
4.	Introd Introd Termi	uction to Document uction to Column l nology	Databases, Document Datab Family Databases, Column	base Terminology Family Database	11					
5.	Introd	uction to Graph Data	bases, Graph Database Termin	ology,	10					
Cor Outc	urse comes		Description		RBT Levels					
	CO1	Acquiring the basic Database and SQL.	knowledge of ER-Diagram, R	elational	R1					
	CO2	Construct queries us applications.	ing Pl/SQL efficiently for dev	eloping database	R4,r5					
	<b>CO3</b>	Critically analyze an	d evaluate variety of NoSQL	databases.	R4					

CO4	Demo based	onstrate Datab	e the ki ases, Co	nowledge olumn bas	e of Key sed Data	y-Value databases, Debases and Graph Datab	ocument bases.	R2,r3
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5			
C01	-	1	3	2	3			
CO2	-	-	3	3	3			
CO3	-	-	3	2	1			
CO4	-	1	3	-	1			
CO5	-	1	3	2	3			
Strong -3	Mediu	m -2	Weal	k -1				

#### **TEXT BOOKS:**

Ramez Elmasri, Shamkant B Navathe,"Database Systems: Models,Languages,Design and Application Programming", 6<sup>th</sup>Edition, Pearson Education, 2013.(ISBN-13:978-8131792476)

- Steven Feuerstein, "Oracle PL/SQL Programming", 6<sup>th</sup>Edition, O'Reilly Media, 2014. (ISBN-13: 978-1449324452)
- 2) Dan Sullivan,"NoSQL for Mere Mortals",1<sup>st</sup>Edition, Pearson Education, 2015. (ISBN-13: 978-9332557338)

#### **REFERENCE BOOKS / WEBLINKS:**

- 1) Michael McLaughlin, "Oracle Database 12c PL/SQL Programming", 1<sup>st</sup>Edition, McGraw-Hill Education, 2014. (ISBN-13: 978-0071812436)
- 2) Pramod J. Sadalage, Martin Fowler,"NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", 1<sup>st</sup>Edition, Pearson Education, 2012. (ISBN-13: 978-8131775691)

COURSE Prof. ShamshekarPatil COORDINATOR:	COURSE COORDINATOR:	Prof. ShamshekarPatil
----------------------------------------------	------------------------	-----------------------

		Course Title: Artificial Intelligence and Prolog Programming								
SOLAR INSTITUTE	E OF ILCOMO	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture ho	ours/week : 4					
Instantial Control of	OGY + may	18SCS23	(L-T-P)							
PARCHAL PEETHAL	WELFADE TRUS	Exam Duration :	CIE + SEE = 50+50=100	Total No. of Co	ontact Hours					
Aided By Govt. o	of Karnataka	5 nours		: 52						
Course			Description							
Objectives:		1. To Implement non-trivial AI techniques in a relatively large system								
		2. To understand uncertainty and Problem solving techniques.								
		<ol> <li>To understand various symbolic knowledge representation to specify domains and reasoning tasks of a situated software agent.</li> </ol>								
		4. To understand d representations, given problem s	ifferent logical systems for infe and trace how a particular infe pecification.	erence over formal rence algorithm w	domain orks on a					
5. To understand how to write a Prolog programs for Artificial Intelligence										
		Analyzing and Backtracking me	Solving Artificial Intelligence pethods	programs by using						
UNIT			Syllabus Content		No of					
No					Hours					
1	Wha assur for s the chara searc	t is Artificial Intel mption, What is an A uccess, real world P problem as a state acteristics, Production ch programs, Addition	ligence: The AI Problems, I Technique?, The Level of the problems, problem spaces and se space search, Production se n system characteristics, Issues and Problems.	The Underlying e model, Criteria search: Defining, ystems, Problem in the design of	10					
	Intel envir Bool	ligent Agents: Ag ronments, The structu k 2: Chapter 2 )	gents and Environments, ' are of agents. (Text Book 1: Ch	The nature of napter 1 & 2 Text						
2	Heu searc Knov Appr repre simp Com	ristic search techniques, Problem reduction wledge representation roaches to knowled esentation, The frame onle facts in logic, manually functions and	tes: Generate-and-test, Hill cli n, Constraint satisfaction, Mea on issues: Representations edge representation, Issues e problem. Using predicate log representing instance and IS I predicates. (Text Book 1: Cha	mbing, Best-first an-ends analysis. and mappings, in knowledge gic: Representing A relationships, apter 3, 4 & 5)	10					
3	Sym reaso	bolic Reasoning Unconing, Logic for non	ler Uncertainty: Introduction to -monotonic reasoning, Impler	o non-monotonic nentation Issues,	10					

	Brea	adth-first search, Statistical Reasoning: Probability and bayes				
	The	orem, Certainty factors and rule-based systems, Bayesian Networks				
	Text	t Book 1: Chapter 7 & 8 Text Book 2: Chapter 13				
4	<ul> <li>Prolog Programming for Artificial Intelligence, An Overview of Prolog, An example program: defining family relations, Extending the example program by rules, A recursive rule definition, How Prolog answers questions, Declarative and procedural meaning of programs; Syntax and Meaning of Prolog Programs, Data objects, Matching Declarative meaning of Prolog programs, Procedural meaning, Example: monkey and banana, Order of clauses and goals, Remarks on the relation between Prolog and logic.</li> <li>Lists, Operators, Arithmetic, Representation of lists, Some operations on</li> </ul>					
5	Lists lists Retr Sim quee Exan Inpu (Tex	11				
Cours Outcon	se nes	Description	<b>RBT Levels</b>			
C01		Design intelligent agents for problem solving, reasoning, planning, decision making, and learning specific design and performance constraints, and when needed, design variants of existing algorithms.	R5,R6			
(	C <b>O2</b>	Apply AI technique on current applications.	R4			
(	C <b>O</b> 3	Problem solving, knowledge representation, reasoning, and learning.	R1,R2			
(	C <b>O4</b>	Demonstrating how to write a programs for Artificial Intelligence	R2,r3			
(	C <b>O5</b>	Solving recursive programs in Prolog	R5			
(	C <b>O</b> 6	Analyzing and Solving Artificial Intelligence programs by using Backtracking methods	R4,R5			

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5
CO1	-	2	3	3	3
CO2	1	-	3	2	3
CO3	2	-	3	2	3
CO4	2	3	3	2	3
Strong -3	Mediu	m -2	Weal	k -1	

#### **TEXT BOOKS**

1. Elaine Rich, Kevin Knight, Shivashanka B Nair: Artificial Intelligence, Tata CGraw Hill 3rd edition. 2013, ISBN 10: <u>0070087709</u> ISBN 13: <u>9780070087705</u>

2. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, Pearson 3rd edition 2013, ISBN: 0-13-604259-7

3. Ivan Bratko Prolog Programming for Artificial Intelligence , (International Computer Science Series) 4th Edition, Publisher: Pearson Education Canada; 4th edition, 2011, ISBN-10: 0321417461; ISBN-13: 978-0321417466

### **REFERENCE BOOKS/WEBLINKS:**

1. Nils J. Nilsson: "Principles of Artificial Intelligence", Elsevier, ISBN-13: 9780934613101

COURSE COORDINATOR:

# Dr. M.V. Vijayakumar & Dr. K. R. Shylaja

		d Data Structu	ure					
SUMPRINST	TUTE OF IS GUE	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week : 4			
ALLER ALLER	LOOV -	18SCS24	(L-T-P)					
Aided By Govt. of Karnataka		Exam Duration : 3 hours	CIE + SEE = 50+50=100	Total No. of Co : 52	ontact Hours			
Co	urse		Description					
Obje	ctives:	1. To learn implem	8					
		2. To learn the graph search algorithms.						
		3. To study network flow problems.						
		4. To study the working mechanism of advanced data structures						
		To understand the	ne application of hashing techn	ique				
Unit	Γ		Syllabus Contont		No.of			
No		Synabus Content						
1	Review of Analysis Techniques: Growth of Functions: Asymptotic							
	Solutio	on of Recurrence eq ence – tree method	uations- The Course substitut , The master method; Amo	ion method, The ortized Analysis:				
2	Grap	h Algorithms: Bellma	an - Ford Algorithm: Single sou	rce shortest paths	10			
	in a D Fulker	AG; Johnson's Algori rson method; Maximu	thm for sparse graphs; Flow ne m bipartite matching.	tworks and Ford-				
3	Hash addres a heap	<b>Tables</b> , Direct-addressing, Perfect hashing , The heapsort algorit	ess tables, Hash tables, Hash , Heaps Maintaining the heap p hm, Priority queues	functions, Open property, Building	10			
4	Binar search Red-B Deleti	y Search Trees, What tree, Insertion and Black Trees, Prope	at is a binary search tree? Q deletion, Randomly built bir rties of red-black trees, Rot	uerying a binary hary search trees, tations, Insertion	11			
5	<b>B-Tre</b> from a	es, Definition of B-tro B-tree, Structure of I	ees, Basic operations on B-tree Fibonacci heaps	s, Deleting a key	10			
<b>C</b> -			Description					
Outc	comes		Description		KD1 Levels			
	CO1	Analyze, Design and	d apply iterative and recursive	algorithms	R3,R4,R6			
	CO2	Interpret the logic ar real-time application	nd determine the suitable data s	structures for a	R2,R5			

CO3	To ap applic	ply gra ations	ne R3,R4						
CO4	Use A rotatio	Advano ons in 1	R4						
CO5	CO5 Use hashing technique to optimize retrieval process in real-time applications.								R4,R5
CO DO PO1 PO2 PO3 PO4 PO5									
CO-PO         PO1         PO2         PO3         PO4         PO5           Mapping									
CO1	-	-	3	3	3				
CO2	-	-	3	3	3				
CO3	-	-	3	3	3				
CO4	-	1	3	2	3				
CO5	-	1	3	2	3				
<b>TEXT BOO</b> 1. T. H ( Editio	<ul> <li>TEXT BOOK:</li> <li>1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd Edition, Prentice-Hall of India, 2010. ISBN:9780262033848</li> </ul>								
REFERENC	E BOO	OKS/V	VEBLI	NKS:					
1. Ellis I Editio	Horowi on, Univ	tz, Sar versitie	tajSahn es press,	i, S.Rajas 2007, IS	sekharan SBN 817	n: Funda /371612	amentals 9, 9788	of Compu 173716126	iter Algorithms, 2nd
2. Horov Publis	witz, Sa sher, IS	hani, 1 BN: 8	Dinesh 175152	Mehata, 788, 9788	—Funda 8175152	amental 2786.	s of Dat	a Structure	es in C++I, Galgotia
3. M Fol	lk, B Zo	bellick,	G. Rice	cardi, —l	File Stru	ctures,	Pearson	Education	, ISBN:81-7758-37-
<b>4.</b> Peter 43982	Brass, - 2-5	—Adv	anced D	)ata Struc	tures∥, C	Cambrid	lge Univ	ersity Press	s, ISBN: 978-1-107-
COURSE COORDINAT	ГOR:	Dr.	K R Shy	ylaja					

		Course Title : Digi						
Star INST	TTUTE OF IF OF	Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture hou	irs/week: 4			
ILE + Dr. AMB	NOLOGY - RE	18SCS251	(L-T-P)					
And By G	ETHA WELFARE TRUB	Exam Duration : 3 hours	CIE + SEE = 50+50=100	Total No. of Con 52	Total No. of Contact Hours : 52			
Co	urse							
<b>Objectives:</b>		1. To understa	al transforms					
		necessary for image processing and to study the image enhancement						
		techniques						
		2. To understar	nd the image segmentation and	representation tecl	nniques.			
		3. To understar	nd how image are analyzed to e	extract features of i	nterest.			
		4. To introduce	the concepts of image registra	tion and image fus	sion.			
		5. To analyze	the constraints in image proce	ssing when dealin	g with image			
		data sets.		C	0 0			
Unit No	Syllabus Content No of Hours							
1.	Introd	Introduction: What is Digital Image Processing, Origins of Digital Image						
	Proces	sing, Examples of fi	elds that use DIP, Fundamenta	l Steps in Digital				
	Image	Processing, and Corr	ponents of an Image Processing	g System. Digital				
	Image	Fundamentals: Eler	nents of Visual Perception, A	A Simple Image	11			
	Forma	tion Model, Basic	Concepts in Sampling an	d Quantization,				
	and St	rinking Digital Image	es. Some Basic Relationships	Between Pixels				
	Linear	and Nonlinear Opera	ations.	Detween Tixels,				
2.	Image	Enhancement in t	he Spatial Domain: Some B	asic Gray Level				
	Transf	ormations, Histog	gram Processing, Enhand	cement Using	11			
	Arithm	netic/Logic Operation	s, Basics of Spatial Filtering, S	moothing Spatial	11			
2	Filters	Sogmontation	and Object Decomition.	Datastian of				
5.	Discor	tinuities Edge Lin	king and Boundary Detection	n Thresholding	10			
	Region	n-Based Segmentatio	n, Patterns and Pattern Classes,	Methods.	10			
4.	Image	Restoration: A	Model of the Image degrad	ation/Restoration				
	proces	s, Noise Models, Re	storation in the Presence of No	oise Only–Spatial	10			
	Filteri	ng, Periodic Noise Re	duction by Frequency Domain	Filtering, Linear,	10			
	POSITIC	on-Invariant Degrada	ations, Estimating the Degra	uation Function,				
5.	Mornh	ological Image Pro	cessing: Preliminaries Dilation	on and Erosion				
	Openin	ng and Closing, T	he Hit-or-Miss Transformation	on, Some Basic				
	Morph	ological Algorithr	ns. Image Segmentation:	Detection of	10			
	Discor	ntinuities, Edge Lin	king and Boundary Detection	n, Thresholding,				
	Regior	n-Based Segmentatio	n.					

Course Outcomes		<b>RBT Levels</b>						
1.	Under in per	Understand image formation and the role human visual system plays in perception of gray and color image data.						
2.	Apply (Four	Apply image processing techniques in both the spatial and frequency (Fourier) domains						
3.	Desig and to	Design image analysis techniques in the form of image segmentation and to evaluate the Methodologies for segmentation.						
4.	Cond techn	R2						
5.	Understand the concepts of image registration and image fusion.						R5	
6.	Analyze the constraints in image processing when dealing with image data sets and to apply image algorithms in practical applications						R4,R3	
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5			
CO1	-	-	3	2	1			
CO2	-	3 2 2						
CO3	-							
CO4	-							
CO5	-	2	3	2	-			
CO6	-	2	3	2	1			

## **TEXT BOOK:**

1. Kazem Sohraby, Daniel Minoli, Taieb Znati "WIRELESS SENSOR NETWORKS Technology, Protocols, and Applications" John Wiley & Sons, Inc. Publications.

2. Holge Karl and Andreas Willing "Protocols and Architectures for Wireless Sensor Networks" 2011 John Wiley & Sons, Inc. Publications.

## **REFERENCE BOOKS / WEBLINKS:**

- 1. Matthijs Kooijman Building Wireless Sensor Networks Using Arduino (Community Experience Distilled).
- 2. Edgar H. Callaway Jr Wireless Sensor Networks: Architectures and Protocols (Internet and Communications)

## Course Coordinator: Prof. Shamshekar S. Patil

	Course Title: Data Science with R-Programming								
SHAR INST	TTUTE OF IEG	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week : 4				
a + Dr. AMB	ADLOGY + c	18SCS252	(L-T-P)						
ANOCHAL D	REGD.	Exam Duration : CIE + SEE = 50+50=100 Total No. of Con							
Aided By C	Aided By Govt. of Karnataka								
Course Objectives:		1 To yu donator							
Objectives.		2. To understar	mming						
		3. To understand linear regression for regression							
	4. To understand parametric and non-parametric classification 5. To understand text mining techniques								
	T								
Unit No			No of Hours						
1	Overv	iew of the R Progra	amming Language Basic Dat	a Types Control	11				
	Data in	nto R. Data Visualiza	tion	ackages, Getting					
2									
2	Distrib	bution, Putting It All	Fogether: Outlier Detection	a Sense of Data	10				
3	Regres	sion: Introduction	Parametric Regression Model	Nonnarametric	10				
5	Regres	ssion Models	r arametrie Regression woder	s, Nonparametric	10				
4	Classit	fication, Introduct	ion, Parametric Classific	ation Models,	10				
	Nonpa	rametric Classificatio	on Models						
5	Text N	Ining, Introduction, I	Dataset, Reading Text Input Da	ta, Common Text	11				
	Pre-pr	ocessing Tasks, Term	i Document Matrix, Text Minii	ng Applications					
					י דשמת				
Outo	urse comes		Description		<b>KBI</b> Levels				
	CO1	Understand and App	ply the data analytics basics		R3				
	CO2	Apply the constructi	on of R Programming to desig	n real time	R3,R4				
		applications							
	CO3	Apply Linear Regres	ssion for Regression problems	in real time	R3				
	CO4	Understand and App	ly parametric and non-paramet	tric classification	R2,R3				
	CO5	Understand and App	oly text mining techniques		R3,R4				
					1				
CO-PO	PO1	PO2	PO3	PO4	PO5				
-----------	-------	------	------	-------------	-----				
Mapping									
CO1	-	-	3	3	2				
CO2	-	-	3	3	3				
CO3	-	-	3	3	2				
CO4	2	-	3	3	2				
CO5	2	-	3	3	2				
Strong -3	Mediu	m -2	Weal	<b>x -1</b>					

## **TEXT BOOKS:**

**1.** Beginning Data Science with R, Manas A Pathak, 2014, ISBN 978-3-319-12065-2 ISBN 978-3-319-12066-9 (eBook) DOI 10.1007/978-3-319-12066-9

## **REFERENCE BOOKS:**

1. Data Science and Big Data: An Environment of Computational Intelligence, **Pedrycz**, Witold, **Chen**, Shyi-Ming (Eds.) ISBN 978-3-319-12066-9

2. A First Level Book to expedite Statistics through R: An Inquisitive approach, Dr. N B Venkateshwaralu, Amazon Asia-Pacific Holdings Private Limited, 2018

	Dr. K R Shylaja
COURSE	
<b>COORDINATOR:</b>	

		Course Title: Cyber Security							
ANRINST	TUTE OF TEC	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture hou	urs/week : 4				
		18SCS253	(L-T-P)						
Aided By G	Exam Duration : 3     CIE + SEE = 50+50=100     Total No. of Contact Ho       Added By Govt. of Karnataka     Figure 1     Source     Source								
Co	urse		Description						
Obje	ctives:	1. To provide an unde 2. To analyze various	erstanding Computer forensics fun computer forensics technologies	damentals					
		<ol> <li>To provide comput</li> <li>To identify method</li> <li>To apply the method</li> </ol>	er forensics systems is for data recovery. ods for preservation of digital evid	ence					
Unit			Syllabus Content		No of				
No					Hours				
1	Comp	uter Forensics Fund	lamentals		10				
	Introd	uction to Computer	Forensics, Use of Computer F	Forensics in Law					
	Enforc	cement, Computer	r Forensics Assistance	to Human					
	Resou	rces/Employment P	Proceedings, Computer Fore	ensics Services,					
	Benefi	ts of Professional Fo	rensics Methodology.						
2	Types of Computer Forensics Technology11Types of Military Computer Forensic Technology, Types of Law11Enforcement: Computer Forensic Technology, Types of Business Computer11Forensic Technology, Specialized Forensics Techniques, Hidden Data and11How to Find It, Spyware and Adware.11Encryption Methods and Vulnerabilities ,Protecting Data from Being11Compromised ,Internet Tracing Methods ,Security and Wireless11Technologies ,Avoiding Pitfalls with Firewalls ,Biometric Security11								
3	Types	of Computer Foren	sics Systems		11				
	Types of Computer Forensics Systems11Internet Security Systems, Intrusion Detection Systems, Firewall Security11Systems, Storage Area Network Security Systems, Network Disaster11Recovery Systems, Public Key Infrastructure Systems, Wireless Network11Security Systems.11Satellite Encryption Security Systems, Instant Messaging (IM) Security								
	Systems, Net Privacy Systems, Identity Management Security Systems								
4	,Identi	ty Thett, Biometric S	Security Systems, Homeland Se	ecurity Systems	10				
-	Data R Data R Data Hidder	Recovery Defined ,Da Recovery ,The Data n Data	ta Backup and Recovery , The Fa-Recovery Solution , Hiding	Role of Backup in and Recovering	10				
	Evide	nce Collection and I	Data Seizure	a — • •					
	Why C ,The R and Ai	Collect Evidence?, Co Rules of Evidence ,V rchiving, Methods of	ollection Options ,Obstacles ,Ty olatile Evidence ,General Proc Collection, Artefacts.	pes of Evidence redure Collection					

5 Dup	lication	and P	reserva	tion of D	igital Ev	vidence	10			
Pres	erving t	ing the Digital Crime Scene, Computer Evidence Processing Step								
Con	puter 1	uthont	verific	ation an Proctical	a Autre	rations				
Course	rse Description									
Outcomes					-		Levels			
COI	Unde	rstand	the defin	nition of o	compute	r forensics fundamentals.	R4			
CO2	Descr	ribe the	types c	of comput	er forens	sics technology.	R2,R3			
CO3	Anal	yze var	ious cor	nputer fo	rensics s	ystems.	R3			
CO4	Illust	rate the	method	ds for dat	a recover	ry, evidence collection and	R4,R3			
	data s	seizure.								
COS	Sum	narize	duplicat	ion and p	preservati	ion of digital evidence.	R6			
							I			
СО-РО	PO	PO	PO3	PO4	PO5					
Mapping	1	2								
CO1	-	-	3	2	-					
CO2	-	-	3	2	1					
CO3	-	3 3 2								
CO4	-	3 2 2								
CO5	-	-	3	2	2					
Strong -3	Med	ium -2	W	eak -1	•	•				

## **TEXT BOOKs:**

1. John R. Vacca, Computer Forensics: Computer Crime Scene Investigation, 2nd Edition, Charles, River Media, 2005 ISBN-13: 978-1584503897

## **REFERENCE BOOKS/WEBLINKS:**

1. ChristofPaar, Jan Pelzl, Understanding Cryptography: A Textbook for Students and Practitioners, 2nd Edition, Springer's, 2010ISBN 978-3-642-04101-3

2. Ali Jahangiri, Live Hacking: The Ultimate Guide to Hacking Techniques & Countermeasures forEthical Hackers & IT Security Experts, Ali Jahangiri, 2009ISBN-13: 978-0984271504

3. Computer Forensics: Investigating Network Intrusions and Cyber Crime (Ec-Council Press Series:Computer Forensics), 2010ISBN-13: 978-1435483521

#### Course Coordinator: Prof. Madhu B

	Course Title: Sensor Networks Infrastructure									
STARINST	TTUTE OF TROIN	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture hou	rs/week: 4					
ALS + Dr. Alle	QLOGY · ·	18SCS254 (L-T-P)								
- Sentonia	REOD.	Exam Duration : 3	CIE + SEE = 50+50=100	Total No. of Con	tact Hours :					
Aided By G	d By Govt. of Karnataka 52									
Co	urse		Description							
Obje	ctives:	1. Understand	of Wireless Sensor Networks	and its applications.						
		2. Understanding	ng of Basic wireless Sensor I	v and Protocols						
		4.Operating Sys	tems for Wireless Sensor Netw	works.						
Unit			Syllabus Content		No of					
No					Hours					
1.	Introd Regio	uction and Overviev	of Wireless Sensor Netwo	rks: Introduction,	10					
	Netwo	orks: Introduction, Ba	ckground, Range of Applicat	ions, Examples of						
	WSN	Applications.		, <b>1</b>						
2.	Basic	Wireless Sensor Tech	nology: Introduction, Sensor	Node Technology,	11					
	Transi	nission Technology	and Systems: Introduction. F	Radio Technology						
	Prime	r, Available Wireless	Technologies,	8,						
3.	Availa of MA	ble Wireless Technol C Protocols, MAC P	logies: Introduction, Backgrou rotocols for WSNs, Sensor-M	nd, Fundamentals AC Case Study.	10					
4.	Routir	ng Protocols for	Wireless Sensor Network	s: Introduction,	11					
	Backg	round, Data Dissemi	nation and Gathering, Routing	g Challenges and tegies in Wireless						
	Sensor	r Networks,	ensor retworks, reduing stre							
5.	Opera	ting Systems for Wir	eless Sensor Networks: Introc	luction, Operating	10					
	Syster	n Design Issues, Exai OS. 276	2 Mate, 277 3 N	agnetOS. 278						
	4 MA	NTIS, 278	5 OSPM, 279 6 E	EYES OS, 279						
	7 Sen	DS, 280	8 EMERALDS, 280 9 I	PicOS,						
Cor	urse		Description		RRT L avolc					
Outc	comes		Description		KD1 Levels					
1	ι.	Explain the wireless	sensor networks and its applie	cations	R2,R3					
2	2.	Explain Basic techno	plogies for WSN.		R2					
3	3.	Different types of Pr	otocols for WSN.		R5,R6					
4	4.     Understand different types of Operating system for WSN.     R2									

5	To ur	To understand different types operating system design						
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5			
CO1	-	-	3	3	3			
CO2	-	-	3	3	3			
CO3	-	-	3	3	3			
CO4	-	-	3	2	1			
CO5	-	1	-	1	1			

## **TEXT BOOK:**

- 3. Kazem Sohraby, Daniel Minoli, Taieb Znati "WIRELESS SENSOR NETWORKS Technology, Protocols, and Applications" John Wiley & Sons, Inc. Publications.
- 4. Holge Karl and Andreas Willing "Protocols and Architectures for Wireless Sensor Networks" 2011 John Wiley & Sons, Inc. Publications.

## **REFERENCE BOOKS / WEBLINKS:**

- 3. Matthijs Kooijman Building Wireless Sensor Networks Using Arduino (Community Experience Distilled).
- 4. Edgar H. Callaway Jr Wireless Sensor Networks: Architectures and Protocols (Internet and Communications)

Course Coordinator: Prof. Shamshekar S. Patil

	Course Title: Data structures and DBMS LAB								
ALL METTURE OF TO	Course Code: 18SCSL26	No. of Credits: 3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 4						
Aided By Govt. of Karnataka	Exam Duration : 3 hours	CIE + SEE = 50+50=100	Total No. of Contact Hours : 16						
		•	·						
Course		Description							
<b>Objectives:</b>	1. To understand u	sage of advanced data structu	are in real time applications						
	2. To acquire inqui	isitive attitude towards resear	ch topics in databases.						
	3. To acquire pract	tical knowledge on advanced	databases and its applications.						

- 4. To implement the shell of Operating System.
  - To implement distributed operating system concepts.

Unit No	Syllabus Content	No of Hours

## Part A: ADBMS LABORATORY WORK

Note: The following experiments may be implemented on MySQL/ORACLE/PostgreSQL or any other suitable RDBMS with support for Object features

- 1. Develop a database application to demonstrate storing and retrieving of BLOB andCLOB objects.
  - a) Write a binary large object (BLOB) to a database as either binary or character (CLOB) data, depending on the type of the field in your data source. To write a BLOB value to the database, issue the appropriate INSERT or UPDATE statement and pass the BLOB value as an input parameter. If your BLOB is stored as text, such as a SQL Server text field, pass the BLOB as a string parameter. If the BLOB is stored in binary format, such as a SQL Server image field, pass an array of type byte as a binary parameter.
  - b) Once storing of BLOB and CLOB objects is done, retrieve them and display the results accordingly.
- 2. Develop a database application to demonstrate the representation of multi valuedattributes, and the use of nested tables to represent complex objects. Write suitablequeries to demonstrate their use.

Consider Purchase Order Example: This example is based on a typical business activity: managing customer orders. Need to demonstrate how the application might evolve from relational to object-relational, and how you could write it from scratch using a pure object-oriented approach.

- a) Show how to implement the schema -- Implementing the Application under the Relational Model
   -- using only MySQL/PostgreSQL/Oracle's built-in data types. Build an object-oriented application on top of this relational schema using object views.
- 3. Design and develop a suitable Student Database application by considering appropriate attributes. Couple of attributes to be maintained is the Attendance of a student in each subject for which he/she has enrolled and Internal Assessment Using TRIGGERS, write active rules to do the following:
  - a) Whenever the attendance is updated, check if the attendance is less than 85%; if so, notify the Head of the Department concerned.

b) Whenever, the marks in an Internal Assessment Test are entered, check if the marks are less than 40%; if so, notify the Head of the Department concerned.

#### Use the following guidelines when designing triggers:

- Use triggers to guarantee that when a specific operation is performed, related actions are performed.
- Use database triggers only for centralized, global operations that should be fired for the triggering statement, regardless of which user or database application issues the statement.
- Do not define triggers that duplicate the functionality already available in any database (Oracle/MySQL/PostgreSQL, etc.). For example, do not define triggers to enforce data integrity rules that can be easily enforced using declarative integrity constraints.
- Limit the size of triggers (60 lines or fewer is a good guideline). If the logic for your trigger requires much more than 60 lines of PL/SQL code, it is better to include most of the code in a stored procedure, and call the procedure from the trigger.
- Be careful not to create recursive triggers. For example, creating an AFTER UPDATE statement trigger on the EMP table that itself issues an UPDATE statement on EMP causes the trigger to fire recursively until it has run out of memory.
- 4. Design, develop, and execute a program to implement specific Apriori algorithm for mining association rules. Run the program against any large database available in the public domain and discuss the results.

Association rules are if/then statements that help uncover relationships between seemingly unrelated data in a relational database or other information repository. An example of an association rule would be "If a customer buys a dozen eggs, he is 80% likely to also purchase milk".

#### **Part B: Algorithms and Data structure Laboratory**

- 1 Implement Binary search tree for some real time application and demonstrate the operations on binary search tree
- 2 Implement Red-Back tree rotations on some real time applications with insertion, deletion and searching
- 3 Implement all the functions of a dictionary (ADT) using hashing. Data: Set of (key, value) pairs, Keys are mapped to values, Keys must be comparable, Keys must be unique Standard Operations: Insert(key, value), Find(key), Delete(key)
- 4 To create ADT that implements the SET concept.
  - a. Add (newElement) -Place a value into the set
  - b. Remove (element) Remove the value
  - c. Contains (element) Return true if element is in collection

d. Size () Return number of values in collection Iterator () Return an iterator used to loop over collection

- e. Intersection of two sets,
- f. Union of two sets,
- g. Difference between two sets,
- h. Subset

Course Outcomes	Description	<b>RBT Levels</b>
1.	Model and represent the real world data using object oriented database.	R1,R2

2.	Embe of mi	Embed the rule set in the database to implement data warehousing of mining.								
	01 1111									
3.	Choo	se and	design d	latabase f	for recen	t applications database for	R6,R5			
	better	intero	perabili	ty						
4.	Use E	Binary s	search t	rees in an	y real tir	ne problem domains where	R5,R3			
	appro	priate.			-	-				
5.	Use R	Redbl	ack tree	s for real	time pro	blems for optimization	R4			
	purpo	se.								
6.	Use h	ashing	techniq	ue for sea	arching i	n any real time applications.	R3			
СО-РО	PO1	PO2	PO3	PO4	PO5					
Mapping										
COL	2	2	3	2	3					
001	2	2	5	2	5					
CO2	1	2	3	2	3					
CO3	2	2	3	2	3					
CO4	-	2	3	3	3					
		2	5	5	5					
C05	1									
CO6	1	2	3	3	3					
Course Coor	dinato	or: Pro	f. Shan	nshekar H	Patil & H	K.R. Shylaja				

	Course Title : Research Methodology							
SHAR INST	TUTE OF TEGH	Course Code:	irs/week : 2					
In the second seco	OLOGY + ma	18RM27	(L-T-P)					
Subcurrant P	TO A S TOTAL OF	Exam Duration : 3	CIE + SEE = 50+50=100	Total No. of Con	tact Hours :			
Aided By G	ovt. of Karnataka	nours		20				
			Description					
Cot Obied	urse ctives:	1 Howe a basis	Description		antitating and			
0 »je		1. Have a basic qualitative re	esearch	ig principles of qu	antitative and			
		2. Identify the o	overall process of designing a res	earch study from i	ts inception to			
		its report. 3. Choose the	most appropriate research m	ethod to address	a narticular			
		research que	stion		u pur troutur			
		4. Gain a overv analysis	iew of a range of quantitative ar	d qualitative appro	oaches to data			
		unui y 515						
Unit			Syllabus Content		No of			
No					Hours			
1.	Unit –	I, Overview of Research and its types is	arch Ientifying and defining resear	ch problem and	08			
	introd	uction to different	research designs. Essential	constituents of				
	Litera	ture Review. Basic p	rinciples of experimental design	gn, Primary data				
	and So	econdary Data, metho	ods of primary data collection,	classification of				
2.	Unit –	II, Sampling Method	ls		06			
	Proba	bility sampling: sim	ple random sampling, syste	matic sampling,				
	stratifi	ed sampling, cluste	er sampling and multistage	sampling. Non-				
	sampl	ing Sampling: conv	tions	sampling, quota				
3.	Unit –	III, Processing and a	nalysis of Data		06			
	Statist	ical measures and th	eir significance: Central tende	encies, variation,				
	skewn	ess, Kurtosis, time se	ries analysis, correlation and re	gression, Testing				
4.	Unit-I	V, Essential of Repor	t writing and Ethical issues:		06			
	Signif	icance of Report Wri	ting, Different Steps in Writing	g Report, Layout				
	of the	Research Report, Et	hical issues related to Research	, Plagiarism and				
	sen- P	iagiarisili, rudiisiling						
Cou	urse		Description		<b>RBT Levels</b>			
Outc	omes							
-		Describe a range of	quantitative and qualitative rese	earch designs and	R3,R4			
	L <b>.</b>	identify the advanta	ages and disadvantages assoc	iated with these				
		designs	, e, . , e	1, 11 1	DC			
2	2.	Choose appropriate	quantitative or qualitative meth	or qualitative method to collect data R6				

3.	Analy	Analyse and test the given data using appropriate methods						
4.	Desig reseat	Design an appropriate mixed-method research study to answer a research question						
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5			
CO1	-	-	-	-	1			
CO2	-	1	2	1	-			
CO3	-	2	2	1	-			
CO4	-	1	-	-	-			
Course Coordinator: Dr. Chandrakant poojari								

	Course Title: Machine Learning Techniques							
SHAR INST	TUTE OF TROUT	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture ho	ours/week: 4			
Alded By Govt. of Karnataka		18SC31						
		Exam Duration : 3 hours	ntact Hours :					
Co	urse		Description					
Obje	ctives:	1. Explain basi	c concepts of learning and deci	sion trees.				
		2. Compare an	d contrast neural networks and	genetic algorithms				
		3. Apply the B 4 Examine and	ayesian techniques and instant	based learning				
			arytical learning and remitired	icarining				
Unit			Syllabus Content		No of Hours			
No			Synabus Content					
1	INTR	ODUCTION, CONC	CEPT LEARNING AND DE	CISION TREES	11			
	Learni	ing Problems – Desig	ning Learning systems, Perspe	ctives and Issues				
	– Colle – Indu	ictive bias – Decision	Tree learning – Representatio	n – Algorithm –				
	Heuris	stic Space Search		C				
2	NEUR	RAL NETWORKS	AND GENETIC ALGORI	THMS: Neural	10			
	and Ba	ack Propagation Algo	rithms – Advanced Topics – Ge	enetic Algorithms				
	– Hyp	othesis Space Search	-Genetic Programming – Moo	dels of Evolution				
3	and Le	earning. ESIAN AND COMP	TATIONAL LEARNINGL F	aves Theorem –	10			
U	Conce	pt Learning – Maxim	um Likelihood – Minimum De	escription Length				
	Princi	ple – Bayes Optimal	Classifier – Gibbs Algorithm	n – Naïve Bayes				
	Classi – Sam	fier– Bayesian Belief inle Complexity for I	Network – EM Algorithm – Pr Finite and Infinite Hypothesis S	robably Learning Spaces – Mistake				
	Bound	l Model.	inte and infinite Hypothesis (	races minimum				
4	INST	ANT BASED LEAR	NING AND LEARNING SET	OF RULES: K-	11			
	Neare	st Neighbor Learning	- Locally Weighted Regression	on – Radial Basis				
	Functi	ions –CaseBased Re	asoning – Sequential Coverir	ng Algorithms –				
	Order	Rules – Induction as	Inverted Deduction– Inverting	Resolution				
5	ANAI	LYTICAL LEARNIN	IG AND REINFORCED LEA	RNING: Perfect	10			
Domain Theories – Explanation Based L		nation Based Learning – Indu- rithm – Reinforcement Learni	uctive-Analytical $n_{\sigma} = Task = \Omega_{-}$					
	Learni	ing – Temporal Diffe	rence Learning					
Cou	irse		Description		<b>RBT Levels</b>			
			· · · · · · · · · · · · · · · · · · ·	1	De			
	<b>CO1</b> Choose the right learning techniques for designing an application with the basic knowledge of ML techniques.							

CO2	Apply appro	y effect	ctively applicat	neural i	networks	and	genet	ic	algorithn	ns for	R4,R5
CO3	Apply	Apply bayesian techniques and derive effectively learning rules.									R4
CO4	Choo techn	Choose and differentiate reinforcement and analytical learning techniques							R5,R6		
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5						
CO1	-	-	3	3	3						
CO2	2	-	3	3	3						
CO3	-	-	3	2	2						
CO4	2	-	3	3	2						
Strong -3	Mediu	<b>m -2</b>	Weal	k -1							

## **TEXT BOOK:**

1. Tom M. Mitchell, "Machine Learning", McGraw-Hill Education (INDIAN EDITION), 2013.

## **REFERENCE BOOKS / WEBLINKS:**

1. Ethem Alpaydin, "Introduction to Machine Learning", 2nd Ed., PHI Learning Pvt. Ltd., 2013.

2. T. Hastie, R. Tibshirani, J. H. Friedman, "The Elements of Statistical Learning", Springer; 1<sup>st</sup> edition, 2001.

Course Coordinator: Dr. K R Shylaja

		Course Title: Internet Of Things								
SUR INST	TTUTE OF TRCL	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week: 4					
a + Dr. AMB	NOLOGY +	18SCS321	(L-T-P)							
- Sunch	REDD	Exam Duration :	CIE + SEE = 50+50=100	Total No. of Co	ontact Hours					
Aided By G	ETHA WELFARE TRUS	3 hours		:52						
Co	urse		Description							
Obje	ective	1. To understand t	the basic concepts of IoT with	th overview of its	Physical and					
5	5:	2. To understand a	nd analyze different IoT enabl	ing Technologies						
		3. To understand d	ifferent IoT levels and their de	ployment template	S					
		4. To understand a	pplication of IoT for different	domains.						
		5. To understand t	the importance of software de	efined networking	and Network					
		virtualization fu	nction from IoT perspective.	mont monitoring u	sing IoT					
		0. TO discuss and an	aryze a case study for Environ	iment monitoring u						
<b>I</b> Ini			Svllabus Content		No of					
t					Hours					
No										
1	INTR	ODUCTION & CO	NCEPTS: Definition & Chara	cteristics of IoT,	10					
	Physic Logics	cal Design of IoT: The Design of IoT:	nings in IoT, IoT Protocols	Communication						
	Model	s, IoT Communication	on APIs	Communication						
	ІоТ	Enabling Technol	ogies: Wireless Sensor N	letworks, Cloud						
	Comp	uting, Big Data Ar	alytics, Communication Prot	ocols, Embedded						
	System	ns								
2	IoT L	evels & Deploymer	nt Templates: IoT Level-1,	IoT Level-2, IoT	11					
	Level-	3, IoT Level-4, IoT I	Level-5, IoT Level-6							
	Doma	in Specific IoTs:	Home Automation: Smart	Lighting, Smart						
	Applia	inces,, Intrusion Dete	ction, Smoke/Gas Detectors.							
	Cities	: Smart Parking, Sn	nart Lighting, Smart Roads,	Structural Health						
	Monitoring, Surveillance, Emergency Response.									
	<b>Environment:</b> Weather Monitoring, Air Pollution Monitoring, Noise Pollution Monitoring, Forest Fire Detection, River Floods Detection									
3	Domain Specific IoTs.: ( Contd)									
	Energ   Retail	y: Smart Grids, Kene : Inventory Managem	Crids, Renewable Energy Systems, Prognostics.							
	Logist	ics: Route Generati	on & Scheduling, Fleet Tra	cking, Shipment						
	Monit	oring, Remote Vehicl	e Diagnostics.							
	Agric	ulture: Smart Irrigati	on, Green House Control.	ality Manitaring						
	Retail Logist Monito Agrico Indus	: Inventory Managem ics: Route Generation oring, Remote Vehicl ulture: Smart Irrigati try: Machine Diagno	ient, Smart Payments, Smart Vo on & Scheduling, Fleet Tra e Diagnostics. on, Green House Control. sis & Prognosis, Indoor Air Ou	ending Machines. acking, Shipment						

	Healt	h & Li	oring, Wearable Electronics.						
4	IoT an SDN a Virtua	nd M2 and Nl Ilizatio	M2M Networking, Network Function	10					
5	IoT Design Methodology: Purpose & Requirements Specification, ProcessSpecification, Domain Model Specification, Information ModelSpecification, Service Specifications, IoT Level Specification, FunctionalView Specification, Operational View Specification, Device & ComponentIntegration, Application DevelopmentSpecification wise Case Study: Environment Monitoring								
Cou Outc	irse come	Description						RBT Levels	
	CO1	Under Logic	Understand the concepts of IoT with overview of its Physical and Logical design						
	CO2	Analy	ze dif	ferent T	echnolog	gies used	in IoT	R3	
	CO3	Interp	oret dif	ferent do	omain spe	ecific Io	Γ diagrams and illustrations	R6	
	CO4	Analy IoT	ze spe	cificatio	on docum	ent for l	Environment Monitoring using	R3	
CO-I	<b>20</b>	PO	PO	PO3	PO4	PO5			
Map	ping	1	2						
	CO1	-	-	3	3	3			
	CO2	2 2 3 2 2							
	CO3	2							
	<b>CO4</b>	-	-	3	2	3			
Strong	g -3	Med	ium -2	W	eak -1				

## **TEXT BOOKS:**

- 1. Vijay Madisetti, Arshdeep Bahga "Internet of things, A hands-on-approach" 2014
- 2. Jean-Philippe Vasseur & Adam Dunkels "Interconnecting smart objects with IP", Morgan Kaufmann Publishers, 2010

## **REFERENCES:**

1.Cuno Pfister, "Getting Started with the Internet of Things", Maker Media Inc, 2011 2.Adrian Mcewen and Hakim, "Designing the Internet of Things", Wiley publication, 2013 3.Zhao, Feng, and Leonidas J. Guibas., "Wireless sensor networks: an information processing approach", Morgan Kaufmann, 2004.

4. Karl, Holger, and Andreas Willig, "Protocols and architectures for wireless sensor networks", John Wiley & Sons, 2007.

5. Dargie, Waltenegus W., and Christian Poellabauer, "Fundamentals of wireless sensor Networks: theory and practice", John Wiley & Sons, 2010.

6. McKinsey Global Institute report, "Unlocking the potential of the Internet of Things".

	Dr. Prakash
COURSE	
<b>COORDINATOR:</b>	

	Course Title: AGILE METHODOLOGIES							
STUR INSTITUT	E OF TROPIN	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture ho	ours/week: 4			
a + Dr. AM	OLOGY + m	18SCS322	(L-T-P)					
Aided By Govt. of Karnataka		Exam Duration : 3 hours	CIE+ SEE = 50+50=100	Total No. of Co :	ontact Hours			
Cour	se		Description					
Objecti	ives:	<ol> <li>To understand how an iterative, incremental development process leads to faster delivery of more useful software</li> <li>To understand the essence of agile development methods</li> <li>To understand the principles and practices of extreme programming</li> <li>To understand the roles of prototyping in the software process</li> <li>To understand the concept of Mastering Agility</li> </ol>						
UNIT No			Syllabus Content		No of Hours			
1	Why Agile?: Understanding Success, Beyond Deadlines, The Importance of Organizational Success, Enter Agility, How to Be Agile?: Agile Methods, Don't Make Your Own Method, The Road to Mastery, Find a Mentor       10							
2	Unde Adoj	erstanding XP: The pting XP: Is XP Righ	XP Lifecycle, The XP Team t for Us?, Go!, Assess Your Ag	n, XP Concepts, gility	10			
3	Practicing XP: Thinking: Pair Programming, Energized Work, Informative Workspace, Root-Cause Analysis, Retrospectives, Collaborating: Trust, Sit Together, Real Customer Involvement, Ubiquitous Language, Stand-Up Meetings, Coding Standards, Iteration Demo, Reporting, Releasing: "Done Done", No Bugs, Version Control, Ten-Minute Build, Continuous Integration, Collective Code Ownership, Documentation. Planning: Vision, Release Planning, The Planning Game, Risk Management, Iteration Planning, Slack, Stories, Estimating.11							
4	Mastering Agility Values and Principles: Commonalities, About Values, Principles, and Practices, Further Reading, Improve the Process: Understand Your Project, Tune and Adapt, Break the Rules, Rely on People :Build Effective Relationships, Let the Right People Do the Right 							
Cours Outcor	Course     Description       Outcomes							

CO1	Under	Understand The XP Lifecycle, XP Concepts, Adopting XP									
CO2	Work	Work on Pair Programming, Root-Cause Analysis, Retrospectives, R3,R4									
	Plann	ing, Inc	rementa	al Require	ments, C	ustomer Tests	•	,			
CO3	Imple	ement (	Concepts	s to Elimi	nate Was	te		R3			
СО-РО	PO1	PO2	PO3	PO4	PO5						
Mapping											
C01	-	-	3	2	2						
			2		2						
CO2	-	-	3	2	2						
CO3	- 2 3 2 2										
Strong -3	Mediu	m -2	Weal	<b>x -1</b>	1						

## **TEXT BOOKS**

1. Elaine Rich, Kevin Knight, Shivashanka B Nair: Artificial Intelligence, Tata CGraw Hill 3rd edition. 2013, ISBN 10: <u>0070087709</u> ISBN 13: <u>9780070087705</u>

2. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, Pearson 3rd edition 2013, ISBN: 0-13-604259-7

3. Ivan Bratko Prolog Programming for Artificial Intelligence , (International Computer Science Series) 4th Edition, Publisher: Pearson Education Canada; 4th edition, 2011, ISBN-10: 0321417461; ISBN-13: 978-0321417466

## **REFERENCE BOOKS/WEBLINKS:**

1. Nils J. Nilsson: "Principles of Artificial Intelligence", Elsevier, ISBN-13: 9780934613101

	Dr. M.V. Vijayakumar & Dr. K. R. Shylaja
COURSE	
<b>COORDINATOR:</b>	

		Course Title: Net	Course Title: Network Programming in UNIX								
SUBRINST	TTUTE OF TEGH	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture ho	ours/week: 4						
a • Dr. All	OLOGY + a	18SCS323	(L-T-P)								
Aided By Govt. of Karnataka		Exam Duration : 3 hours	CIE + SEE = 50+50=100	Total No. of Co : 52	ontact Hours						
Co	urse	Description									
Objectives:		<ol> <li>To familiarize students with advanced concepts of network programming in UNIX environment.</li> <li>To enable them to write programs for network programming</li> </ol>									
		<ol> <li>To enable th</li> <li>To enable th</li> <li>To enable th</li> </ol>	em to understand network prot em to understand client server	ocol stacks communications							
Unit No			Syllabus Content		No of Hours						
1	OSI n Proces unrelia	nodel, client server n ss, groups, job cont able signals.	nodel, TCP/IP protocols, intro rol and non-job control she	duction to Unix; lls, reliable and	11						
2	Inter p pipes, systen its use Daeme	FIFOs, properties of N message queues, s RPC, authentication on processes and inet	on in Unix, pipes, half duplex of pipes and FIFOs, POSIX emaphores, shared memory, m , timeout and retransmission, c d daemon.	a and full duplex message queues, map function and eall semantics,	10						
3	Introd functionserver condit	uction to Berkeley so ons, sockets and Un examples for TCP a ions.	ckets, socket addressing, TCP ix signals, socket implement and UDP and their behaviour	and UDP socket ation, client and under abnormal	10						
4	Socke and po	t options, IPv4, IPv6, oll functions, Unix do	TCP, I/O multiplexing, Unix I main protocols	/O models, select	11						
5	5       Routing sockets, raw sockets, example programs, ping, traceroute, methods for writing client and server in Unix, iterative server, concurrent server, preforking, prethreads programming       10										
Cor Outc	Course     Description       Outcomes				RBT Levels						
	CO1	Analyze basic netwo	ork programming tools availabl	e in UNIX	R3						
	CO2	Design programs for	network communications		R6						
	CO3	Interpret the network	c protocol stacks in UNIX		R2						
	CO4Use commands to understand the network configureR4										

CO-PO Mapping	Po1	PO2	Po3	PO4	PO5	
CO1	-	-	3	2	-	
CO2	-	-	3	2	-	
CO3	-	-	3	2	2	
CO4	-	-	3	2	2	
CO5	-	2	3	2	2	
TEXT BOO	K:					
1. Stever	ns, W.R	l., Fenr	ner, B. a	nd Rudof	f A.M., '	'Unix Network Programming: Vol. I", 3rd Ed
Pearso	n Educ	ation 20	004			
2. Stever	ns, W.R	., "Unix	x Networ	k Program	nming: V	ol. II", 2nd Ed., Pearson Education
REFERENC	E BO	OKS /	WEBL	INKS:		
1. Steve	ns, W.I	R., "Ad	lvanced	Program	ming in I	Unix Environment", Pearson Education 2002
2. Bovet	, D.A.	and Ce	esati, M.	, "Unders	standing	the Linux Kernel", 2 nd Ed., O'Reilly.
					-	
		-				

COURSE COORDINATOR:	Dr. K R Shylaja
------------------------	-----------------

		Course Title: Mobile Computing and Wireless Network								
STAR INST	TUTE OF TECHNIC	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week : 4					
Alded By Govt. of Kamataka		18SCS324	(L-T-P)							
		Exam Duration : 3 hours	CIE + SEE = 50+50=100	Total No. of Co : 52	ontact Hours					
Co	urse		Description							
Obje	ctives:	<ol> <li>To introduce the</li> <li>To understand C</li> <li>To understand E</li> <li>To learn variou for CLDC, MID</li> </ol>	concepts of wireless commun CDMA, GSM, Mobile IP, WIm Different Mobile OS. Is Markup Languages and CD let model and security concern	ication ax. C, CLDC, MIDP; Is	Programming					
Unit			Syllabus Content		No of					
No		~		~	Hours					
	Architecture, Design Considerations for Mobile Computing, S-ther Architecture, Design Considerations for Mobile Computing. Wireless Networks : Global Systems for Mobile Communication (GSM and Short Service Messages (SMS): GSM Architecture, Entities, Call routing in GSM, PLMN Interface, GSM Addresses and Identities, Network Aspects in GSM, Mobility Management, GSM Frequency allocation. Introduction to SMS, SMS Architecture, SM MT, SM MO, SMS as Information bearer, applications, GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS,									
2	Mobile phones handhe Tunne	e Client: Moving bey s and their features, eld devices. Mobil- ling, Cellular IP.	ond desktop, Mobile handset of PDA, Design Constraints in e IP: Introduction, discove	overview, Mobile applications for ry, Registration,	10					
3	Mobile OS and Computing Environment: Smart Client Architecture, The Client: User Interface, Data Storage, Performance, Data Synchronization, Messaging. The Server: Data Synchronization, Enterprise Data Source, Messaging. Mobile Operating Systems: WinCE, Palm OS, Symbian OS, Linux and Proprietary OS.10									
4	Building, Mobile Internet Applications: Thin client: Architecture, the client, Middleware, messaging Servers, Processing a Wireless request, Wireless Applications Protocol (WAP) Overview, Wireless Languages: Markup Languages, HDML, WML, HTML, cHTML, XHTML, VoiceXML11									
5	J2ME: Introduction, CDC, CLDC, MIDP; Programming for CLDC, MIDlet10model, Provisioning, MIDlet lifecycle, Creating new application, MIDletevent handling, GUI in MIDP, Low level GUI Components, MultimediaAPIs; Communication in MIDP, Security Considerations in MIDP.									

Course				]	Descripti	on	<b>RBT Levels</b>	
Outcomes								
C01	Work	on sta	te of art	techniqu	es in wir	eless communication	R5,r6	
CO2	Explo	ore CD	MA, GS	M, Mobi	le IP, W	iMax.	R2,r3	
	1			,				
CO3	Work	on Di	fferent	Mobile O	S, Deve	lop program for CLDC, MIDP	R1	
	let mo	odel an	d securi	ty concer	ns			
	DOI	<b>D</b> 04	200	DOL		Ι		
CO-PO	POI	PO2	PO3	PO4	PO5			
Mapping								
CO1	-	1	-	1	2			
<u> </u>		1	2		1			
02	-	1	5	-	1			
CO3	-	-	2	1	3			
Strong -3	Mediu	m -2	Weal	k -1				
TEXT BOO	K:							
1. Ashol	c Talu	kder,	Roopa	Yavagal,	Hasan	Ahmed: Mobile Computing,	Technology,	
Applications	and Se	rvice C	Creation	, 2nd Edit	tion, Tat	a McGraw Hill, 2010.		
					<b>D</b> .			
2. Marty	2. Martyn Mallik: Mobile and Wireless Design Essentials, Wiley India, 2003							
1 Rai kama	UE BU	ile Cor	/ WEBI	Ovford 1	Universi	ty Press 2007		
1. Kaj kalila	I. IVIOU		nputnig,	OXIDIU		ty 11035, 2007.		
2. Iti Saha	Misra	: Wire	less Co	mmunica	ations ar	nd Networks, 3G and Beyond	, Tata	
McGraw Hi	11, 2009	Э.						

COURSE COORDINATOR:	Prof. Shamshekar Patil
------------------------	------------------------

	Course Title: Natural Language Processing and Text Mining						
SUR INST	TTUTE OF TECH	No. of lecture he	ours/week : 4				
a + Dr. Alle	NOLOGY - O	18SCS331	(L-T-P)				
Rincha	Medo	Exam Duration :	CIE + SEE = 50+50=100	Total No. of Co	ontact Hours		
Aided By G	ETHA WELFARE TRUS	3 hours		: 52			
			Description				
Obje	urse ctives:	1. Learn the techniq	ues in natural language processir	ng.			
0 × <b>j</b> •		2. Be familiar with t	he natural language generation.				
		3. Be exposed to Te:	xt Mining. ation retrieval techniques				
		4.Analyze the morna					
Unit No			Syllabus Content		No of Hours		
1	OVER challen Applic based I	<b>VIEW AND LANG</b> ges of NLPLanguage ations-Information Re Language Models-Stati	GUAGE MODELING: Overvision of Grammar-Processing Indian trieval. Language Modeling: Vestical Language Model.	iew: Origins and Languages- NLP Various Grammar-	10		
2	<ul> <li>WORD LEVEL AND SYNTACTIC ANALYSIS: Word Level Analysis:</li> <li>Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error</li> <li>Detection and correction-Words and Word classes-Part-of Speech Tagging.</li> <li>Syntactic Analysis: Contextfree Grammar-Constituency- Parsing-Probabilistic</li> <li>Parsing</li> </ul>						
3	Extracting Relations from Text: From Word Sequences to Dependency Paths:11Introduction, Subsequence Kernels for Relation Extraction, A Dependency-Path Kernel for Relation Extraction and Experimental Evaluation. Mining Diagnostic Text Reports by Learning to Annotate Knowledge Roles: Introduction, Domain Knowledge and Knowledge Roles, Frame Semantics and Semantic Role Labeling, Learning to Annotate Cases with Knowledge Roles and Evaluations. A Case Study in Natural Language Based Web Search: InFact System Overview, The						
4	<ul> <li>in Natural Language Based Web Search: InFact System Overview, The GlobalSecurity.org Experience.</li> <li>Evaluating Self-Explanations in iSTART: Word Matching, Latent Semantic Analysis, and Topic Models: Introduction, iSTART: Feedback Systems, iSTART: Evaluation of Feedback Systems, Textual Signatures: Identifying Text-Types Using Latent Semantic Analysis to Measure the Cohesion of Text Structures: Introduction, Cohesion, Coh-Metrix, Approaches to Analyzing Texts, Latent Semantic Analysis, Predictions, Results of Experiments. Automatic Document Separation: A Combination of Probabilistic Classification and FiniteState Sequence Modeling: Introduction, Related Work, Data Preparation, Document Separation as a Sequence Mapping Problem, Results. Evolving Explanatory Novel Patterns for Semantically-Based Text Mining: Related Work, A Semantically Guided Model for Effective TextMining.</li> </ul>						

5	<b>INFORMATION RETRIEVAL AND LEXICAL RESOURCES:</b> Information	10
	Retrieval: Design features of Information Retrieval Systems-Classical, Non	
	classical, Alternative Models of Information Retrieval – valuation Lexical	
	Resources: World Net-Frame NetStemmers-POS Tagger- Research Corpora.	

Course	Description	<b>RBT Levels</b>
Outcomes	L	
<b>CO1</b>	Analyze the natural language text.	R3
CO2	Generate the natural language.	R5
CO3	Demonstrate Text mining.	R2
CO4	Apply information retrieval techniques	R1

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5
CO1	-	-	3	2	2
CO2	-	-	3	2	2
CO3	-	-	3	2	2
CO4	-	2	3	2	2
Strong -3	Mediu	m -2	Weal	k -1	

## **TEXT BOOK:**

1. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.

2. Anne Kao and Stephen R. Poteet (Eds), "Natural LanguageProcessingandText Mining", Springer- Verlag London Limited 2007.

## **REFERENCE BOOKS / WEBLINKS:**

 Daniel Jurafsky and James H Martin, "Speech and Language Processing: Anintroduction to Natural Language Processing, Computational Linguistics and SpeechRecognition", 2nd Edition, Prentice Hall, 2008.
 James Allen, "Natural Language Understanding", 2nd edition, Benjamin/Cummings publishing company, 1995.

3. Gerald J. Kowalski and Mark.T. Maybury, "Information Storage and Retrieval systems", Kluwer academic Publishers, 2000.

4. Steven Bird, Ewan Klein, Edward Loper, "Natural Language Processing with Python," Publisher: O'Reilly Media, June 2009

5. Christopher D.Manning and HinrichSchutze, "Foundations of Statistical Natural Language Processing", MIT Press, 1999.

COURSE Prof. Shamshekhar Patil COORDINATOR:	
------------------------------------------------	--

		Course Title: Data ware house and Data mining								
SHAR INST	TUTE OF TECH	Course Code:         No. of Credits: 3 : 0 : 0         No. of lecture hours/weel								
NUCORY - :		18SCS332	(L-T-P)							
Aided By G	Ernh WELFARE TR	Exam Duration : 3 hours	CIE+ SEE = 50+50=100	Total No. of Con 52	tact Hours :					
Co	urse		Description							
Objec	Objectives:       1.Explain Data mining principles and techniques and Introduce DM a edge business intelligence         2.Interpret association rule mining for handling large data         3. Classification for the retrieval purposes         4.Explain clustering techniques in details for better organization and n data									
Unit No			Syllabus Content		No of Hours					
1	Introduction and Data Preprocessing : Why data mining, What is data mining, What kinds of data can be mined, What kinds of patterns can be mined, Which Technologies Are used, Which kinds of Applications are targeted, Major issues in data mining. <b>Data Preprocessing:</b> An overview, Data cleaning, Data integration, Data reduction, Data transformation and data discretization.									
2	<b>Data</b> Basic warehe	warehousing and on concepts, Data ware ouse design and us ilization by attribute-o	<b>line analytical processing:</b> Debugged by the second structure of the second s	ata warehousing: and OLAP, Data mentation, Data	11					
3	Classi Bays ( and se	fication: Basic Cond Classification Method lection, Techniques to	<b>cepts:</b> Basic Concepts, Decisio ls, Rule-Based classification, No pimprove classification accurate	n tree induction, Model evaluation cy	11					
4	<ul> <li>Cluster Analysis: Basic concepts and methods: Cluster Analysis, 10</li> <li>Partitioning methods, Hierarchical Methods, Density-based methods, Grid- Based Methods, Evaluation of clustering.</li> </ul>									
5	5Data mining trends and research frontiers: Mining complex data types, other methodologies of data mining, Data mining applications, Data Mining and society.10									
Co	Irce		Decorintion		DBT Lovele					
Outc	omes		Description		KD1 LEVEIS					
	CO1	Demonstrate Storing v data for mining applic	oluminous data for online process ations	ing, Preprocess the	R2					
	CO2	Apply the association	rules for mining the data		R3					
	CO3Design and deploy appropriate classification techniquesR5									

CO4	Cluste	Cluster the high dimensional data for better organization of the data							R4	
CO5	Disco	ver the	knowled	lge imbib	ed in the	high	dimer	nsional s	ystem	R1
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5					
C01	-	-	3	2	2					
CO2	-	-	3	2	2					
CO3	-	-	3	2	2					
CO4	-	2	3	2	2					
CO5	-	2	3	2	2					
Strong -3 N	Aedium	-2	Weak -1							
<b>TEXT BOO</b> 1. Jiawei Han,	K: Miche	line Ka	mber, Jia	an Pei: Da	ata Minin	ig Co	oncept	s and Te	chniques, E	LSEVIER(MK) 3
edition 2012.			,			U	1		1	
REFERENC	E BO	OKS /	WEBL	INKS:						

Data Mining and Warehousing" by Khushboo and Sandeep
 The Encyclopedia of Data Warehousing and Mining" by John Wang

## Course Coordinator: Prof. Shamshekhar Patil

		Course Title: Cryptography and Network Security						
SHAR INST	ITUTE OF TEC	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture hou	irs/week: 4			
a · Dr. AMBE	NOLOGY · c	18SCS333	(L-T-P)					
Aided By G	THA WELFARE TR	Exam Duration : 3 hours	CIE + SEE = 50+50=100	Total No. of Con 52	tact Hours :			
Co	urse		Description					
Objeo	ctives:	<ol> <li>Explain stand authenticity.</li> <li>Distinguish ko</li> <li>Deploy encry</li> <li>Implement s</li> </ol>	ty and etworks plogy					
Unit No			Syllabus Content		No of Hours			
1	Classical Encryption Techniques Symmetric Cipher Model, Cryptography, Cryptanalysis and Brute-Force Attack, Substitution Techniques, Caesar Cipher, Mono-alphabetic Cipher, Playfair Cipher, Hill Cipher, Poly alphabetic Cipher, One Time Pad. Block Ciphers and the data encryption standard: Traditional block Cipher structure, stream Ciphers and block Ciphers, Motivation for the feistel Cipher structure, the feistel Cipher, The data encryption standard, DES encryption, DES decryption, A DES example, results, the avalanche effect, the strength of DES, the use of 56-Bit Keys, the nature of the DES algorithm, timing attacks, Block cipher design principles, number of rounds, design of function F, key schedule							
2	algorithm.11Public-Key Cryptography and RSA: Principles of public-key cryptosystems.11Public-key cryptosystems. Applications for public-key cryptosystems, requirements for public-key cryptosystems. Public-key cryptanalysis. The RSA algorithm, description of the algorithm, computational aspects, the security of RSA. Other Public-Key Cryptosystems: Diffiehellman key exchange, The algorithm, key exchange protocols, man in the middle attack, Elliptic curve cryptography, Analog of Diffie-hellman key exchange, Elliptic curve encryption/							
3	decryption.Key Management and Distribution: Symmetric key distribution using Symmetric encryption, A key distribution scenario, Hierarchical key control, session key lifetime, a transparent key control scheme, Decentralized key control, controlling key usage, Symmetric key distribution using asymmetric encryption, simple secret key distribution, secret key distribution with confidentiality and authentication, A hybrid scheme, distribution of public keys, public announcement of public keys, publicly available directory, public key authority, public keys certificates, X-509 certificates. Certificates, X-509 version 3, public key infrastructure. User Authentication: Remote user Authentication principles, Mutual Authentication, one way Authentication, one way Authentication.10Wireless network security: Wireless security Wireless network threats Wireless10							
	networ strategy protoco operati	k measures, mobile dev y, IEEE 802.11 Wirel ol architecture. Securit on, discovery phase,	vice security, security threats, mob ess LAN overview, the Wi-Fi a y, IEEE 802.11i services, IEEE Authentication phase, key ma	ile device security lliance, IEEE 802 802.11i phases of magement phase,				

proteSecurApprChanComp5ElectS/MIS/MIDomastrateof IPstranspondent	10						
Course					Descriptio	on	<b>RBT</b> Levels
Outcomes					•		
CO1	Unde backg	rstand ground	crypto for cryp	graphy l tography	basics, a	algorithms and mathematical	R6
CO2	Unde	rstand	the vari	ious crypt	tographi	c algorithms.	R3
CO3	Ability to analyses the key management and Discuss the authentication applications.						R2,R3
CO4	Unde	rstand	security	/ issues in	Wireles	s LAN and web.	R6
CO5	Analy	se the	importa	ant securi	ty proto	cols and theirapplications.	R4
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5		
CO1	1	1	3	3	2		
CO2	CO2 3 3 2						
CO3	CO3 3 2 2						
CO4	CO4         2         1         3         3         3						
CO5	-	-	3	3	2		
TEXT BOO	OK:	ı	1	ı	1	1	

1. William Stallings, Cryptography and Network Security, Pearson 6th edition.

## **REFERENCE BOOKS / WEBLINKS:**

1. V K Pachghare: Cryptography and Information Security

## Course Coordinator: Prof. Shamshekar S. Patil

	Course Title : COMPUTATIONAL INTELLIGENCE							
OUR INST	TUTE OF TROL	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture hou	urs/week : 4			
S + Dr. Alle	TOLOGY -	18SCS334	(L-T-P)					
Aided By G	ETHA WELFARE TRU	Total No. of Con 52	tact Hours :					
Co	urse		Description					
Objec	ctives:	<ol> <li>To understand the fundamental theory and concepts of neural networks, neuro- modeling, several neural network paradigms and its applications.</li> <li>To comprehend the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.</li> <li>To interpret the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.</li> </ol>						
Unit No			Syllabus Content		No of Hours			
1	Computational Intelligence and Knowledge: What Is Computational 11 Intelligence?, Agents in the World, Representation and Reasoning Applications, Overview, A Representation and Reasoning System Introduction, Representation and Reasoning Systems, Simplifying Assumptions of the Initial RRS, Data log, Semantics, Questions and Answers, Proofs, Extending the Language with Function Symbols RBT:							
2	Using Definite Knowledge :Introduction, Case Study: House Wiring , Databases and Recursion, Verification and Limitations, Case Study: Representing Abstract Concepts, Case Study: Representing Regulatory Knowledge, Applications in Natural Language Processing ; Representing Knowledge : Introduction, Defining a Solution, Choosing a Representation Language, Mapping from Problem to Representation, Choosing an							
3	Inference Procedure KB1: L1, L2, L5Knowledge Engineering ,Introduction, Knowledge-Based SystemArchitecture, Meta- Interpreters, Querying the User, Explanation,Debugging Knowledge Bases, A Meta-Interpreter with Search, Unification,Beyond Definite Knowledge :Introduction, Equality ,Integrity Constraints,Complete Knowledge Assumption ,Disjunctive Knowledge, ExplicitQuantification , First-Order Predicate Calculus, Modal Logic, RBT: L1, L2,L3							
4	Using Assum RBT:	Uncertain Knowled options, Making Dec. L1, L2, L3	ge ,Introduction , Probability isions Under Uncertainty	, Independence	11			
5	Learni Introdu Reason Uncert RBT:	ng 08 Hours uction, Learning as 0 ning, Learning as Re tainty, Explanation-E L1, L2, L3	Choosing the Best Representate efining the Hypothesis Space Based Learning	tion , Case-Based , Learning Under	10			

Course Outcomes				]	Descriptio	on	<b>RBT Levels</b>					
C01	Identi	fy diff	erent typ	pes of AI	agents		R1,R2					
CO2	Apply heuris	Apply various AI search algorithms (uninformed, informed, neuristic, constraint satisfaction, genetic algorithms)										
CO3	Exhib based	Exhibit the fundamental usage of knowledge representation (logic- based, frame-based, semantic nets), inference and theorem proving										
CO4	Build	simple	e knowle	edge-base	ed system	ns	R1					
CO5	Expre incom	ess wo nplete a	orking l and/or u	knowledg ncertain i	e of re nformati	easoning in the presence of	R2					
CO6	Apply techn	/ know	vledge r	epresenta orld prol	tion, rea	soning, and machine learning	R3,R4					
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5							
CO1	-	-	3	2	-							
CO2	-	-	3	2	-							
CO3	-	-	3	2	2							
CO4	-	-	3	-	2							
CO5	-	1	3	2	2							
CO6	-	2	3	2	2							
<b>Text Books:</b>												
1. David Poo	le, Alaı	n MAc	kworth,	Randy G	oebel: C	Computational Intelligence – a lo	gical					
approach, Oxford University Reference Books:												
1. Fundamentals of Computational Intelligence: Neural Networks, Fuzzy Systems, and Evolutionary												
Course Cool	-dinato	or: Pro	f. Sham	shekar S	5. Patil	a b. 10ger 15bit. 770-1-117-21	TJT <sup>-</sup> 2					

(An Autonomous Institute, Affiliated to VTU, Accredited by NAAC with 'A' grade) Department of Computer Science & Engineering

## SCHEME OF TEACHING AND EXAMINATION I SEMESTER (Autonomous) 2018-2020 M. Tech (CSE)

I semester

SI			Teaching	Teac	hing hours po	Maximum Marks allotted			Examination	
No.	Sub Code	Subject Title	Departmen t	Lecture	Tutorial/ Seminar/ Assignment	Practical / Project	CIE	SEE	Total	Credits
1.	18SCS11	Probability Statistics and Queueing Theory (Maths)	MAT	4	-	-	50	50	100	3
2.	18SCS12	Cloud Computing	CSE	4	-	-	50	50	100	3
3.	18SCS13	Advanced Database Systems	CSE	4	-	-	50	50	100	3
4.	18SCS14	Soft Computing	CSE	4	-	-	50	50	100	3
5.	18SCS15X	ELECTIVE – I	CSE	4	-	-	50	50	100	3
6.	18SCSL16	Cloud Computing Lab	CSE	-	-	3	50	50	100	2
7.	18SCSS17	Technical Seminar	CSE	-	2	-	50	-	50	2
8.	18SCSM18	Mini project	CSE	-	-	6	50	-	50	2
	Total							300	700	21

Technical Seminar: Seminar on Advanced topics from refereed journals by each student.

## **ELECTIVE I**

Sl .No	Name of the Subject	Subject Code
1	Advances in Storage Area Networks	18SCS151
2	Software Quality Assurance, Testing and Metrics	18SCS152
3	Artificial Neural Networks	18SCS153
4	Multicore Architecture	18SCS154

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Department of Computer Science & Engineering

SCHEME OF TEACHING AND EXAMINATION II SEMESTER (Autonomous) 2018-2020

## M. Tech (CSE)

II semester

	Sub Code			Teac	hing hours pe	r week	Maximum Marks allotted			
Sl. No.		Subject Title	Teaching Department	Lecture	Tutorial/ Seminar/ Assignment	Practical / Project	CIE	SEE	Total	Examination Credits
1.	18SCS21	Managing Big Data	CSE	4	-	-	50	50	100	3
2.	18SCS22	Advances in Computer Networks	CSE	4	-	-	50	50	100	3
3.	18SCS23	Artificial Intelligence and Prolog Programming	CSE	4	-	-	50	50	100	3
4.	18SCS24	Advanced Algorithms and Data structure	CSE	4	-	-	50	50	100	3
5.	18SCS25X	ELECTIVE – II	CSE	4	-	-	50	50	100	3
6.	18SCSL26	Data structure and Computer Network Lab	CSE	-	-	3	50	50	100	2
7.	18RM27	Research Methodology	CSE	-	2	-	50	50	100	2
8.	18SCSM28	Mini project/Research Institute Visit	CSE	-	-	6	50	-	50	2
	Total								750	21

## **ELECTIVE-II**

Sl .No	Name of the Subject	Subject Code
1	<b>Data Center Virtualization</b>	18SCS251
2	Data Science with R-	18SCS252
	Programming	
3	Cyber Security	18SCS253
4	Sensor Networks Infrastructure	18SCS254

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## **Department of Computer Science**

## SCHEME OF TEACHING AND EXAMINATION III SEMESTER (Autonomous) 2018-2020 M. Tech (CSE)

## III semester# : Internship

Sl. No.	Sub Code			Теа	ching hours p	oer week	M	aximun allot	n Marks ted	Eveningtion
		Subject Title	Department	Lecture	Tutorial/ Seminar/ Assignment	Practical / Field Work	CIE	SEE	Total	Credits
1.	18SCS31	Midterm Presentation on Internship(After 8 weeks from the date of commencement)*	CSE	-	-	-	25	-	25	2
2.	18SCS32	Report on Internship (After 16 weeks from the date of commencement)	CSE	-	-	-	25	-	25	13
3.	18SCS33	Evaluation and Viva-voce on Internship	CSE	-	-	-	-	50	50	5
4.	18SCSP34	Project phase - I	CSE	-	-	-	-	-	-	2
		Total	50	50	100	22				

\* The student shall make a midterm presentation of the activities undertaken during the first 8 weeks of internship to a panel comprising Internship Guide, a senior faculty from the department and Head of the Department.

# The College shall facilitate and monitor the student internship program.

The internship report of each student shall be submitted to the Institute.

(An Autonomous Institute, Affiliated to VTU, Accredited by NAAC with 'A' grade)

# **Department of Computer Science**

SCHEME OF TEACHING AND EXAMINATION IV SEMESTER (Autonomous) 2018-2020

## M. Tech in CSE

**IV** semester

SI	Sub Code		Teaching Department	Tea	ching hours p	oer week	M	aximun allot	n Marks ted	Examination
No.		Subject Title		Lecture	Tutorial/ Seminar/ Assignment	Practical / Field Work	CIE	SEE	Total	Credits
1.	18SCS41	Internet of Things (Dr. Prakash)	CSE	04	-	4	50	50	100	3
2.	18SCS42X	ELECTIVE – III	CSE	04	-	4	50	50	100	3
2.	18SCSP43	Evaluation of Project Work Phase II	CSE	-	-	6	100	-	100	2
3.	18SCSP44	Project Work Evaluation and Viva –Voce	CSE	-	-	-	-	200	200	16
Total 200 300 500										24
	Grand Total (I to IV Semester) : 2050 Marks ; 88 Credits									

## **ELECTIVE III**

Sl .No	Name of the Subject	Subject
		Code
1	Machine Learning with Python Programming	18SCS421
2	Agile Methodologies	18SCS422
3	Programmatic development using APEX and VISUALFORCE	18SCS423
4	Mobile Computing and Wireless Network	18SCS424
- \* The student shall make a midterm presentation of the activities undertaken during the first 8 weeks of internship to a panel comprising Internship Guide, a senior faculty from the department and Head of the Department.
- # The College shall facilitate and monitor the student internship program.

# The internship report of each student shall be submitted to the Institute.

# Note:

- 1) Project Phase I: 6 weeks duration shall be carried out during III Semester. Candidates in consultation with the guides shall carryout literature survey / visit to Industries to finalize the topic of dissertation.
- 2) Project Phase II: 16 weeks duration during IV Semester. Evaluation shall be taken during the IV Semester. Total Marks shall be 100.
- 3) Project Work Evaluation and viva-voce: 24 weeks duration in IV Semester. Project Work Evaluation shall be taken up at the end of the IV Semester. Project Work Evaluation and Viva-Voce Examinations shall be conducted. Total Marks shall be 200 (Phase –II Evaluation: 100 Marks, Project Evaluation marks by Internal Examiner (guide): 50, Project Evaluation marks by External Examiner: 50, and 100 for viva-voce).

## Marks of Evaluation of Project:

- 1. During Project Phase I, finalise titles and submit synopsis to the Institute along with Project Work report at the end of the Semester.
- 2. During the final viva, students have to submit all the reports.
- 3. The Project Valuation and Viva-Voce will be conducted by a committee consisting of the following:
- a) Head of the Department (Chairman)
- b) Internal examiner (Guide)
- c) External examiner proposed by the Chairman, BoE (PG)

		Course Title: Probability Statistics And Queuing Theory								
Street The Street Stree		Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture l	hours/week :					
a · Dr. AM	OLOGY · m	18SCS11	(L-T-P)	4						
And the second s		Exam Duration : 3 hours	CIE+ SEE = 50+50=100	Total No. of Co : 52	ontact Hours					
Coi	urse	Description								
Objec	ctives:	1. To develop ana	alytical capability and to imp	oart knowledge o	f Probability,					
		Statistics and Queuing.								
		2. The application of above concepts in Engineering and Technology.								
		3. Students acquire knowledge of Hypothesis testing and Queuing methods and								
		their application	is so as to enable them to app	bly them for solvin	ng real world					
		problems								
Unit No			Syllabus Content		No of Hours					
1	Axion	ns of probability, Con	ditional probability, Total prob	ability, Baye's	10					
	theore Rando	m, Discrete Random m variable. Probabili	etion, Continuous e Distribution							
	Functi	Function, and its properties, Two-dimensional Random variables, Joint pdf								
	/ cui a	nd then properties								
2	Probat Geome	oility Distributions / I etric and Hyper-geom	Discrete distributions: Binomia metric distributions and their pro-	l, Poisson operties.	10					
	Contin	uous distributions: U	niform, Normal, exponential d	istributions and						
	their p	roperties.								
3	Testin	g Hypothesis: Testing	g of Hypothesis: Formulation o	f Null	11					
	Tests of	of significance for La	rge and Small Samples, t-distri	bution, its						
	proper distrib	ties and uses, F-distri	bution, its properties and uses, nd uses, $\chi^2$ – test for goodness	Chi-square of fit. $\gamma$ 2 test for						
	Indepe	endence		or, <u>~</u>						
4	Rando	m Processes: Classifi	cation, Methods of description	, Special classes,	11					
	Average values of Random Processes, Analytical representation of Random Processes, Autocompletion Exaction, Cross correlation function									
	their p	roperties, Ergodicity,								
5	chain. Symbo	olic Representation of	a Queuing Model. Poisson Ou	ieue system.	10					
	Little	Law, Types of Stocha	stic Processes, Birth-Death Pro	ocess, The						
	Queuin	ng with Finite buffers	ie wi/wi/s Queuing System, Th	U IVI/IVI/S						

Course Outcomes		Description <b>KBT</b> Levels								
C01	Demo	Demonstrate knowledge & use of probability and will be able to R1, R2,R3								
	functi	haracterize probability models using probability mass (density)								
<u> </u>	Apply	the	toohni	auge of	davalor	ning discrete & continuous	D4 and D5			
02	probal	bility c	listribut	ions and i	its applic	cations.	K4 and KJ			
CO3	Descr	ibe a	random	process	in term	s of its mean and correlation	R3			
	function	ons.								
CO4	Apply	the m	ethods of	of Hypoth	nesis test	ing for goodness of fit.	R5			
CO5	Under	stand	the ter	minology	&nome	enclature appropriate queuing				
	theory	and and	also de	emonstrate dels	e the ki	nowledge and understand the				
					<b>DO7</b>					
CO-PO Mapping	POI	PO2	PO3	PO4	PO5					
CO1	-	-	3	2	3					
CO2	2	-	2	3	2					
CO3	2	2	2	3	3					
CO4	2	-	2	1	2					
CO5	-	-	2	3	3					
Strong -3	Mediu	m -2	Weal	<b>x -1</b>						
TEXT BOOK	KS:									
1. Probabilit	ty, Stati	stics a	nd Queu	ing Theo	ry, V. St	Indarapandian, Eastern Economy	Edition, PHI			
Learning ISBN 13-	97881	d, 2009 20338/	). Publis 149	shed by Pl	HI Learn	ung, New Delhi (2009) ISBN 10	: 8120338448			
	770012									
<b>REFERENCI</b>	E BOOI	<b>KS:</b> atistics	with R	eliability	Queuin	g and Computer Applications 2	nd Edition by			
Kishore.	S. Trive	edi, Pre	entice H	all of Ind	ia, 2004	. ISBN: 978-0-471-33341-8	o			
2. Pattern R	ecognit	ion ( A	n Intro	duction),	V Sushe	elaDevi, M Narsimha Murthy, 2	.011,			
Universit	ies Pres	s, ISB	N : 978	-81-7371	-725-3					
COURSE	ΓΩÐ	Dr.s	Shiva Pr	asanna						
COORDINA	COORDINATOR:									

		Course Title: Clo	oud Computing Theory and P	Practice			
STUR INST	TTUTE OF IEG	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week : 4		
8 + DI: AMB	OLOGY · c	18SCS12	(L-T-P)				
Aided By Govt. of Karnataka		Exam Duration : 3 hours	Total No. of Co : 52	ontact Hours			
Co	urse		Description				
Obje	ctives:	<ol> <li>To provide com service models, providers in the</li> <li>To introduce to analyze and di followed in clou</li> <li>To understand h cloud environme</li> <li>To understand a Industry</li> <li>To understand h computing. To cloud federation</li> </ol>	prehensive view to different a challenges & infrastructure market cloud virtualization, with diff fferentiate between cloud ar d computing ow high throughput can be ac ent. and demonstrate different featu ow energy efficiency achieved also understand technologies stack.	spects of cloud co with different C ferent type of virtu chitectures and f chieved with task ures of cloud plath in cloud computin used for Cloud fe	End of the second secon		
Unit No			Syllabus Content		No of Hours		
1	Cloud Computing at a Glance, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model, Characteristics and Benefits, Challenges Ahead, Historical Developments, Distributed Systems, Virtualization, Web 20, Service-Oriented Computing, Utility-Oriented Computing, Building Cloud Computing Environments, Application Development, Infrastructure and System Development, Computing Platforms and Technologies, Amazon Web Services (AWS), Google AppEngine, Microsoft Azure, Hadoop, Force- com and Salesforcecom, Manjrasoft AnekaInfrastructure Infrastructure						
2	Virtua Introdu securit technic Virtua Advan	<b>lization</b> uction, Characteristicy, Managed execut ques, Execution vi lization and cloud tages of virtualization	ics of virtualized environn ion, Portability, Taxonomy rtualization, Other types o computing, Pros and cons o on, The other side of the coin	nents, Increased of virtualization of virtualization, of virtualization, n: disadvantages,	12		

	Techn Micro	ology examples, Xen par virtualization, VMware: full virtualization, soft Hyper-V					
	Cloud Introd hardw of clo Econd intero trust,	<b>Computing Architecture</b> uction, The cloud reference model, Architecture, Infrastructure- and are-as-a-service Platform as a service, Software as a service, Types uds, Public clouds, Private clouds, Hybrid clouds Community clouds, omics of the cloud, Open challenges, Cloud definition, Cloud perability and standards, Scalability and fault tolerance, Security, and privacy, Organizational aspects					
3	High- Task of for ta paralle Work: progra task workf	Task computing, Characterizing a task, Computing categories, Frameworks for task computing, Task-based application models, Embarrassingly parallel applications, Parameter sweep applications, MPI applications, Workflow applications with task dependencies, Aneka task-based programming, Task programming model, Developing applications with the task model, Developing a parameter sweep application, Managing workflows					
4	Cloud	Platforms in Industry:	10				
	Amaze service concep Azure applia	on web services: Compute services ,Storage services, Communication es ,Additional services. Google AppEngine : Architecture and core pts, Application life cycle, Cost model Observations Microsoft : Azure core concepts, SQL Azure, Windows Azure platform nce, Observations					
5	Adva	10					
	Energ archite compu suppo Chara Techn servic						
Cou Outc	urse comes	Description	RBT Levels				
	CO1	Obtain knowledge on different aspects of cloud computing like; service models, challenges & infrastructure and different services provided by cloud service providers.	R1, R2,R3				
	CO2	Analyze the importance of virtualization and different features of Virtual Machine (VM) in cloud computing and understand cloud architectures and few standards followed in cloud computing.	R4 and R5				

CO3	To abl	To able to understand task computing on cloud environment.								
CO4	Able to platfor	Able to understand and demonstrate different features of cloud platforms used in Industry.								
CO5	Able to	o unde	rstand t	echnolog	ies used	for Cloud federation with cloud				
	federat	tion st	ack.							
СО-РО	PO1	PO2	PO3	PO4	PO5					
Mapping										
CO1			3	2	2					
CO2	2		3	3	2					
<u> </u>			3	3	3					
0.03			5	5	5					
CO4		2	3	2	3					
CO5		3	2	3	3					
Strong -3	Mediun	n -2	Weal	k -1						
TEXT BOOK	S:									
1.Rajkumar I	Buyya, '	The U	niversi	ty of Me	lbourne	and Manjrasoft Pty Ltd, Austra	lia, Christian			
Vecchiola, C	loud co	mputi	ing theo	ory and p	oractice	2 <sup>nd</sup> Edition				
REFERENCE	E BOOK	KS:	a							
I. Distribute Hwang I	ed and ( ack Dor	Cloud	Compu	iting, Fro rev Fox M	m Paral	lel Processing to the Internet of	Things, Kai			
2. Cloud Co	mputing	g: A P	ractical	Approacl	h, Antho	ny T. Velte, Toby J. Velte, Robe	rt Elsenpeter,			
McGraw	Fill, 201	10.		11	,		1 /			
3. Cloud Co	mputing	g: The	ory and	Practice,	Dan Ma	urinescu, 1 <sup>st</sup> edition, MK Publish	ers, 2013.			
		Dr.	Prakas	sh						
COURS	E									
COORDINA	TOR:		COORDINATOR:							

		Course Title: Adv	S						
SHAR INST	TUTE OF TRC	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture ho	ours/week: 4				
A + Dr. AMBE	ROLOGY -	18SCS13	(L-T-P)						
And the second s	ETHA WELFARE TRUE	Exam Duration : 3 hours	ontact Hours						
Co	urse	Description							
Obje	ctives:	<ol> <li>Discuss with the</li> <li>Compare variou</li> <li>Discuss fundame</li> <li>Define and analy allocation</li> </ol>	basics of Computer Networks s Network architectures. ental protocols. yse network traffic, congestior	s. n, and controlling a	nd resource				
Unit No			Syllabus Content		No of Hours				
1	Found	lation: Building a N	letwork, Requirements, Persp	bectives, Scalable	08				
	Conne	ctivity, Cost-Effective	ve Resource sharing, Suppo	ort for Common					
	Latenc	cy, Delay X Bandwi	dth Product, Reliable Transm	ission, Stop-and-					
	Wait,	Sliding Window prot	cocol.						
2	Switch	networking I: Switch	ning and Bridging, Datagram'	s, Virtual Circuit Switches Basic	09				
	Interne	etworking (IP), Wha	t is an Internetwork?, Servic	e Model, Global					
	Addre Addre	sses, Datagram Forwa ss Translation (ARP)	arding in IP, subnetting and cla , Host Configuration (DHCP)	ssless addressing, Error Reporting					
	(ICMI	P),							
3	Intern State ( Auton	OSPF), Metrics, The omous systems (BGP	vork as a Graph, Distance V Global Internet, Routing Area ). IP Version 6 (IPv6)	ector (RIP), Link s, Routing among	08				
4	End-t	o-End Protocols: S	Simple Demultiplexer (UDP	), Reliable Byte	09				
	Stream	n(TCP), Endto- E ishment and Termin	nd Issues, Segment Forr	nat, Connecting					
	Transi	nission, Adaptive Re	transmission, Queuing Discip	plines, FIFO, Fair					
	Queui	ng, TCP Congestion	n Control, Additive Increas	e/ Multiplicative					
5	Decrea Conge	ase, Slow Start, Fast I estion Control and	Resource Allocation Cons	estion-Avoidance	08				
C	Mecha	anisms, DEC bit, Ra	andom Early Detection (REI	D), Source-Based	00				
	Conge	estion Avoidance.	(DNS) Electronic Mail (SM	TD DOD IMAD					
	MIME	E), World Wide Web	(HTTP), Network Managemer	nt (SNMP)					
Cou Outc	urse comes		<b>RBT Levels</b>						
	CO1	Able to classify netw	vork services, protocols and ar	chitectures,	R1, R2,R3				

CO2	Choose	e key	Internet	applicati	ons and	their protocols, and apply to	R4 and R5		
	develo	p their	r own A	pplicatio	ns.				
CO3	Develo	Develop effective communication mechanisms using techniques							
	like co	nnecti	ion esta	blishment	t, queuin	g theory, recovery Etc.			
CO4	Ability	y to an	alyse di	ifferent tr	ansmissi	on protocols and Interpret	R5		
	variou	s cong	gestion of	control tec	chniques				
CO5	Analys	se Net	work tra	affic, resc	ource allo	ocation and need of different			
	protoc	ols foi	r differe	nt applica	ations.				
CO-PO	PO1	PO2	PO3	PO4	PO5				
Mapping									
<u> </u>			2	2	2	-			
	-		5	2	5				
CO2	-	2							
			3	3	2				
CO3									
CO4	-	-	3	3	1				
CO5		1	3	2	3				
		1	5	2	5				
Strong -3	Mediun	n -2	Weal	к <b>-1</b>					
TEXT BOOK	S:								
1. La	arry Pet	erson	and Br	uce S Da	vis "Co	mputer Networks :A System A	Approach" 5th		
	dition, E	lsevie	r -2014	·····		with TCD/ID Driveringles	) wata an la sur d		
2. Do	ougias rchitecti	$E \cup$	omer, th Editic	n PHI -	2014	with ICP/IP, Principles, F	rotocols and		
REFERENCE	E BOOK	<b>S:</b>		, 111	2011				
			~				n and		
1. U	yless Bla	ack, "	Comput	er Netwo	rks Prot	ocols, Standards and Interfaces	s" 2 <sup>nd</sup> Edition		
-P 2 R	ehrouz 4	A For	uizan "	ТСР /ІР І	Protocol	Suite" 4 th Edition – Tata McG	raw-Hill		
		11010	azan,	1 ~ 1 / 11 1	1010001				
COUDSE		Ъ	e C1		<b>D</b> . (1)				
COURSE COORDINA'	FOR:	Pro	i. Shan	isnekar S	5. Patil				

	Course Title: Soft Computing							
SOLAR INST	TTUTE OF TECH	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week :			
AL DI. AM	LOGY - W	18SCS14						
- Sulchala	IREGD.	Exam Duration :	ntact Hours					
Aided By G	Govt. of Karnataka	3 nours		: 52				
Co Obie	urse ctives:	1 To loorn the	Description	~				
0 »je		2. To know ab	g ling block hypothes	sis of Genetic				
		algorithm.						
		3. To gain insight onto Neuro Fuzzy modeling and control. To gain knowledge in machine learning through Support vector machines						
				8				
Unit No			Syllabus Content		No of Hours			
1	Introd	luction to Soft comp	outing: Neural networks, Fuz	zzy logic, Genetic	11			
	algorit	hms, Hybrid systems Evolution basic Mo	s and its applications. Fundational of ANN Terminologies (	mental concept of used in ANN MP				
	model	, linear separability, I	Hebb Network.					
2	Superv	vised Learning: Perce	ptual Network, Adaptive linea	r neuron, Multiple	11			
	adapti	ve linear neurons, Ba	ck propagation Network,					
	Assoc	iative Memory Netwo	ork: introduction, training algo	prithms for pattern				
	netwo	rk, bidirectional associative	ciative memory.	sociative memory				
3	Classi	cal sets and Fuzzy Se	ts – classical and Fuzzy Relat	tions – Features of	10			
	memb	ership functions, Fu	zzification and methods of r	membership value				
	assign	ment. Defuzzificatior	a lambda cuts for fuzzy relation	ons and fuzzy sets.				
4	Fuzzy	Decision Making:	introduction, individual	decision making,	10			
	multia	ttribute decision mak	ing,	ecision making,				
	fuzzy	Bayesian decision ma	king, Fuzzy logic control syst	ems: introduction,				
	control system design, architecture and operation of FLC systems, FLC							
	system				10			
5	optimi	ic algorithms: Intro	chniques. Genetic algorithms	and search space,	10			
	Operat	tors of genetic algorit	hms – Genetic programming					
Cou	urse		Description		RBT Levels			
Outc	comes		-					

CO1	Analy relate	ze the and ur	g, ANN and Terminologies to oblems	R1, R2,R3						
CO2	Apply analyz	Apply supervised and unsupervised learning representations for analyzing real time problems								
CO3	Analy applic	Analyze and adopt fuzzy logic in implementing soft computing applications.								
CO4	Analy proble	ze and ems	d apply	genetic	algorith	ims to solve the optimization	R5			
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5					
CO1		-	3	3	3	-				
CO2			3	3	3	-				
CO3	1	3	3	2	2	-				
CO4	2	2	3	3	2					
Strong -3	Mediur	n -2	Weal	k -1						
TEXT BOOK	S:	~ ~					e etd ee e			
1. Princi ISBN	ples of 13: 978	Soft c 38126:	58744-5	ng, S N S 5, 2019	Sivanand	am, and S N Deepa, Wiley Ind	ia, 3 <sup>rd</sup> edition			
REFERENCE	E BOOH	KS:			~ ~ ~					
1. Neuro	o-fuzzy ISBN (	and so $-13-2$	oft com	puting, J.	.S.R. Jar	ng, C.T. Sun, E. Mizutani, Phi (l	EEE edition),			
2. Timot	thy J. R	oss, "I	Fuzzy L	ogic with	n Engine	ering Applications", Third Editic	on			
COURSE COORDINAT	FOR:	COURSE Dr. K R Shylaja								

	Course Title: Cloud Computing Laboratory								
STAR INST	TTUTE OF ISCU	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week : 3				
DI. ANG		18SCSL16	(L-T-P)						
Aided By Govt. of Karnataka		Exam Duration : 3 hours	CIE+ SEE = 50+50=100	Total No. of Contact Hours : 16					
Co	urse		Description						
Obje	ctives:	1. To Install and understand Virtual Box by deploying web application							
		2. To get Hands on with Different Cloud services: Amazon, Google apps and							
		Salesforce and VMware							
		3. To Create an	d provision VMs on any Cloud	d Simulation enviro	onments, and				
		execute diffe	frent polices to understand the	v IVI Teatures					
			Part A						
1	Using Given Data set apply Find-s and Candidate Elimination algorithm to find most specific and Most generic Hypothesis.								
2	Using Value	Boston Data Set imp	ement Linear regression to pre	dict Mean House					
3	Using Mean	Boston Data Set im House Value	plement Multiple Linear regr	ession to predict					
4	Using	Stock Market Data, i	mplement logistic regression to	o recognize stock					
	marke with lo	t trends. Implement L	DA for the same data set and g	ive a comparison					
5	Using to pred	Boston data set impl dict the Mean house d	ement regression tree and fit thata.	ne regression tree					
			Part B (Mini Project)						
	•	A team of two stude	nts can be formed to implement	nt a mini project					
	-	on real time data set	using any machine learning te	chnique					
	•	Design an appropria	te user interface for the project	either using					
NOTI	<b>F</b> .	web interface or and	roid app platform.						
The st	z: tudent h	nas to execute one fro	om Part A and Demonstrate th	e mini project and	l answer the				
viva-v	oce	U U		1 0					
Соч	irse		Description		RBT Levels				
Outco	omes		······						
	CO1	Learn about Amazon Amazon Web Service	EC2. Amazon Cloud computir es.	ng platform,	R4				
	CO2	Salesforce cloud com applications and serve	puting platform, deploying and	l managing	R5				

CO3	Goog	le Apps	Docs and Google Slides R5			
CO4	To cr	eate and	lization Hypervisors and R5			
	under	standin	g Cloud	Sim		
СО-РО	PO1	PO2	PO3	PO4	PO5	
Mapping						
CO1	2	2	3	2	3	
CO2	-	2	3	2	3	
CO3	-	2	3	2	3	-
CO4	2	2	3	2	3	
Strong -3	Medi	um -2	Wea	k -1		
TEXT BOC	)KS:					
1. Cloud C	omputi	ing: The	eory and	Practice	e, Dan M	Iarinescu, 1 <sup>st</sup> edition, MK Publishers, 2013.
REFEREN	CES:					
1. Distribut	ted and	l Cloud	Compu	iting, Fr	om Para	allel Processing to the Internet of Things, Kai
Hwang,	Jack D	ongarra	, Geoffi	ey Fox.	MK Pub	olishers.
2. Cloud C	omputi	ing: A F	ractical	Approa	ch, Anth	ony T. Velte, Toby J. Velte, Robert Elsenpeter,
McGraw	Fill, 2	2010.	1		<b>C</b> 1 4	
3. Case stu	idies: A	4w5, G	oogle a	pp engin	e, Salesi	force Trailnead
COURSE COORDINA	COURSE Dr. Prakash COORDINATOR:					

		Course Title: Multi Core Architectures								
STAR INST	TITUTE OF TEG	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week : 4					
s + Dr. AMB		18SCS154	(L-T-P)							
Alded By Govt. of Karnataka		Exam Duration : 3 hours	ontact Hours							
Co	urse		Description							
Obje	ctives:	1. To understar	nd the recent trends in the field	of Computer Arch	itecture and					
		identify perf	ormance related parameters.	-						
		2. To appreciat	e the need for parallel processi	ing.						
		3. To expose the students to the problems related to multiprocessing - To								
		understand the different types of multicore architectures.								
		4. To understar	nd the concepts of multicore ar	chitectures						
		5. To understar	nd concepts of multi-threading,	, OPENMP						
IIn:4			Sullabua Contont		No of					
No		Syllabus Content								
	1 Introduction to Multi-core Architecture: Motivation for Concurrency in software, Parallel Computing Platforms, Parallel Computing in Microprocessors, Differentiating Multi-core Architectures from Hyper- Threading Technology, Multi-threading on Single-Core versus Multi-Core Platforms Understanding Performance, Amdahl's Law, Growing Returns: Gustafson's Law. System Overview of Threading: Defining Threads, System View of Threads, Threading above the Operating System, Threads inside the OS, Threads inside the Hardware, What Happens When a Thread Is Created, Application Programming Models and Threading, Virtual Environment: VMs and Platforms, Runtime Virtualization, System Virtualization									
2	Fundamental Concepts of Parallel Programming: Designing for Threads, Task Decomposition, Data Decomposition, Data Flow Decomposition, Implications of Different Decompositions, Challenges You'll Face, Parallel Programming Patterns, A Motivating Problem: Error Diffusion, Analysis of the Error Diffusion Algorithm, An Alternate Approach: Parallel Error Diffusion, Other Alternatives.10Threading and Parallel Programming Constructs: Synchronization, Critical Sections, Deadlock, Synchronization Primitives, Semaphores, Locks, Condition Variables, Messages, Flow Control- based Concepts, Fence,10									
3	Thread	ling APIs : Threadir APIs, Threading AF	ng APIs for Microsoft Windo PIs for Microsoft. NET Framev	ws, Win32/MFC vork.	10					

	Struct Soluti Deper Loop	ures: ( on for idence, Schedu						
4	Effective Use of Reductions, Minimizing Threading Overhead, Work- sharing Sections, Performance-oriented Programming, Using Barrier and No wait, Solutions to Common Parallel Programming Problems: Too Many Threads, Data Races, Deadlocks, and Live Locks, Deadlock, Heavily Contended Locks,							
5	Priorit Algor Reclar Librar Conte	ty Inve ithms, mation ries, M ntion, (	ABA ABA Probl emory Cache-	Solution Problem, Ro Issues, related	ns for He lem, Ca ecommen Bandwie Issues, Fa	avily Co Iche Li Idations, dth, Wo Ilse Shar	ontended Locks, Non-blocking ine Ping-ponging, Memory Thread-safe Functions and rking in the Cache, Memory ing, Memory Consistency,	11
Cou Outc	irse				I	Descripti	on	RBT Levels
	CO1	Ines       Identify the limitations of ILP and the need for multicore architectures						
	CO2	Analy solve	ze the the iss	parallel ues relat	program ted to mu	ming te ltiproces	echniques and design issues to ssing	R4 and R5
	CO3	Interp how t	oret the hey ex	salient ploit pa	features or rallelism	of differe	ent multicore architectures and	R3
	CO4	Desig conce	n loop pt.	s in Ope	en MP to	find solu	utions to parallel programming	R5
	CO5	Analy	ze Thr	reads and	d Reducti	ions in p	arallel programming problems	
CO-P	0	PO1	PO2	PO3	PO4	PO5		
Марр	oing	101	102	105	104	105		
	<b>CO1</b> - 2 3 1							
	CO2 2 3 2							
	CO3	-	-	3	3	2		
	CO4	2	-	2	3	3		
	CO5	1	2	2	3	2		

Strong -3	Medium -	2 Weak -1
TEXT BOO	KS:	
1. Mult	icore Prog	amming, Increased Performance through Software, Multi-threading by
Shar	neem Akht	er and Jason Roberts, Intel Press, 2012
DEPENDENC	T DOOMO	
REFERENC	E BOOKS	
COURSE		Dr. M V Vijavakumar
COORDINA	TOR:	

Multi Colorida		Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week :4	
		18SCS151	(L-T-P)			
Aided By G	THA WELFARE TRUE	Exam Duration : 3 hours	CIE+ Assignment + SEE = 50+50=100	Total No. of Co : 52	ontact Hours	
Co	urse		Description			
Objec	ctives:	<ol> <li>Define and c</li> <li>Define metri</li> <li>Illustrate RA</li> <li>Demonstrate backup main systems.</li> </ol>	contrast storage centric and services used for Designing storage a ID concepts b, how data centers maintain aly remote mirroring concepts	ver centric systems area networks the data with the s for both simple	e concepts of and complex	
Unit No			Syllabus Content		No of Hours	
1	Introd Centric with S Battle Intellig Storag Accele	<b>Server Centr</b> c IT Architecture and torage Networks, Th for size and access. gent Disk Subsystems e virtualization using eration of Hard Disk A	ic IT Architecture and its Limit i its advantages. Case study: R e Data Storage and Data Acce Intelligent Disk Subsystems: s; Hard disks and Internal I/O ( g RAID and different RAID Access; Intelligent Disk Subsys	ations; Storage – eplacing a server ess problem; The Architecture of Channels; JBOD, levels; Caching: stems;	11	
2	I/O T Systen Storag hardwa	<b>Sechniques</b> : The Phy n; SCSI; Fibre Char e. Network Attached are Architecture, File	ysical I/O path from the CPU nnel Protocol Stack; Fibre C d Storage: The NAS Archite Systems, network file system	J to the Storage hannel SAN; IP cture, The NAS and file servers.	11	
3	StorageVirtualization:DefinitionofStoragevirtualization;10Implementation Considerations;StoragevirtualizationonBlockorfilelevel;StoragevirtualizationonvariouslevelsofthestorageNetwork;Symmetricand Asymmetric storagevirtualizationintheNetwork.					
4	Network Attached Storage: The NAS Architecture, The NAS hardware10Architecture.Storage Area Network: Architecture Overview: Creating a Network for storage, SAN Hardware devices, Software components.10					
5	Manag manag Interfa Manag	gement of Storage N ement System, Sup ce, Standardized N gement, Out-band ma	Network: System Management port by Management System Aechanisms, Property Mechan nagement.	, Requirement of m, Management anisms, In-band	10	

Course Outcomes				]	Description				
CO1	Identif it	Identify the need for performance evaluation and the metrics used for it							
CO2	Apply	the te	chnique	es used fo	r data m	aintenance.	R4 and R5		
C03	Realiz	e stroi	ng virtu	alization	concepts	3	R3		
CO4	Develo system	op tec Is	hniques	for eval	uating p	policies for LUN masking, file	R5		
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5				
CO1	2	-	3	3	2				
CO2	2	-	3	-	2	-			
CO3	-	-	3	-	2	-			
CO4	-	2	3	2	-				
Strong -3	Medium	n -2	Weal	k -1					
<ul> <li>Strong -3 Medium -2 Weak -1</li> <li>TEXT BOOKS: TEXT BOOKS: <ol> <li>Ulf Troppens, Rainer Erkens and Wolfgang Muller: Storage Networks Explained, Wiley India, 2013. ISBN 978-81-265-1832-6</li> </ol> </li> <li>REFERENCE BOOKS: REFERENCES: <ol> <li>Robert Spalding: "Storage Networks The Complete Reference", Tata McGraw-Hill, 2011 ISBN 978-0-07-053292-2</li> <li>Marc Farley: Storage Networking Fundamentals – An Introduction to Storage Devices Subsystems, Applications, Management, and File Systems, Cisco Press, 2011. ISBN-10 1-58705-162-1ISBN-13: 978-1-58705-162-3</li> <li>Richard Barker and Paul Massiglia: "Storage Area Network Essentials "A Complete Guida to understanding and Implementing SANs", Wiley India, 2012. ISBN: 978-0-471-03445-2</li> </ol> </li> </ul>							aw-Hill, 2011. aw-Hill, 2011. rage Devices, 011. ISBN-10: omplete Guide 0-471-03445-2		
COURSE COORDINAT	FOR:	Cou	ırse Co	ordinato	or: Prof.	Shamshekar S. Patil			

		Course Title: So	ftware Quality Assurance	e, Testing and	Metrics	
NAR INSTITUTE OF IT COM		Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week : 4	
ALL ALL	LOGY - m	18SCS152	(L-T-P)			
And a state of the		Exam Duration :	CIE+ Assignment + SEE	Total No. of Co	ontact Hours	
Added By Govt. of Karnataka         3 hours         = 50+50=100         : 52						
Cou	irse		Description			
Objec	cuves:	1. To adapt different	methodologies and models for	design developme	nt of software	
		2. To Apply SQA a	nd SOA function for testing of	frameworks .		
		3 To understand of	lifferent Software testing pro	cess and mechan	isms used in	
		Industry	interent software testing pro		isinis used in	
		4. To formulate diff	ferent Matrices used for measur	ring software qual	ity	
		5.To compare differ	rent tools used for software qua	ality Improvement		
T Inc #4			S-ll-h C4		N f	
No			Synabus Content		Hours	
1	What i	is Software Quality?	McCall Model Boehm Model	, FURPS Model,	12	
	Drome	ey Model ISO 9120	6 Model Who Cares for So w Phases in Software Develo	oftware Quality?		
	Develo	opment Life Cycle M	odels Types of Defects Cost of	of Fixing Defects		
	,Cost o	of Poor Quality				
	Defini	tions Used in Soft				
	Activit	ties . Software Conf				
	Develo	ping Quality Softwa	re	1 CO A D1	10	
2	What i	is of SQA, Kole of a Process? Process	SQA, SQA Functions, SQA F Frameworks. ISO 9001:2008	SEI's CMMI Six	10	
	Sigma	Test Maturity Mode	l Integration (TMMi)			
3	Softwa	are Testing			12	
	Guidir Test N	ng Principles of Testi Manager Role of a	ng , Composition of a Testing Tester Essential Skills of a T	Team Role of a		
	Testing	g,White Box Testing	Integration Testing System Te	sting Acceptance		
	Testing	g Re-Testing or Con	nfirmation Testing Regression	Testing Positive		
	Testing	g Database Testing				
	Risk-E	Based Testing				
4	Metri	cs for Software Qua	lity		12	
	Catego	ories of Software Me	etrics Metrics Program: Goal	Question Metric		
	Metric	s Based on Meth	od of Measurement: Direct	and Indirect		
	Measu	rement Metrics Ba	sed on Type of Data Some (	Commonly Used		
	Software Metrics Process Metrics Product Metrics Metrics for Resources					

5	Tools	for Qu	uality 1	mprov	ement			06	
	Basic	Quality	Quality Control Tools Check Sheet Cause and Effect Diagram (C&E						
	Diagra	am) Pa	n) Pareto Diagram Histogram Scatter Plot Run Chart Control						
	Cnari	Ortho	gonal I	Jelect		.1011			
Соц	rse				I	Descripti	on	<b>RBT Levels</b>	
Outco	omes					<b>L</b>	-		
	CO1	Able	to ad	apt dif	ferent me	ethodolo	gies and models for design	R1, R2	
		develo	opmen	t of soft	ware proc	luct.			
	CO2	Able	annly	SOA an	d SOA fu	unction f	or testing of frameworks	R3 R2	
	~~~		appij			-		N3, N2	
	CO3	Able mecha	to u anisms	nderstar used in	nd differ Industry	rent So	ftware testing process and	R1, R3	
	CO4	Able qualit	to fori y	nulate o	different	Matrices	used for measuring software	R4, R3	
	CO5	Able Impro	to c ovemen	ompare t	differer	nt tools	used for software quality	R2,R3,R4	
CO-P	0	PO1	PO2	PO3	PO4	PO5			
Mapp	ing								
	CO1	3	3	-	2	3			
	CO2	2	3	2	3	2			
	CO3	2	2	3	2	3			
	CO4	2	2	3	3	2			
Strong	-3	Mediu	m -2	Weal	к -1	I			
TEXT	BOO	KS:							
Anirba	ın Basu	Softv	ware Q	uality A	ssurance,	, Testing	and Metrics" First Edition, PHI	Publication	
REFE	RENC	ES:							
1. N	Metrics	and	Mo	dels i	n Softv	vare Q	Quality Engineering by St	tephen Kan	
Addisc ISBN:	Addison-Wesley Longman Publishing Co., Inc. Boston, MA, USA ©2002 ISBN:0201729156								
<i>a</i> = :	~-		_						
COUR COOR	SE RDINAT	FOR:	Dr.	Prakas	h				

		Course Title: Artificial Neural Networks							
STUR INST	TUTE OF IECH	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week :4				
ALL AN	OLOGY · m	18SCS153	(L-T-P)						
AND DEFINING		Exam Duration :	CIE+ SEE = 50+50=100	Total No. of Co	ontact Hours				
Aided By G	ovt. of Karnataka	3 nours		: 52					
Obje	urse ctives:	1 To understand a	Description	ithms					
		1. To understand a	nd compare the learning algor.	tumis.					
		2. To understand the between the per-	ne perceptron convergence the	orem, and the relat	ionship				
		Environment.	Leption and the Bayes classifie	of operating in a Ga	lussiali				
		3 To understand S	OM development which follow	ws the principles of	f Self-				
		organization.	ent de relepinent which follo	principies of					
		4.To understand dvr	namical systems and HOPFIEI	LD Models					
Unit No			Syllabus Content		No of Hours				
1	INTR	<b>ODUCTION</b> - what	is a neural network? Human B	Brain, Models of a	10				
	Neuro	n, Neural network	ts viewed as Directed C	braphs, Network					
	Archit	ectures, Knowledge	NG PROCESS 1 – Error Co	Intelligence and					
	Memo	ry based learning, He	bbian learning.	freetion learning,					
2	LEAR	NING PROCESS	2: Competitive, Boltzmann	learning, Credit	11				
	Assign	ment Problem, Stat	istical nature of the learning	process, SINGLE					
	LAYE	R PERCEPTRONS	– Adaptive filtering probler	n, Unconstrained					
	algorit	hm. learning curves.	Learning rate annealing techr	niques, perception					
	-conve	ergence theorem, Re	lation between perception and	l Bayes classifier					
	for a C	Baussian Environmen	t.						
3	MULT	<b>FILAYER PERCE</b>	PTRON – Back propagation	algorithm XOR	11				
	proble	m, Heuristics, Outpu	it representation and decision	n rule, Computer					
	experiment	ifferentiation Hessi	n, BACK PROPAGATION - back propagation						
	Netwo	rk pruning Techniqu	ues, Virtues and limitations of back propagation						
	learnin	ng, Accelerated conve	ergence, supervised learning.						
4	SELF	ORGANIZATION	MAPS – Two basic feature	mapping models,	10				
	Self-organization map, SOM algorithm, properties of feature map, computer								

	simula Hierar	ations, rchal V	tions, learning vector quantization, Adaptive patter classification, chal Vector quantilizer, contexmel Maps.							
<ul> <li>5 NEURO DYNAMICS – Dynamical systems, stability of equilibrium states, attractors, neurodynamical models, manipulation of attractors' as a recurrent network paradigm, HOPFIELD MODELS – Hopfield models, computer experiment.</li> </ul>								10		
Co	irse					Descrinti	on	<b>RBT</b> Levels		
Outc	omes					Descripti		NDT LEVELS		
	CO1	Able	to appl	y ANN	concept	s /techniq	ues for real time applications	R1, R2,R3		
	CO2	Able	to desig	gn and	develop	ment of a	codes for different learning	R3, R4		
	CO3	Able critica	R2, R3.R4							
	CO4	Able Desig	R4, R3							
CO-P Mapp	O Ding	PO1	PO2	PO3	PO4	PO5				
CO-P Manr	O ing	PO1	PO2	PO3	PO4	PO5				
mapp	CO1	3	3	2	-	2	-			
	CO2	2	2	3	3	3	-			
	CO3	2	2	3	3	2	-			
	CO4         2         3         2         3         3									
Strong	g -3	Mediu	m -2	Wea	k -1					
<b>TEX</b> 1 1. Net	<b>TEXT BOOK:</b> 1. Neural networks a comprehensive foundations. Simon Havkin, Pearson Education 2nd Edition									

# **REFERENCE BOOKS:**

2004 ISBN 10: 0023527617 ISBN 13: 9780023527616

- 1. Artificial neural networks B.Yegnanarayana Prentice Hall of India P Ltd 2005ISBN:8120312538
- Neural networks in Computer intelligence, Li Min Fu TMH 2003 ISBN 0079118178, 9780079118172

3. Neural networks James A Freeman David M Skapura Pearson Education 2004 ISBN 10: 0201513765 ISBN 13: 9780201513769
 Course Co-ordinator Dr. Siddaraju

		Course Title: M			
SUR INSTITUTE OF ITCH		Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week : 4
an • Dr. Ang	AUGY · ·	18SCS21	(L-T-P)		
AND A MOTA PEL	ETHA WELFARE TR	Exam Duration : 3 hours	CIE + SEE = 50+50=100	Total No. of Co 52	ntact Hours :
			Density	I	
Obie	urse ctives:	1 To Understand h	Description		
5		2. To Learn busine	ess case studies for big data ana	lytics	
		3. To Understand I	NoSQL big data management		
		4. To understand n	hap-reduce analytics using Had	oop and related to	ols
	1				N. 677
Unit No			Syllabus Content		No of Hours
1	Under	standing Big Data: W	hat is big data – why big data – I	Data!, Data Storage	10
	and Ar	nalysis, convergence of	key trends unstructured data - in	dustry examples of	
	big dat	a – web analytics – big	g data and marketing – fraud and	big data – risk and	
	big dat	a— big data and health	care – big data in medicine – adve	rtising and big data	
	- big data technologies - Introduction to Hadoop - open source technologies -				
	cloud a	and big data – mobile	business intelligence - Crowd so	ourcing analytics –	
	inter an	nd trans firewall analyti	ics		
2	NoSQ	L Data Management:	Introduction to NoSQL - aggreg	gate data models –	10
	aggreg	ates – key-value and	document data models - rela	tionships – graph	
	databas	ses – schema less data	bases - materialized views - dis	tribution models –	
	shardir	ng — version – Map rec	luce – partitioning and combining	<ul> <li>composing map-</li> </ul>	
	reduce	calculations			
3	Basics	Of Hadoop: Data for	rmat – analysing data with Hado	op – scaling out –	11
	Hadoo	p streaming– Hadoop	pipes - design of Hadoop distr	ibuted file system	
	(HDFS	S) – HDFS concepts –	- Java interface – data flow – H	Iadoop I/O – data	
	integrit	ty – compression – seri	alization – Avro – file-based data	structures	
	Exerci	se 1 HDFS			
	Start by	y reviewing HDFS. You	a will find that its composition is s	imilar to your local	
	Linux	file system. You will	use the hadoop is command whe	en interacting with	
	HDFS.	· · · · · · · · · · · · · · · · · · ·	1.1.1. C d H. J		
	1.  Rev	iew the commands avai	liable for the Hadoop Distributed	File System:	
	2. Cop	y file foo.txt from local	all ask to the user's directory in HL	JE 5	
	3. Get				

	4. Get a directory listing of the HDFS root directory	
	5. Display the contents of the HDFS file user/fred/bar.txt	
	6. Move that file to the local disk, named as baz.txt	
	7. Create a directory called input under the user's home directory	
	8. Delete the directory input old and all its contents	
	9. Verify the copy by listing the directory contents in HDFS	
4	MapReduce Applications: MapReduce workflows – unit tests with MRUnit – test	10
	data and local tests - anatomy of MapReduce job run - classic Map-reduce -	
	YARN – failures in classic MapReduce and YARN – job scheduling – shuffle and	
	sort – task execution – MapReduce types – input formats – output formats	
	Exercise 2 MapReduce	
	1. Create a JOB and submit to cluster	
	2. Track the job information	
	3. Terminate the job	
	4. Counters in MR Jobs with example	
	5. Map only Jobs and generic map examples	
	6. Distributed cache example	
	7. Combiners, Secondary sorting and Job chain examples	
5	Hadoop Related Tools: Hbase – data model and implementations – Hbase clients	11
	– Hbase examples –praxis. Cassandra – Cassandra data model – cassandra	
	$examples-cass and ra \ clients-Hadoop \ integration. \ Pig-Grunt-pig \ data \ model-$	
	Pig Latin - developing and testing Pig Latin scripts. Hive - data types and file	
	formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries.	
	Exercise 3 – Extract facts using Hive	
	Hive allows for the manipulation of data in HDFS using a variant of SQL. This	
	makes it excellent for transforming and consolidating data for load into a relational	
	database. In this exercise you will use HiveQL to filter and aggregate click data to	
	build facts about user's movie preferences. The query results will be saved in a	
	staging table used to populate the Oracle Database. The moveapp_log_json table	
	contains an activity column. Activity states are as follows:	
	1. RATE_MOVIE	
	2. COMPLETED_MOVIE	

3. PAUSE MOVIE 4. START\_MOVIE 5. BROWSE\_MOVIE 6. LIST\_MOVIE 7. SEARCH MOVIE 8. LOGIN 9. LOGOUT 10. INCOMPLETE\_MOVIE hive> SELECT \* FROM movieapp\_log\_json LIMIT 5; hive> drop table movieapp\_log\_json; hive> CREATE EXTERNAL TABLE movieapp\_log\_json ( movieId INT, genreId INT, time STRING, recommended STRING, activity INT, rating INT, price FLOAT ) ROW FORMAT SERDE 'org.apache.hadoop.hive.contrib.serde2.JsonSerde' LOCATION '/user/oracle/moviework/applog/'; hive> SELECT \* FROM movieapp\_log\_json LIMIT 20; hive> SELECT MIN(time), MAX(time) FROM movieapp\_log\_json 1. PURCHASE\_MOVIE Hive maps queries into Map Reduce jobs, simplifying the process of querying large datasets in HDFS. HiveQL statements can be mapped to phases of the Map Reduce framework. As illustrated in the following figure, selection and transformation operations occur in map tasks, while aggregation is handled by reducers. Join operations are flexible: they can be performed in the reducer or mappers depending on the size of the leftmost table. 1. Write a query to select only those clicks which correspond to starting, browsing, completing, or purchasing movies. Use a CASE statement to transform the RECOMMENDED column into integers where 'Y' is 1 and 'N' is 0. Also, ensure GENREID is not null. Only include the first 25 rows.

2. Write a query to select the customer ID, movie ID, recommended state and most recent rating for each movie.

3. Load the results of the previous two queries into a staging table. First, create the staging table:

4. Next, load the results of the queries into the staging table.

#### **Exercise 4 -- Extract sessions using Pig**

While the SQL semantics of HiveQL are useful for aggregation and projection, some analysis is better described as the flow of data through a series of sequential operations. For these situations, Pig Latin provides a convenient way of implementing data flows over data stored in HDFS. Pig Latin statements are translated into a sequence of Map Reduce jobs on the execution of any STORE or DUMP command. Job construction is optimized to exploit as much parallelism as possible, and much like Hive, temporary storage is used to hold intermediate results. As with Hive, aggregation occurs largely in the reduce tasks. Map tasks handle Pig's FOREACH and LOAD, and GENERATE statements. The EXPLAIN command will show the execution plan for any Pig Latin script. As of Pig 0.10, the ILLUSTRATE command will provide sample results for each stage of the execution plan.

In this exercise you will learn basic Pig Latin semantics and about the fundamental types in Pig Latin, Data Bags and Tuples.

1. Start the Grunt shell and execute the following statements to set up a dataflow with the click stream data. Note: Pig Latin statements are assembled into Map Reduce jobs which are launched at execution of a DUMP or STORE statement.

2. Group the log sample by movie and dump the resulting bag.

3. Add a GROUP BY statement to the sessionize.pig script to process the click stream data into user sessions.

Course Outcomes	Description	<b>RBT</b> Levels
CO1	Learn, analyze and interpret big data and few of its use cases from selected business domains, Health Care, Fraud Detection and Advertising.	R2,R3,R4

CO2	Analy	Analyze and apply NoSQL in big data applications.							
CO3	Appl	y map-	reduce a	analytics	using Ha	doop.	R3		
CO4	Analy	yze and	develo	p applica	tions usir	ng Hadoop and its related tools.	R4,R5		
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5				
C01	1	-	2	3	2				
CO2	-	-	2	3	3				
CO3	-	2	3	3	2				
CO4	2	3	2	3	3				
Strong -3	Mediu	m -2	Weal	k -1					

## **TEXT BOOKS**

1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.

2. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Copyright © 2013 Pearson Education, Inc. 2012.

3. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.

4. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.

#### **REFERENCE BOOKS**

1. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.

2. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.

3. Alan Gates, "Programming Pig", O'Reilley, 2011.

Course Coordinator: Dr. Siddaraju

Sus menture of ice	Course Title: Advanced Database Systems								
	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture hours/week :4						
NU - OF - O	18SCS22	(L-T-P)							
APPLICATION OF A DESCRIPTION OF A DESCRI	Exam Duration :	CIE+ SEE = 50+50=100	Total No. of Contact Hours						
Aided By Govt. of Karnataka	3 hours		:52						

C	Description				
Course	Description				
<b>Objectives:</b>	Course objectives:				
	1. Design and implement advanced queries using Structured Query Language				
	2. To study the usage and applications of Object Oriented database				
	3 To acquire knowledge on variety of NoSOL databases				

To acquire knowledge on variety of NoSQL databases
 To attain inquisitive attitude towards research topics in NoSQL databases

Unit No		Syllabus Content	No of Hours				
1.	Datab	ase System Concepts and Architecture: Data Models, Schemes and	10				
	Instand	ces, Three-Schema Architecture and Data Independence, The Relational					
	Data I	Model and Relational Database Constraints: Relational Model Concepts,					
	Relatio	onal Model Constraints and Relational Database Schemas, Update					
	Operat	tions, Transactions and Dealing with Constraints Violations. Basic Queries					
	and Co	ommands in SQL.					
2.	PL/SQ	L Language Fundamentals, Conditional and Sequential Control, Iterative	11				
	Proces	sing with Loops, String Datatypes, Working with Strings, Specifying String					
	Consta	ants, Using Nonprintable Characters, Concatenating Strings, Dealing with					
	Case,	Traditional Searching, Extracting, and Replacing, Date time Datatypes,					
	Gettin	g the Current Date and Time, Date time Conversions, From Strings to Date					
	times,	From Date times to Strings.					
3.	NoSQ	L: Motivations for Not Just/No SQL (NoSQL) Databases, Variety of	10				
	NoSQ	L Databases, Introduction to Key-Value Databases, Key-Value Database					
	Termin	nology.					
4.	Introdu	uction to Document Databases, Document Database Terminology	11				
	Introduction to Column Family Databases, Column Family Database Terminology						
5.	Introduction to Graph Databases, Graph Database Terminology,						
~							
Cor Outc	irse omes	Description	<b>RBT Levels</b>				

Strong -3	Mediu	m -2	Wea	k -1	•	•				
CO4	-	1	3	-	1					
CO3	-		3	2	1					
CO2	-	-	3	3	3					
C01	-	1	3	2	3					
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5					
	Datab	ases, Co	olumn ba	ased Datab	bases and	Graph Databases.				
CO4	Demo	nstrate	the kno	wledge of	f Key-Va	alue databases, Document based	R1,R4			
CO3	Critica	ally ana	lyze and	l evaluate	variety of	NoSQL databases.	R4			
CO2	Constr applic	Construct queries using Pl/SQL efficiently for developing database applications.								
	SQL.	SQL.								
C01	Acqui	ring the	e basic k	knowledge	of ER-D	Diagram, Relational Database and	R1,R2			

#### **TEXT BOOKS:**

Ramez Elmasri, Shamkant B Navathe,"Database Systems: Models,Languages,Design and Application Programming", 6<sup>th</sup>Edition, Pearson Education, 2013.(ISBN-13:978-8131792476)

- 1) Steven Feuerstein, "Oracle PL/SQL Programming", 6<sup>th</sup>Edition, O'Reilly Media, 2014. (ISBN-13: 978-1449324452)
- Dan Sullivan, "NoSQL for Mere Mortals", 1<sup>st</sup>Edition, Pearson Education, 2015. (ISBN-13: 978-9332557338)

#### **REFERENCE BOOKS / WEBLINKS:**

- 1) Michael McLaughlin,"Oracle Database 12c PL/SQL Programming", 1<sup>st</sup>Edition, McGraw-Hill Education, 2014. (ISBN-13: 978-0071812436)
- Pramod J. Sadalage, Martin Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", 1<sup>st</sup>Edition, Pearson Education, 2012. (ISBN-13: 978-8131775691)

COURSE	Prof. Shamshekar Patil
<b>COORDINATOR:</b>	

		Course Title: Artificial Intelligence and Prolog Programming									
A CONTRACT OF CONTRACT.		Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture h	ours/week :4						
		18SCS23	(L-T-P)								
Aided By Govt. of	WELFARE TRUS	Exam Duration : 3 hours	CIE+ SEE = 50+50=100	Total No. of Co : 52	ontact Hours						
Cour	se	Description									
Objecti	ives:	1. To Implement non-trivial AI techniques in a relatively large system									
		2. To understand u	ncertainty and Problem solving	g techniques.							
		3. To understand v and reasoning ta	arious symbolic knowledge re sks of a situated software agen	presentation to spe t.	ecify domains						
		4. To understand representations, problem specific	different logical systems for and trace how a particular infer cation.	inference over for ence algorithm wo	ormal domain rks on a given						
		5. To understand IntelligenceAnal Backtracking me	how to write a Prol lyzing and Solving Artificial ethods	og programs f Intelligence progr	or Artificial ams by using						
UNIT			Syllabus Content		No of						
No	** **		1		Hours						
1	Wha assur- for s the chara searc	What is Artificial Intelligence: The AI Problems, The Underlying <b>10</b> assumption, What is an AI Technique?, The Level of the model, Criteria for success, real world Problems, problem spaces and search: Defining, the problem as a state space search, Production systems, Problem characteristics, Production system characteristics, Issues in the design of search programs, Additional Problems.									
	Intelligent Agents: Agents and Environments, The nature of environments, The structure of agents. (Text Book 1: Chapter 1 & 2 Text Book 2: Chapter 2)										
2	Book 2: Chapter 2 )10Heuristic search techniques: Generate-and-test, Hill climbing, Best-first search, Problem reduction, Constraint satisfaction, Mean-ends analysis. Knowledge representation issues: Representations and mappings, Approaches to knowledge representation, Issues in knowledge representation, The frame problem. Using predicate logic: Representing simple facts in logic, representing instance and ISA relationships, Computable functions and predicates. (Text Book 1: Chapter 3, 4 & 5)										

3	Sym rease Brea Theo Text Prol An o prog ques Mea mea bana Prol (Tex	bolic I oning, dth-fir orem, C Book og Pro exampl gram b stions, ning of ning of una, Or og and at Book	10						
5	Lists lists Retr Simu quee Exan Inpu (Tex	Lists, Operators, Arithmetic, Representation of lists, Some operations on lists, Operator notation, Arithmetic, Using Struclures: Example Programs, Retrieving structured information from a database, Doing data abstraction, Simulating a non-deterministic automaton,Travel planning, The eight queens problem, Controlling, Backtracking, Preventing backtracking, Examples using cut, Negation as failure, Problems with cut and negation, Input and Output, Communication with files. (Text Book 3: Chapter 3, 4, 5 & 6)							
Cours	se				]	Descripti	on	RBT Levels	
(	CO1         Acquire knowledge and understand AI agents with problem solving, reasoning, planning, decision making, and learning abilities					I agents with problem solving, and learning abilities	R1,R5		
(	CO2 Analyze the real time problems to represent it in AI framework and techniques							R4	
(	CO3 Use prolog programming constructs to represent AI components							R3	
(	CO4 Design and implement AI applications in prolog to solve real time problems							R5	
CO-PO Mannin	σ	PO1	PO2	PO3	PO4	PO5			
(	oping              CO1         -         2         3         3         3								

Strong -3	Mediu	ım -2	Wea	ak -1	
CO4	2	3	3	2	3
CO3	2	-	3	2	3
CO2	1	-	3	2	3

### **TEXT BOOKS**

1. Elaine Rich, Kevin Knight, Shivashanka B Nair: Artificial Intelligence, Tata CGraw Hill 3rd edition. 2013, ISBN 10: 0070087709 ISBN 13: 9780070087705

2. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, Pearson 3rd edition 2013, ISBN: 0-13-604259-7

3. Ivan Bratko Prolog Programming for Artificial Intelligence , (International Computer Science Series) 4th Edition, Publisher: Pearson Education Canada; 4th edition, 2011, ISBN-10: 0321417461; ISBN-13: 978-0321417466

#### **REFERENCE BOOKS/WEBLINKS:**

1. Nils J. Nilsson: "Principles of Artificial Intelligence", Elsevier, ISBN-13: 9780934613101

	Dr. M.V. Vijayakumar & Dr. K. R. Shylaja
COURSE	
<b>COORDINATOR:</b>	

		Course Title: Advanced Algorithms and Data structure									
ALLE INSTITUTE OF TICS		Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture ho	ours/week: 4						
ILER PLUT	LOGY - as	18SCS24	(L-T-P)								
Aided By G	COLUMN STATES	Exam Duration : 3 hours	CIE+ SEE = 50+50=100	Total No. of Co : 52	ntact Hours						
Co	urse		Description								
Obje	ctives:	1. To learn implem	enting iterative and recursive of	optimized solution	8						
		2. To learn the grap	oh search algorithms.								
		3. To study networ	k flow problems.								
		4. To study the wo	rking mechanism of advanced	data structures							
		To understand the	ne application of hashing techn	ique							
TIre#4			Sullahus Contort		Nosf						
No			Synabus Content		Hours						
1	Revie notatio Soluti recurr Aggre	w of Analysis Tec ons; Standard notation on of Recurrence eq ence – tree method gate, Accounting and	<b>Iniques:</b> Growth of Functions; ons and common functions; uations- The Course substitut l, The master method; Amo Potential Methods	ons: Asymptotic Recurrences and ion method, The ortized Analysis:	11						
2	<b>Grap</b> in a D Fulker	h <b>Algorithms:</b> Bellma AG; Johnson's Algor rson method; Maximu	an - Ford Algorithm; Single sou thm for sparse graphs; Flow ne im bipartite matching.	rce shortest paths tworks and Ford-	10						
3	Hash Tables, Direct-address tables, Hash tables, Hash functions, Open addressing, Perfect hashing, Heaps Maintaining the heap property, Building a heap, The heapsort algorithm, Priority queues       10										
4	4Binary Search Trees, What is a binary search tree? Querying a binary search tree, Insertion and deletion, Randomly built binary search trees, Red-Black Trees, Properties of red-black trees, Rotations, Insertion Deletion11										
5	5B-Trees, Definition of B-trees, Basic operations on B-trees, Deleting a key from a B-tree, Structure of Fibonacci heaps10										
Co	1150		Decorintion		DBT Lovala						
Outc	omes		Description		ND I LEVEIS						
	CO1	Analyze and design	iterative and recursive algorith	ims	R4,R5						

CO2	Interpr real-tin	Interpret the logic and determine the suitable data structures for a real-time applications							
CO3	To An real tir	alyze ne app	ns to find optimal solutions for	R4,R3,R5					
CO4	Apply solutio	Apply the operations on tree based data structures to find optima solutions using for real time applications.							
CO5	Apply applica	R3							
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5				
CO1	-	-	3	3	3	-			
CO2	-	-	3	3	3	-			
CO3	-	-	3	3	3	-			
CO4	-	1	3	2	3				
CO5	-	1	3	2	3				
TEXT BOO 1. T. H ( Editio	<ul> <li><b>TEXT BOOK:</b></li> <li>1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd Edition, Prentice-Hall of India, 2010. ISBN:9780262033848</li> </ul>								
<ul> <li><b>REFERENCE BOOKS/WEBLINKS:</b></li> <li>1. Ellis Horowitz, SartajSahni, S.Rajasekharan: Fundamentals of Computer Algorithms, 2nd Edition, Universities press, 2007, ISBN 8173716129, 9788173716126</li> </ul>									
<ol> <li>Horowitz, Sahani, Dinesh Mehata, —Fundamentals of Data Structures in C++I, Galgotia Publisher, ISBN: 8175152788, 9788175152786.</li> <li>M Folk, B Zoellick, G. Riccardi, —File StructuresI, Pearson Education, ISBN:81-7758-37-</li> </ol>									
4. Peter 43982	Brass, – 2-5	-Adv	anced D	ata Struc	tures∥, C	ambridge University Press, ISBN	N: 978-1-107-		
COURSE COORDINAT	FOR:	Dr.	K R Shy	ylaja					

		Course Title :DIGITAL IMAGE PROCESSING									
SHARINST	TUTE OF IF OF	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture hou	urs/week :4						
A CONTRACTOR		18SCS251	(L-T-P)								
- Sunchar	HECON	Exam Duration : 3	CIE+ SEE = 50+50=100	Total No. of Con	tact Hours :						
Aided By G	ovt. of Karnataka	nours		52							
Car			Description								
Obje	ctives:	1. To understand th	be image fundamentals and ma	thematical transfor	rms necessary						
		for image proces	sing and to study the image en	hancement technic	nues.						
		2. To understand the	image segmentation and repre	esentation techniqu	ies.						
		3. To understand ho	w image are analyzed to extrac	t features of intere	est.						
		4. To introduce the	concepts of image registration	and image fusion.							
		5. To analyze the co	nstraints in image processing v	when dealing with	image						
		data sets.									
Unit No			Syllabus Content		No of Hours						
1.	Introd	uction: What is Digita	al Image Processing, Origins of	f Digital Image	10						
	Proces	sing, Examples of fie	elds that use DIP, Fundamenta	l Steps in Digital							
	Image	Processing, and Com	ponents of an Image Processin	g System. Digital							
	Image	Fundamentals: Eler	nents of Visual Perception,	A Simple Image							
	Forma	tion Model, Basic	Concepts in Sampling an	d Quantization,							
	Repres	senting DigitalImages	s, Spatial and Gray-level Reso	olution, Zooming							
	and Sl	nrinking Digital Imag	ges, Some Basic Relationships	Between Pixels,							
	Linear	and Nonlinear Opera	tions.								
2.	Image	Enhancement in the	Spatial Domain: Some Basic G	iray Level	11						
	Transf	ormations, Histog	ram Processing, Enhan	cement Using							
	Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial										
	Filters.										
3.	Image	Segmentation and O	oject Recognition: Detection of	t Discontinuities,	10						
	Edge I	Linking and Boundary	Detection, Thresholding, Reg	gion-Based							
4	Segme	entation, Patterns and	Pattern Classes, Methods	<i>,</i> ,•	11						
4.	Image	Restoration: A Mode	el of the Image degradation/Res	storation process,	11						
	Noise	Models, Restoration	in the Presence of Noise Only-	-Spatial Filtering,							
	Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-										
---	---	---	------------------------------	----------	------------------------------	--	-------------------------------	------------	--	--	--
	Invari	ant De									
	Filteri	ng.									
5.	Morpl	Iorphological Image Processing: Preliminaries, Dilation and Erosion									
	Openi	ing an	d Clo	sing, T	he Hit-o	or-Miss	Transformation, Some Basic				
	Morpl	hologic	al A	lgorith	ms. Im	nage Se	egmentation: Detection of				
	Disco	ntinuiti	ies, Eo	lge Lir	nking an	d Bound	lary Detection, Thresholding,				
	Regio	n-Base	d Segr	nentatio	on.						
Cor Oute	irse omes					Descripti	on	RBT Levels			
		Unda	natord	imaga f	amation	and the	role humon viewel evetem	P3			
CO	<b>D1</b>	Under		image i	ormation		imaga data	K5			
		plays	$\frac{10}{\cdot}$	ception	of gray a	$\frac{1}{10000000000000000000000000000000000$	image data.	D2			
CO	02	Apply	/ image	e proces	sing tech	iniques ii	n both the spatial and	R3			
		freque	trequency (Fourier) domains.								
CO	03	Desig	R4,R5								
		segme									
CO	<b>D4</b>	Cond	R4								
		techni									
CO5 Understand the concepts of image registration and					gistration and image fusion.	R1,R3					
C	76	Analyze the constraints in image processing when dealing with image						R4			
		data sets and to apply image algorithms in practical applications									
CO-PC	) ng	PO1	PO2	PO3	PO4	PO5		I			
марри							-				
	CO1	1	-	3	3	1					
	CO2	-	1	3	3	2	-				
	CO3	_	-	3	3	2	-				
		-		5		1					
TEX'I 1.	TEXT BOOK: 1 Kazem Sohrahy Daniel Minoli Taieh Znati "WIRELESS SENSOR NETWORKS										
	Technology, Protocols, and Applications" John Wiley & Sons, Inc. Publications.										

2. Holge Karl and Andreas Willing "Protocols and Architectures for Wireless Sensor Networks" 2011 John Wiley & Sons, Inc. Publications.

# **REFERENCE BOOKS / WEBLINKS:**

- 1. Matthijs Kooijman Building Wireless Sensor Networks Using Arduino (Community Experience Distilled).
- 2. Edgar H. Callaway Jr Wireless Sensor Networks: Architectures and Protocols (Internet and Communications)

# **Course Coordinator:**

		Course Title: Da	ta Science with R-Program	ıming					
SUAR INST	TITUTE OF TREE	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture	hours/week :				
Alded By Govt. of Karnataka		18SCS252	(L-T-P)	4					
		Exam Duration : 3 hours	ontact Hours						
Co	urse		Description						
Obje	ctives:	1. To understar	nd the data analytics basics	ramming					
		3. To understar	nd linear regression for regre	ssion					
		4. To understar	nd parametric and non-parar	netric classification					
		5. To understar	la text mining teeninques						
Unit No			Syllabus Content		No of Hours				
1	Overvi Structu Data in	iew of the R Progra ures. Functions, help nto R, Data Visualiza	amming Language Basic D o System, Running R Code tion	ata Types Control , Packages, Getting	11				
2	Explor Distrib	catory Data Analysis oution, Putting It All '	, Summary Statistics, Gettin Together: Outlier Detection	ng a Sense of Data	10				
3	Regres Regres	ssion: Introduction, ssion Models	Parametric Regression Mod	els, Nonparametric	10				
4	Classif Nonpa	fication, Introduct rametric Classification	ion, Parametric Classi on Models	fication Models,	10				
5	Text Mining, Introduction, Dataset, Reading Text Input Data, Common Text       11         Pre-processing Tasks, Term Document Matrix, Text Mining Applications       11								
Course Outcomes			Description						
	CO1	Understand and App	ply the data analytics basics		R1,R3				
	CO2 Apply the construction of R Programming to design real time applications								
	CO3	Apply Linear Regres	Apply Linear Regression for Regression problems in real time						
	CO4	Understand and App	ly parametric and non-paran	netric classification	R1,R3				
	CO5       Understand and Apply text mining techniques       R1,R3								

СО-РО	PO1	PO2	PO3	PO4	PO5
Mapping					
C01	-	-	3	3	2
CO2	-	-	3	3	3
CO3		-	3	3	2
CO4	2	-	3	3	2
CO5	2	-	3	3	2
Strong -3	Mediu	<b>m -2</b>	Weal	k -1	

### **TEXT BOOKS:**

**1.** Beginning Data Science with R, Manas A Pathak, 2014, ISBN 978-3-319-12065-2 ISBN 978-3-319-12066-9 (eBook) DOI 10.1007/978-3-319-12066-9

# **REFERENCE BOOKS:**

1. Data Science and Big Data: An Environment of Computational Intelligence, **Pedrycz**, Witold, **Chen**, Shyi-Ming (Eds.) ISBN 978-3-319-12066-9

2. A First Level Book to expedite Statistics through R: An Inquisitive approach, Dr. N B Venkateshwaralu , Amazon Asia-Pacific Holdings Private Limited, 2018

COURSE COORDINATOR:	Dr. Siddaraju & Dr. K R Shylaja

NAR INST	ITUTE OF IEC	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture hou	ırs/week: 4					
Addd By Govt. of Kamataka		18SCS253	(L-T-P)							
		Exam Duration : 3 hours	Total No. of Con 52	tact Hours :						
Со	urse		Description							
Objec	ctives:	1. To provide an unde	rstanding Computer forensics fun	damentals						
		2. To analyze various	computer forensics technologies							
		3. To provide compute	er forensics systems							
		4. To identify method	s for data recovery.							
		5. To apply the metho	ds for preservation of digital evid	ence						
<b>T</b> T •/										
Unit No			Syllabus Content		No of Hours					
1	Comp	uter Forensics Fund	lamentals		10					
	Introdu	uction to Computer	Forensics, Use of Computer F	Forensics in Law						
	Enforc	ement, Computer	Forensics Assistance	to Human						
	Resour	rces/Employment P	roceedings, Computer Fore	ensics Services,						
	Benefi	ts of Professional For	rensics Methodology.							
2	Types	of Computer Foren	sics Technology		11					
	Types	of Military Comp	outer Forensic Technology,	Types of Law						
	Enforc	ement: Computer For	rensic Technology, Types of Bu	isiness Computer						
	Forens	ic Technology, Spec	ialized Forensics Techniques,	Hidden Data and						
	How to									
	Encry									
	Comp	and Wireless								
	Technologies ,Avoiding Pitfalls with Firewalls ,Biometric Security									
	System	Systems.								
3	Types	of Computer Foren	sics Systems		11					
	Interne	et Security Systems,	Intrusion Detection Systems, I	Firewall Security						
	System	ns, Storage Area N	etwork Security Systems, N	etwork Disaster						
	Recov	ery Systems, Public	Key Infrastructure Systems, W	Vireless Network						
	Securi	ty Systems.								

	Satellite Encryption Security Systems, Instant Messaging (IM) Security													
	Systems, Net Privacy Systems, Identity Management Security Systems													
	,Identity Theft, Biometric Security Systems, Homeland Security Systems													
4	Data Recovery													
	Data Recovery Defined ,Data Backup and Recovery ,The Role of Backup in													
	Data Recovery ,The Data-Recovery Solution ,Hiding and Recovering													
	Hidden Data													
	Evide	nce Co	llection	n and Da	ata Seizu	re								
	Why	Collect	Evider	nce?, Co	ollection (	Options	Obstacles, Types of Evidence							
	,The I	Rules c	of Evid	ence ,V	olatile Ev	vidence	General Procedure Collection							
	and A	rchivir	ng, Met	hods of	Collectio	on, Artef	acts.							
5	Dupli	cation	and P	reserva	tion of D	igital E	vidence	10						
	Preser	rving th	ne Digi	ital Crin	ne Scene,	, Compu	ter Evidence Processing Step.							
	Comp	outer I	mage	Verific	ation and	d Autho	entication Special Needs of							
	Evide	ntial A	uthenti	cation,	Practical	Conside	Evidential Authentication, Practical Considerations.							
Cou Outc	irse omes				D	escripti	on	RBT Levels						
Cou Outc	irse omes CO1	Unde	rstand	the defin	D nition of c	Descripti	on r forensics fundamentals.	RBT Levels R1,R3						
Cou Outc	irse omes CO1 CO2	Under	rstand t	the define types of	D nition of c f comput	Descripti compute er forens	on r forensics fundamentals. sics technology.	<b>RBT</b> <b>Levels</b> R1,R3 R4						
Cou Outc	irse omes CO1 CO2 CO3	Under Descr Analy	rstand t ibe the ze vari	the define types of ious con	D nition of c f computer nputer for	Descriptic compute er forens rensics s	r forensics fundamentals. sics technology. ystems.	RBT Levels R1,R3 R4 R4						
Cou Outc	Irse omes CO1 CO2 CO3 CO4	Under Descr Analy Illustr	rstand t ibe the ze vari- cate the	the define types of ious cont method	D nition of c f compute nputer for ls for data	Description compute er forens rensics s a recover	r forensics fundamentals. sics technology. ystems. ry, evidence collection and	RBT Levels R1,R3 R4 R4 R4 R4						
Cou Outc	Irse omes CO1 CO2 CO3 CO4	Under Descr Analy Illustr data s	rstand t ibe the ze vari- cate the eizure.	the define types of ious cont method	D nition of c f compute nputer for ls for data	Description compute er forens rensics s a recover	r forensics fundamentals. sics technology. ystems. ry, evidence collection and	RBT Levels R1,R3 R4 R4 R4 R4						
Cou Outc	Irse omes CO1 CO2 CO3 CO4	Under Descr Analy Illustr data s Sumn	rstand t ibe the ze vari cate the eizure.	the define types of ious cont method duplicat	D nition of c f computer nputer for ls for data ion and p	Description compute er forens rensics s a recover reservation	r forensics fundamentals. sics technology. ystems. ry, evidence collection and ion of digital evidence.	RBT Levels R1,R3 R4 R4 R4 R4 R4						
Cou Outc	Irse omes CO1 CO2 CO3 CO4 CO5	Under Descr Analy Illustr data s Sumn	rstand t ibe the ze vari cate the eizure.	the define types of ious cont method duplicat	D nition of c f computer nputer for ls for data ion and p	Description compute er forens rensics s a recover reservation	r forensics fundamentals. sics technology. ystems. ry, evidence collection and ion of digital evidence.	RBT Levels R1,R3 R4 R4 R4 R4 R4						
Cou Outc	Irse omes CO1 CO2 CO3 CO4 CO5	Under Descr Analy Illustr data s Sumn	rstand the the variant the the variant the variant the variant the variant of the	the define types of ious content method duplicat	D nition of c f computer nputer for ls for data ion and p PO4	Pescripti compute er forens rensics s a recover reservati	r forensics fundamentals. sics technology. ystems. ry, evidence collection and ion of digital evidence.	RBT Levels R1,R3 R4 R4 R4 R4 R4						
Cou Outc CO-P Mapp	Irse omes CO1 CO2 CO3 CO4 CO5 O ing	Under Descr Analy Illustr data s Sumn PO 1	rstand t ibe the ze vari cate the eizure. narize o <b>PO</b> 2	the define types of ious content method duplicat PO3	D nition of c f computer nputer for ls for data ion and p PO4	Pescripti compute er forens rensics s a recover reservati	r forensics fundamentals. sics technology. ystems. ry, evidence collection and ion of digital evidence.	RBT LevelsR1,R3R4R4R4R4						
Cou Outc CO-P Mapp	Irse omes CO1 CO2 CO3 CO4 CO5 O ing CO1	Under Descr Analy Illustr data s Sumn PO 1	rstand t ibe the vze vari cate the eizure. marize o PO 2	the define types of ious content method duplicat <b>PO3</b>	D nition of c f computer nputer for ls for data ion and p PO4 3	Pescripti compute er forens rensics s a recover reservati	r forensics fundamentals. sics technology. ystems. ry, evidence collection and ion of digital evidence.	RBT Levels R1,R3 R4 R4 R4 R4						
Cou Outc CO-P Mapp	Irse omes CO1 CO2 CO3 CO4 CO5 O ing CO1 CO2	Under Descr Analy Illustr data s Sumn PO 1 -	rstand t ibe the vze vari cate the eizure. marize o PO 2 -	the define types of ious content method duplicat <b>PO3</b> 3 3	D nition of c f compute nputer for ls for data ion and p PO4 3 3	Pescripti compute er forens rensics s a recover reservati PO5 - 1	r forensics fundamentals. sics technology. ystems. ry, evidence collection and ion of digital evidence.	RBT Levels R1,R3 R4 R4 R4 R4						
Cou Outc CO-P Mapp	Irse omes CO1 CO2 CO3 CO4 CO5 O oing CO1 CO2 CO3	Under Descr Analy Illustr data s Summ PO 1 - - -	rstand t ibe the vze vari rate the eizure. narize o PO 2 - -	the define types of ious content method duplicat <b>PO3</b> 3 3 3	D nition of c f compute nputer for ls for data ion and p PO4 3 3 3	Pescripti compute er forens rensics s a recover reservati PO5 - 1 2	r forensics fundamentals. sics technology. ystems. ry, evidence collection and ion of digital evidence.	RBT Levels R1,R3 R4 R4 R4 R4 R4						
Cou Outc	Irse omes CO1 CO2 CO3 CO4 CO4 CO5 O ing CO1 CO2 CO3	Under Descr Analy Illustr data s Summ PO 1 - - -	rstand t ibe the ze vari rate the eizure. narize o PO 2 - -	the define types of ious content method duplicat <b>PO3</b> 3 3 3 3	D nition of c f computer nputer for ls for data ion and p PO4 3 3 3 3	Pescripti compute er forens rensics s a recover reservati PO5 - 1 2	r forensics fundamentals. sics technology. ystems. ry, evidence collection and ion of digital evidence.	RBT LevelsR1,R3R4R4R4R4						

CO5	1	-	3	3	2	
Strong -3 Medium -2		W	eak -1			

#### **TEXT BOOKs:**

1. John R. Vacca, Computer Forensics: Computer Crime Scene Investigation, 2nd Edition, Charles, River Media, 2005 ISBN-13: 978-1584503897

### **REFERENCE BOOKS/WEBLINKS:**

1. ChristofPaar, Jan Pelzl, Understanding Cryptography: A Textbook for Students and Practitioners, 2nd Edition, Springer's, 2010ISBN 978-3-642-04101-3

2. Ali Jahangiri, Live Hacking: The Ultimate Guide to Hacking Techniques & Countermeasures forEthical Hackers & IT Security Experts, Ali Jahangiri, 2009ISBN-13: 978-0984271504

3. Computer Forensics: Investigating Network Intrusions and Cyber Crime (Ec-Council Press Series:Computer Forensics), 2010ISBN-13: 978-1435483521

# Course Coordinator: Prof. Madhu B

		Course Title: S	ensor Networks Infrastru	ucture	
SURINST	TITUTE OF TRC	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture hou	ırs/week : 4
MILA OLOGA		18SCS254	(L-T-P)		
Suncher R.	MEDD)	Exam Duration : 3	CIE + SEE = 50 + 50 = 100	Total No. of Con	tact Hours :
Aided By G	ETHA WELFARE TROS	hours		52	
Co	urse		Description		
Obje	ctives:	2. Understand	of Wireless Sensor Networks a	ind its applications.	
		3. Understandin 4 Discuss Wir			
		5. Operating S	ystems for Wireless Sensor No	etworks.	
Unit			Syllabus Content		No of
No					Hours
1.	Introd	uction and Overview	v of Wireless Sensor Networ	rks: Introduction,	10
	Netwo	orks: Introduction. Ba	ckground, Range of Application	ons. Examples of	
	WSN	Applications.			
2.	Basic	Wireless Sensor Tech	nology: Introduction, Sensor N	Node Technology,	11
	Transi	nission Technology	and Systems: Introduction, R	adio Technology	
	Prime	r, Available Wireless	Technologies,		
3.	Availa of MA	ble Wireless Technol C Protocols, MAC P	ogies: Introduction, Backgrou rotocols for WSNs, Sensor-M	nd, Fundamentals AC Case Study.	10
4.	Routir	ng Protocols for	Wireless Sensor Network	s: Introduction,	11
	Backg	round, Data Dissemi n Issues in Wireless S	nation and Gathering, Routing	g Challenges and tegies in Wireless	
	Sensor	r Networks,	ensor receiverne, reducing Stra		
5.	Opera	ting Systems for Wir	eless Sensor Networks: Introd	uction, Operating	10
	1 Tinv	OS, 276	2 Mate, 277 3 N	lagnetOS, 278	
	4 MA	NTIS, 278	5 OSPM, 279 6 E	YES OS, 279	
	7 Sen	OS, 280	8 EMERALDS, 280 9 F	PicOS,	
Co	urse		Description		<b>RBT</b> Levels
Outo	comes				
1	ι.	Explain the wireless	sensor networks and its applic	ations	R4,R3
2	2.	Explain Basic techno	blogies for WSN.		R4
3	3.	Different types of Pr	otocols for WSN.		R4
4	4.	Understand different	types of Operating system for	WSN.	R3,R4

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5
C01	-	-	3	3	1
CO2	-	-	3	3	2
CO3	-	-	3	3	2
CO4	-	2	3	2	1

### **TEXT BOOK:**

- 3. Kazem Sohraby, Daniel Minoli, Taieb Znati "WIRELESS SENSOR NETWORKS Technology, Protocols, and Applications" John Wiley & Sons, Inc. Publications.
- 4. Holge Karl and Andreas Willing "Protocols and Architectures for Wireless Sensor Networks" 2011 John Wiley & Sons, Inc. Publications.

### **REFERENCE BOOKS / WEBLINKS:**

- 3. Matthijs Kooijman Building Wireless Sensor Networks Using Arduino (Community Experience Distilled).
- 4. Edgar H. Callaway Jr Wireless Sensor Networks: Architectures and Protocols (Internet and Communications)

### Course Coordinator: Prof. Shamshekar S. Patil

	Course Title: Data structures and DBMS LAB										
SUR INSTITUTE OF ITCH	<b>Course Code:</b>	No. of Credits: 3 : 0 : 0	No. of lecture hours/week : 3								
D. Alo	18SCSL26	(L-T-P)									
AHONNA AND AND AND AND AND AND AND AND AND AND	Exam Duration : 3	CIE+ SEE = 50+50=100	Total No. of Contact Hours :								
Aided By Govt. of Karnataka	nours		30								
Course	Description										
<b>Objectives:</b>	1. To understand usage of advanced data structure in real time applications										
	2. To acquire inquisitive attitude towards research topics in databases.										

- 3. To acquire practical knowledge on advanced databases and its applications.
- 4. To implement the shell of Operating System.
  - To implement distributed operating system concepts.

No of Hours

### Part A: ADBMS LABORATORY WORK

Note: The following experiments may be implemented on MySQL/ORACLE/PostgreSQL or any other suitable RDBMS with support for Object features

- 1. Develop a database application to demonstrate storing and retrieving of BLOB andCLOB objects.
  - a) Write a binary large object (BLOB) to a database as either binary or character (CLOB) data, depending on the type of the field in your data source. To write a BLOB value to the database, issue the appropriate INSERT or UPDATE statement and pass the BLOB value as an input parameter. If your BLOB is stored as text, such as a SQL Server text field, pass the BLOB as a string parameter. If the BLOB is stored in binary format, such as a SQL Server image field, pass an array of type byte as a binary parameter.
  - b) Once storing of BLOB and CLOB objects is done, retrieve them and display the results accordingly.
- 2. Develop a database application to demonstrate the representation of multi valuedattributes, and the use of nested tables to represent complex objects. Write suitablequeries to demonstrate their use.

Consider Purchase Order Example: This example is based on a typical business activity: managing customer orders. Need to demonstrate how the application might evolve from relational to object-relational, and how you could write it from scratch using a pure object-oriented approach.

- a) Show how to implement the schema -- Implementing the Application under the Relational Model
   -- using only MySQL/PostgreSQL/Oracle's built-in data types. Build an object-oriented application on top of this relational schema using object views.
- 3. Design and develop a suitable Student Database application by considering appropriate attributes. Couple of attributes to be maintained is the Attendance of a student in each subject for which he/she has enrolled and Internal Assessment Using TRIGGERS, write active rules to do the following:
  - a) Whenever the attendance is updated, check if the attendance is less than 85%; if so, notify the Head of the Department concerned.

b) Whenever, the marks in an Internal Assessment Test are entered, check if the marks are less than 40%; if so, notify the Head of the Department concerned.

#### Use the following guidelines when designing triggers:

- Use triggers to guarantee that when a specific operation is performed, related actions are performed.
- Use database triggers only for centralized, global operations that should be fired for the triggering statement, regardless of which user or database application issues the statement.
- Do not define triggers that duplicate the functionality already available in any database (Oracle/MySQL/PostgreSQL, etc.). For example, do not define triggers to enforce data integrity rules that can be easily enforced using declarative integrity constraints.
- Limit the size of triggers (60 lines or fewer is a good guideline). If the logic for your trigger requires much more than 60 lines of PL/SQL code, it is better to include most of the code in a stored procedure, and call the procedure from the trigger.
- Be careful not to create recursive triggers. For example, creating an AFTER UPDATE statement trigger on the EMP table that itself issues an UPDATE statement on EMP causes the trigger to fire recursively until it has run out of memory.
- 4. Design, develop, and execute a program to implement specific Apriori algorithm for mining association rules. Run the program against any large database available in the public domain and discuss the results.

Association rules are if/then statements that help uncover relationships between seemingly unrelated data in a relational database or other information repository. An example of an association rule would be "If a customer buys a dozen eggs, he is 80% likely to also purchase milk".

#### Part B: Algorithms and Data structure Laboratory

- 1 Implement Binary search tree for some real time application and demonstrate the operations on binary search tree
- 2 Implement Red-Back tree rotations on some real time applications with insertion, deletion and searching
- 3 Implement all the functions of a dictionary (ADT) using hashing. Data: Set of (key, value) pairs, Keys are mapped to values, Keys must be comparable, Keys must be unique Standard Operations: Insert(key, value), Find(key), Delete(key)
- 4 To create ADT that implements the SET concept.
  - a. Add (newElement) -Place a value into the set
  - b. Remove (element) Remove the value
  - c. Contains (element) Return true if element is in collection

d. Size () Return number of values in collection Iterator () Return an iterator used to loop over collection

- e. Intersection of two sets,
- f. Union of two sets,
- g. Difference between two sets,
- h. Subset

Course Outcomes	Description	RBT Levels
1.	Model and represent the real world data using object oriented database.	

2.	Embe	Embed the rule set in the database to implement data warehousing					
	of mi	mining.					
3	Choo	se and	design	database f	for recen	t applications database for	
5.	battar	intono	norohili	4		t applications database for	
	better	stter interoperability					
4.	Use E	Use Binary search trees in any real time problem domains where					
	appro	ppropriate.					
5.	Use F	se Red –black trees for real time problems for optimization					
	purpo	urpose.					
6.	Use h	Use hashing technique for searching in any real time applications.					
СО-РО	PO1	PO2	PO3	PO4	PO5		
Mapping							
C01	2	2	3	2	3		
001	2	2	5	2	5		
CO2	1	2	3	2	3		
CO3	2	2	3	2	3		
CO4	_	2	3	3	3		
001		2	5	5	5		
C05	1	2	3	3	3		
CO6	1	2	3	3	3		
Course Coor	dinato	or: Pro	f. Shan	ıshekar I	Patil & I	K.R. Shylaja	

		Course Title : Research Methodology					
STURINST	TUTE OF TECHNIC	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture hou	ırs/week : 4		
ab + Dr. AM		18RM27	(L-T-P)				
Allicity and a second	REOD A	Exam Duration : 3	CIE+SEE = 50+50=100	Total No. of Con	tact Hours :		
Aided By G	OVL. of Karnataka	hours		26			
Co	urse		Description				
Obje	ctives:	1. Have a basic un	nderstanding of the underlying	g principles of qua	antitative and		
		2 Identify the over	rch rall process of designing a rese	arch study from it	s incention to		
		its report.	an process of designing a rese	aren study from h	s meeption to		
		3. Choose the mos	t appropriate research method	to address a partic	cular research		
		question		1 11			
		4. Gain a overview	of a range of quantitative and	d qualitative appro	baches to data		
		unury 515					
Unit		No of					
No		Hours					
1.	I. Unit – I, Overview of Research						
	Research and its types, identifying and defining research problem and introduction to different research designs. Essential constituents of						
	Literat	ture Review. Basic p					
	and Se	econdary Data, metho	ods of primary data collection,	classification of			
	second	lary data, designing q	uestionnaires and schedules.				
2.	Unit –	- II, Sampling Metho	ods		06 Hrs		
	Probal stratifi	onity sampling: sim					
	probal	oility sampling: conv					
	sampli	ing. Sampling distribution	ations	1 0/ 1			
3.	Unit –	- III, Processing and	analysis of Data		06 Hrs		
	Statist	ical measures and the	err significance: Central tender	encies, variation,			
	of Hvi	ootheses: Parametric	(t and Chi Square).	gression, resumg			
4.	Unit-l	V,			06 Hrs		
	Essen	tial of Report writin	g and Ethical issues:				
	Signif	icance of Report Wri	ting, Different Steps in Writing	g Report, Layout			
	self- P	Research Report, Ell lagiarism, Publishing	incal issues related to Research	i, riagiarisin and			
		, <b></b>					
Cou	ırse		Description		RBT Levels		
Oute	omes						
		Describe a range of	quantitative and qualitative rese	earch designs and			
1		identify the advanta	ages and disadvantages assoc	iated with these			
		uesigns					

2.	Choo	hoose appropriate quantitative or qualitative method to collect data								
3.	Analy	nalyse and test the given data using appropriate methods								
4.	Desig reseat	esign an appropriate mixed-method research study to answer a search question								
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5					
CO1	-	-	3	3	1					
CO2	-	2	3	3	2					
CO3	1	-	3	3	2					
CO4	-	2	3	2	1					
Course Coor	dinato	or:								

		Course Title: Ma	chine Learning Techniques				
STARINST	TUTE OF TROUT	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture ho	ours/week: 4		
s + Dr. Allg	OLOGY - a	18SC31 (L-T-P)					
Aided By G	ada s the weil FARE TR	Exam Duration : 3 hours	CIE+SEE = 50+50=100	Total No. of Co 52	ntact Hours :		
Co	urse		Description				
Obje	<ol> <li>Explain basic concepts of learning and decision trees.</li> <li>Compare and contrast neural networks and genetic algorithms</li> <li>Apply the Bayesian techniques and instant based learning</li> <li>Examine analytical learning and reinforced learning</li> </ol>						
Unit No	Unit Syllabus Content No of Hour						
1	INTRODUCTION, CONCEPT LEARNING AND DECISION TREES11Learning Problems – Designing Learning systems, Perspectives and Issues–– Concept Learning – Version Spaces and Candidate Elimination Algorithm–– Inductive bias –Decision Tree learning – Representation – Algorithm ––Heuristic Space Search–						
2	NEURAL NETWORKS AND GENETIC ALGORITHMS: Neural         Network Representation – Problems – Perceptrons – Multilayer Networks         and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms         – Hypothesis Space Search –Genetic Programming – Models of Evolution						
3	BAYE Conce Princip Classi – Sam Bound	ESIAN AND COMP pt Learning – Maxim ple – Bayes Optimal fier– Bayesian Belief ple Complexity for H I Model.	UTATIONAL LEARNINGL E num Likelihood – Minimum De Classifier – Gibbs Algorithm Network – EM Algorithm – P Finite and Infinite Hypothesis S	Bayes Theorem – escription Length n – Naïve Bayes robably Learning Spaces – Mistake	10		
4	INSTA Neare Functi Learni Order	ANT BASED LEARN st Neighbor Learning ions –CaseBased Rea ing Rule Sets – Learn Rules – Induction as	NING AND LEARNING SET – Locally Weighted Regressio soning – Sequential Covering A ing First Order Rules – Learning Inverted Deduction– Inverting	OF RULES: K- n – Radial Basis Algorithms – ng Sets of First Resolution	11		
5	Order Rules – Induction as Inverted Deduction– Inverting Resolution         S       ANALYTICAL LEARNING AND REINFORCED LEARNING: Perfect         Domain Theories – Explanation Based Learning – Inductive-Analytical         Approaches – FOCL Algorithm – Reinforcement Learning – Task – Q-         Learning – Temporal Difference Learning						
Cou	irse		Description		<b>RBT</b> Levels		
	CO1	Choose the right le with the basic know	arning techniques for designir ledge of ML techniques.	ng an application	R6		

CO2	Apply appro	y effectopriate a	tively applicat	neural 1 ions.	networks	and	genetic	algorit	hms for	R3
CO3	Apply	y bayes	ian tech	niques a	nd derive	effec	ctively lo	earning r	ules.	R3
CO4	Choo techn	se and iques	differ	entiate 1	reinforcei	nent	and ar	alytical	learning	R6
CO-PO	PO	PO	PO3	PO4	PO5					
Mapping	1	2								
CO1		-	3	3	3					
CO2	2	-	3	3	3					
CO3		-	3	2	2					
CO4	2	-	3	3	2					
Strong -3	Med	ium -2	W	eak -1						

### **TEXT BOOK:**

1. Tom M. Mitchell, "Machine Learning", McGraw-Hill Education (INDIAN EDITION), 2013.

# **REFERENCE BOOKS / WEBLINKS:**

1. Ethem Alpaydin, "Introduction to Machine Learning", 2nd Ed., PHI Learning Pvt. Ltd., 2013.

2. T. Hastie, R. Tibshirani, J. H. Friedman, "The Elements of Statistical Learning", Springer; 1<sup>st</sup> edition, 2001.

Course Coordinator: Dr. K R Shylaja

		Course Title: Internet Of Things					
SHAR INST	TUTE OF TRON	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture ho	ours/week: 4		
a + Dr. Ang	QLOGY · m	18SCS321	(L-T-P)				
Sunche Sunche	BOD STATE	Exam Duration :	CIE+SEE = 50+50=100	Total No. of Co	ntact Hours		
Aided By G	ETHA WELFARE TRUS	3 hours		:52			
Co	Course Description						
<b>Objectives:</b> 1. To understand the basic concepts of IoT with overview of				ith overview of its	Physical and		
		Logical design	nd analyza different IoT anab	ling Tashnalagias			
		2. To understand a 3 To understand d	ifferent IoT levels and their d	enloyment template	\$		
		4. To understand a	pplication of IoT for different	t domains.	5		
		5. To understand	the importance of software of	lefined networking	and Network		
		virtualization fu	nction from IoT perspective.				
		6. To discuss and an	alyze a case study for Enviro	nment monitoring u	sing IoT		
Unit	Γ		Syllabus Contont		No.of		
No		Hours					
1	1 INTRODUCTION & CONCEPTS: Definition & Characteristics of IoT,						
	Physic Logic	cal Design of IoT: The Design of IoT:	nings in IoT, IoT Protocols	T. Communication			
	Model	s. IoT Communication	on APIs				
	IoT	Enabling Technol	ogies: Wireless Sensor	Networks, Cloud			
	Comp	uting, Big Data Ar	alytics, Communication Pro	tocols, Embedded			
	System	ns					
2	IoT L Level-	evels & Deploymer 3, IoT Level-4, IoT I	<b>t Templates:</b> IoT Level-1, Level-5, IoT Level-6	IoT Level-2, IoT	11		
	Doma	in Specific IoTs:	Home Automation Smart	Lighting Smart			
	Applia	inces,, Intrusion Dete	ction, Smoke/Gas Detectors.				
	Cities	: Smart Parking, Sn	nart Lighting, Smart Roads,	Structural Health			
	Monit	oring, Surveillance, E	Emergency Response.				
	<b>Envir</b>	onment: Weather Mo	onitoring, Air Pollution Monit	toring, Noise			
3	Doma	in Specific IoTs.: ( (	Contd)	is Detection.	11		
		-					
	Energ	y: Smart Grids, Rene	wable Energy Systems, Prog	nostics.			
	Logist	<b>ics:</b> Route Generati	on & Scheduling Fleet Tr	acking. Shipment			
	Monit	oring, Remote Vehicl	e Diagnostics.				
	Agric	ulture: Smart Irrigati	on, Green House Control.				
	Indus	try: Machine Diagno	sis & Prognosis, Indoor Air Q	uality Monitoring.			
	Incalt	i & Litestyle: fiealth		able Electronics.			

4	IoT a	nd M2	M: Di	fference	between	n IoT and	M2M	10
	<b>SDN</b> a Virtua	and NFV for IoT: Software Defined Networking, Network Functio alization.						
5	<ul> <li>5 IoT Design Methodology: Purpose &amp; Requirements Specification, Process Specification, Domain Model Specification, Information Model Specification, Service Specifications, IoT Level Specification, Functional View Specification, Operational View Specification, Device &amp; Component Integration, Application Development</li> <li>Specification wise Case Study: Environment Monitoring</li> </ul>						10	
Cou Outc	urse comes				]	Descript	ion	RBT Levels
	<b>CO1</b>	Under Logic	Understand the concepts of IoT with overview of its Physical and Logical design					
	CO2	Analy	Analyze different Technologies used in IoT					R4
	CO3	Interp	oret dif	ferent d	omain sp	ecific Io	T diagrams and illustrations	R3,R4
	CO4	Analy IoT	ze spe	cificatio	on docur	nent for	Environment Monitoring using	R4,R3
CO-P Mapp	O oing	PO 1	<b>PO</b> 2	PO3	PO4	PO5		
	C01	-	-	3	3	3		
	CO2	2	2	3	2	2		
	CO3	2	1	3	2	3		
	CO4	-	-	3	2	3		
Stron	g -3	Med	ium -2	W	eak -1			
<b>TEXT</b> 1. Vi 2. Jea Ka	<b>Г ВОО</b> ijay Ma an-Phili aufman	<b>KS:</b> disetti, ippe V n Publi	Arshd asseur shers.	eep Bał & Adai 2010	ıga "Inte m Dunke	ernet of tl els "Inter	nings, A hands-on-approach" 20 connecting smart objects with	14 IP", Morgan

# **REFERENCES:**

1.Cuno Pfister, "Getting Started with the Internet of Things", Maker Media Inc, 2011

2.Adrian Mcewen and Hakim, "Designing the Internet of Things", Wiley publication, 2013

3.Zhao, Feng, and Leonidas J. Guibas., "Wireless sensor networks: an information processing approach", Morgan Kaufmann, 2004.

4. Karl, Holger, and Andreas Willig, "Protocols and architectures for wireless sensor networks", John Wiley & Sons, 2007.

5. Dargie, Waltenegus W., and Christian Poellabauer, "Fundamentals of wireless sensor Networks: theory and practice", John Wiley & Sons, 2010.
6. Makingany Clobal Institute report, "Unleaking the potential of the Internet of Things".

6. McKinsey Global Institute report, "Unlocking the potential of the Inte	rnet of Things".
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	Dr. Prakash
COURSE	
<b>COORDINATOR:</b>	

	Course Title: AGILE METHODOLOGIES						
STUR INSTITUTE	E OF TROUB	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture ho	ours/week: 4		
a + Dr. AM	OLOGY + m	18SCS322	(L-T-P)				
Aided By Govt. o	WELFARE TRUS	Exam Duration : 3 hours	CIE+SEE = 50+50=100	Total No. of Co : 52	ntact Hours		
Cour	se		Description				
Objecti	ives:	1. To understa	nd how an iterative, increment	al development pro	ocess leads to		
		faster deliver	ry of more useful software	1 1			
	2. To understand the essence of agile development methods						
		3. To understar	nd the principles and practices	of extreme program	nming		
		4. To understar	nd the roles of prototyping in the	ne software process	5		
		5. To understar	nd the concept of Mastering Ag	gility			
UNIT No	UNIT Syllabus Content						
1	Why Agile?: Understanding Success, Beyond Deadlines, The Importance of Organizational Success, Enter Agility, How to Be Agile?: Agile Methods, Don't Make Your Own Method, The Road to Mastery, Find a Mentor10						
2	Unde Adoj	erstanding XP: The X pting XP: Is XP Righ	P Lifecycle, The XP Team, X t for Us?, Go!, Assess Your Ag	P Concepts, gility	10		
3	Prac Infor Coll Ubic Dem Ten- Doct Gam	cticing XP: Thinking rmative Workspace, H aborating: Trust, Sit quitous Language, Sta to, Reporting, Releas Minute Build, Contir umentation. Planning the, Risk Management	<b>g:</b> Pair Programming, Energize Root-Cause Analysis, Retrospe Together, Real Customer Invo and-Up Meetings, Coding Stan <b>ing:</b> "Done Done", No Bugs, V nuous Integration, Collective C <b>g:</b> Vision, Release Planning, Th , Iteration Planning, Slack, Sto	d Work, ctives, olvement, dards, Iteration Version Control, ode Ownership, ne Planning ries, Estimating.	11		
4	<ul> <li>4 Mastering Agility Values and Principles: Commonalities, About 10</li> <li>Values, Principles, and Practices, Further Reading, Improve the Process: Understand Your Project, Tune and Adapt, Break the Rules, Rely on People :Build Effective Relationships, Let the Right People Do the Right Things, Build the Process for the People, Eliminate Waste :Work in Small, Reversible Steps, Fail Fast, Maximize Work Not Done, Pursue Throughput</li> </ul>				10		
~			<b>.</b>				
Cours Outcor	se nes		Description		RBT Levels		

CO1	Unde	Understand The XP Lifecycle, XP Concepts, Adopting XPR1,R3					
CO2	Work Plann	Work on Pair Programming, Root-Cause Analysis, Retrospectives, R4 Planning, Incremental Requirements, Customer Tests					
CO3	Imple	ement	Concept	ts to Elim	iinate Wa	aste	R3,R4
CO-PO	PO	PO	PO3	PO4	PO5		
Mapping	1	2					
CO1	1	1	3	3	2		
CO2	-	2	3	3	2		
CO3	-	-	3	2	2		
Strong -3	Strong -3 Medium -2 Weak -1						
TEXT BOO	KS						
1. Elaine Ric	1. Elaine Rich Kevin Knight, Shivashanka B Nair Artificial Intelligence, Tata CGraw Hill 3rd						

1. Elaine Rich, Kevin Knight, Shivashanka B Nair:Artificial Intelligence, Tata CGraw Hill 3rd edition. 2013, ISBN 10: <u>0070087709</u> ISBN 13: <u>9780070087705</u>

2. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, Pearson 3rd edition 2013, ISBN: 0-13-604259-7

3. Ivan Bratko Prolog Programming for Artificial Intelligence , (International Computer Science Series) 4th Edition, Publisher: Pearson Education Canada; 4th edition, 2011, ISBN-10: 0321417461; ISBN-13: 978-0321417466

### **REFERENCE BOOKS/WEBLINKS:**

1. Nils J. Nilsson: "Principles of Artificial Intelligence", Elsevier, ISBN-13: 9780934613101

	Dr. M.V. Vijayakumar & Dr. K. R. Shylaja
COURSE	
<b>COORDINATOR:</b>	

		Course Title: Net	Course Title: Network Programming in UNIX						
AND THE OF ICE DOOY -		Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week :4				
		18SCS323	(L-T-P)						
Aided By G	ETHA WELFARE TRUS	Exam Duration : 3 hours	CIE+ SEE = 50+50=100	Total No. of Co : 52	ntact Hours				
Co	urse		Description						
Obje	ctives:	1. To familiariz	te students with advanced conc	epts of network pro	ogramming in				
		UNIX enviro	onment.	1 1	8 8				
		2. To enable th	em to write programs for netw	ork programming					
		3. To enable th	em to understand the daemon j	programs					
		4. To enable th	em to understand network prot	cocol stacks					
		5. To enable th	em to understand client server	communications					
		I							
Unit No			Syllabus Content		No of Hours				
1	OSI m	nodel, client server mo	odel, TCP/IP protocols, introdu	ction to Unix;	11				
	Proces	ss, groups, job control	and non-job control shells, re	liable and					
	unrelia	able signals.	· · · · · · · · · · · · · · · · · · ·		10				
2	Inter j	FIFOs properties of	on in Unix, pipes, half duples	and full duplex	10				
	systen	n V message queues s	emaphores shared memory m	map function and					
	its use	, RPC, authentication	, timeout and retransmission, c	call semantics,					
	Daem	on processes and inet	d daemon.						
3	Introd	uction to Berkeley so	ckets, socket addressing, TCP	and UDP socket	10				
	function	ons, sockets and Un	ix signals, socket implement	ation, client and					
	server	examples for TCP	and UDP and their behaviour	under abnormal					
	condit	ions.							
4	Socke	t options, IPv4, IPv6,	TCP, I/O multiplexing, Unix I	/O models, select	11				
	and po	oll functions, Unix do	main protocols						
5	Routir	ng sockets, raw socke	ts, example programs, ping, tra	ceroute, methods	10				
	for wi	riting client and serv	er in Unix, iterative server, c	oncurrent server,					
	preforking, prethreads programming								
Course Outcomes			Description		RBT Levels				
	CO1	Analyze basic netwo	ork programming tools availabl	e in UNIX	R4				
	CO2	Design programs for	network communications		R4				
	CO3	Interpret the network	c protocol stacks in UNIX		R3				
	CO4	Use commands to un	nderstand the network configur	e	R1,R3				
L					1				

Image: ConstructionImage: ConstructionImage: ConstructionCO212231CO3-2333CO4233TEXT BOOK:-2331. Stevens, W.R., Fenner, B. and Rudoff A.M., "Unix Network Programming: Vol. I", Ed., Pearson Education 20042. Stevens, W.R., "Unix Network Programming: Vol. II", 2nd Ed., Pearson EducationREFERENCE BOOKS / WEBLINKS:1. Stevens, W.R., "Advanced Programming in Unix Environment", Pearson Education 202. Bovet, D.A. and Cesati, M., "Understanding the Linux Kernel", 2 nd Ed., O'Reilly.	CO-PO Mapping	PO 1	PO 2	PO3	PO4	PO5			
CO1231CO212231CO3-233CO4-233CO4-233TEXT BOOK:1. Stevens, W.R., Fenner, B. and Rudoff A.M., "Unix Network Programming: Vol. I", Ed., Pearson Education 20042. Stevens, W.R., "Unix Network Programming: Vol. II", 2nd Ed., Pearson EducationREFERENCE BOOKS / WEBLINKS:1. Stevens, W.R., "Advanced Programming in Unix Environment", Pearson Education 202. Bovet, D.A. and Cesati, M., "Understanding the Linux Kernel", 2 nd Ed., O'Reilly.						_			
CO212231CO3-233CO4-233TEXT BOOK:1. Stevens, W.R., Fenner, B. and Rudoff A.M., "Unix Network Programming: Vol. I", Ed., Pearson Education 20042. Stevens, W.R., "Unix Network Programming: Vol. II", 2nd Ed., Pearson EducationREFERENCE BOOKS / WEBLINKS:1. Stevens, W.R., "Advanced Programming in Unix Environment", Pearson Education 202. Bovet, D.A. and Cesati, M., "Understanding the Linux Kernel", 2 nd Ed., O'Reilly.	CO1	-	-	2	3	1			
CO3       -       2       3       3       3         CO4       -       -       2       3       3         TEXT BOOK:       .	CO2	1	2	2	3	1			
CO4       -       2       3       3         TEXT BOOK:       1. Stevens, W.R., Fenner, B. and Rudoff A.M., "Unix Network Programming: Vol. I", Ed., Pearson Education 2004         2. Stevens, W.R., "Unix Network Programming: Vol. II", 2nd Ed., Pearson Education <b>REFERENCE BOOKS / WEBLINKS:</b> 1. Stevens, W.R., "Advanced Programming in Unix Environment", Pearson Education 20         2. Bovet, D.A. and Cesati, M., "Understanding the Linux Kernel", 2 nd Ed., O'Reilly.	CO3	-	2	3	3	3			
<ul> <li>TEXT BOOK:</li> <li>1. Stevens, W.R., Fenner, B. and Rudoff A.M., "Unix Network Programming: Vol. I", Ed., Pearson Education 2004</li> <li>2. Stevens, W.R., "Unix Network Programming: Vol. II", 2nd Ed., Pearson Education</li> <li>REFERENCE BOOKS / WEBLINKS: <ol> <li>Stevens, W.R., "Advanced Programming in Unix Environment", Pearson Education 20</li> <li>Bovet, D.A. and Cesati, M., "Understanding the Linux Kernel", 2 nd Ed., O'Reilly.</li> </ol> </li> </ul>	CO4	-	-	2	3	3			
<ol> <li>Stevens, W.R., Fenner, B. and Rudoff A.M., "Unix Network Programming: Vol. I", Ed., Pearson Education 2004</li> <li>Stevens, W.R., "Unix Network Programming: Vol. II", 2nd Ed., Pearson Education</li> <li><b>REFERENCE BOOKS / WEBLINKS:</b> <ol> <li>Stevens, W.R., "Advanced Programming in Unix Environment", Pearson Education 20</li> <li>Bovet, D.A. and Cesati, M., "Understanding the Linux Kernel", 2 nd Ed., O'Reilly.</li> </ol> </li> </ol>	TEXT BOO	K:				•			
<ul> <li>Ed., Pearson Education 2004</li> <li>2. Stevens, W.R., "Unix Network Programming: Vol. II", 2nd Ed., Pearson Education</li> <li><b>REFERENCE BOOKS / WEBLINKS:</b> <ol> <li>Stevens, W.R., "Advanced Programming in Unix Environment", Pearson Education 20</li> <li>Bovet, D.A. and Cesati, M., "Understanding the Linux Kernel", 2 nd Ed., O'Reilly.</li> </ol> </li> </ul>	1. Steven	ns, W.I	R., Fer	nner, B.	and Rud	off A.M			
<ol> <li>Stevens, W.R., "Unix Network Programming: Vol. II", 2nd Ed., Pearson Education</li> <li><b>REFERENCE BOOKS / WEBLINKS:</b> <ol> <li>Stevens, W.R., "Advanced Programming in Unix Environment", Pearson Education 20</li> <li>Bovet, D.A. and Cesati, M., "Understanding the Linux Kernel", 2 nd Ed., O'Reilly.</li> </ol> </li> </ol>	Ed., P	earson	Educa	tion 200	04				
<ul> <li><b>REFERENCE BOOKS / WEBLINKS:</b></li> <li>1. Stevens, W.R., "Advanced Programming in Unix Environment", Pearson Education 20</li> <li>2. Bovet, D.A. and Cesati, M., "Understanding the Linux Kernel", 2 nd Ed., O'Reilly.</li> </ul>	2. Steven	ns, W.I	R., "Ur	nix Netv	vork Prog	gramming			
<ol> <li>Stevens, W.R., "Advanced Programming in Unix Environment", Pearson Education 20</li> <li>Bovet, D.A. and Cesati, M., "Understanding the Linux Kernel", 2 nd Ed., O'Reilly.</li> </ol>	REFERENC	E BO	OKS /	WEBL	INKS:				
2. Bovet, D.A. and Cesati, M., "Understanding the Linux Kernel", 2 nd Ed., O'Reilly.	1. Stevens, W.R., "Advanced Programming in Unix Environment", Pearson Education 2002								
	2. Bovet	, D.A.	and Ce	esati, M	., "Under	standing			
						C			

COURSE	
COURSE	Dr. K K Snylaja
<b>COORDINATOR:</b>	

		Course Title: Mobile Computing and Wireless Network							
		<b>Course Code:</b>	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week : 4				
		18SCS324							
- Sunchu and a sun of the sun of	P HERO	Exam Duration :	CIE+ SEE = 50+50=100	Total No. of Co	ntact Hours				
Aided By G	ovt. of Karnataka	5 nours		: 52					
				•					
Obje	urse ctives:	1 To introduce the	Description	ication					
5		2. To understand C	CDMA, GSM, Mobile IP, WIm	ax.					
		3. To understand D	Different Mobile OS.						
		4. To learn variou	as Markup Languages and CD	C, CLDC, MIDP;	Programming				
		for CLDC, MID	let model and security concern	IS					
Unit No			Syllabus Content		No of Hours				
1	Mobile	e Computing Archited	cture: Architecture for Mobile (	Computing, 3-tier	11				
	Archit	ecture, Design Con	siderations for Mobile Com	puting. Wireless					
	Netwo Servic	e Messages (SMS): C	s for Mobile Communication SM Architecture Entities Cal	(GSM and Short I routing in GSM					
	PLMN	I Interface, GSM Add	lresses and Identities, Network	Aspects in GSM,					
	Mobili	ity Management, GS	M Frequency allocation. Intro	oduction to SMS,					
	SMS	Architecture, SM N ations GPRS and Pac	MT, SM MO, SMS as Info ket Data Network GPRS Netw	ormation bearer,					
	GPRS	Network Operations,	Data Services in GPRS, Applic	cations for GPRS,					
	Billing	and Charging in GP	RS.						
2	Mobile	e Client: Moving bey	ond desktop, Mobile handset ( PDA Design Constraints in	overview, Mobile	10				
	handhe	eld devices. Mobile	e IP: Introduction, discover	ry, Registration,					
	Tunne	ling, Cellular IP.	·						
3	Mobile	e OS and Computing	g Environment: Smart Client	Architecture, The	10				
	Messa	ging. The Server Γ	a Storage, Performance, Data Data Synchronization Enterpr	synchronization, ise Data Source					
	Messa	ging. Mobile Operat	ing Systems: WinCE, Palm C	OS, Symbian OS,					
	Linux	and Proprietary OS.		·					
4	Buildi	ng, Mobile Internet A	pplications: Thin client: Archit	ecture, the client,	11				
	Middle	eware, messaging Se	rvers, Processing a Wireless	request, Wireless					
	Applications Protocol (WAP) Overview, Wireless Languages: Markup								
5	J2ME: model	Provisioning MID	ULDU, MIDP; Programming for let lifecycle. Creating new and	or CLDC, MIDlet	10				
	event	handling, GUI in M	IDP, Low level GUI Compon	ents, Multimedia					
	APIs;	Communication in M	IDP, Security Considerations	in MIDP.					

Course Outcomes				D	)escripti	on	RBT Levels
CO1	Work	on sta	te of art	techniqu	es in wir	eless communication	R3
CO2	Explo	re CD	MA, GS	SM, Mobi	le IP, W	iMax.	R4,R6
CO3	Work let mo	on Di del an	fferent I d securi	Mobile O ty concer	S, Devel	op program for CLDC, MIDP	R3,R4
CO-PO Mapping	PO 1	PO 2	PO3	PO4	PO5		
CO1	3	1	-	1	2		
CO2	2	1	3	-	1		
CO3	1	-	2	1	3		
Strong -3	Medi	um -2	W	eak -1			
<ul> <li><b>TEXT BOOK:</b></li> <li>1. Ashok Talukder, Roopa Yavagal, Hasan Ahmed: Mobile Computing, Technology, Applications and Service Creation, 2nd Edition, Tata McGraw Hill, 2010.</li> <li>2. Martyn Mallik: Mobile and Wireless Design Essentials, Wiley India, 2003</li> <li><b>REFERENCE BOOKS / WEBLINKS:</b></li> <li>1. Raj kamal: Mobile Computing, Oxford University Press, 2007.</li> <li>2. Iti Saha Misra: Wireless Communications and Networks, 3G and Beyond, Tata McGraw Hill, 2009.</li> </ul>							
COURSE COORDINA	COURSE Prof. Shamshekar Patil COORDINATOR:						

ANR INST	TTUTE OF TEC	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture h	ours/week :4			
MIN - I - E		18SCS331 (L-T-P)						
Panch	HEOD A	Exam Duration :	CIE+ SEE = 50+50=100	Total No. of Co	ontact Hours			
Aided By G	ETHA WELFARE TRUS	3 hours		: 52				
Co	urse		Description					
Obje	ctives:	1. Learn the tee	chniques in natural language p	rocessing.				
		2. Be familiar	with the natural language gene	ration.				
		3. Be exposed i	to Text Mining.	20				
		<b>4.</b> Analyze the						
TT 94			S-U-hard Carretand		N f			
No			Synabus Content		Hours			
1	OVER	<b>RVIEW AND LANC</b>	GUAGE MODELING: Overv	view: Origins and	10			
	challer	nges of NLPLanguag	ge and Grammar-Processing In	ndian Languages-				
	NLP .	Applications-Informa	tion Retrieval. Language M	odeling: Various				
	Gram	nar- based Language	Models-Statistical Language I	Model.				
2	WOR	D LEVEL AND SY	NTACTIC ANALYSIS: Wor	d Level Analysis:	10			
	Regula	ar Expressions-Finit	ite-State Automata-Morphol	ogical Parsing-				
	Spellir	ng Error Detection a	nd correction-Words and Wo	rd classes-Part-of				
	Speech	n Tagging. Syntactic	Analysis: Contextfree Gramn	nar-Constituency-				
	Parsing	g-Probabilistic Parsin	lg					
3	Extra	cting Relations from	Text: From Word Sequences	to Dependency	11			
	Paths:	Introduction, Subseq	uence Kernels for Relation Ex	traction, A				
	Depen	dency-Path Kernel fo	or Relation Extraction and Exp	erimental				
	Know	ledge Roles: Introduc	tion. Domain Knowledge and	Knowledge				
	Roles,	Frame Semantics and	d Semantic Role Labeling, Lea	rning to				
	Annot	ate Cases with Know	ledge Roles and Evaluations. A	A Case Study in				
	Natur	al Language Based	Web Search: InFact System C	Overview, The				
4	<b>Evalue</b>	ating Self-Experie	nce. tions in iSTART. Word N	Matching Latent	11			
-	Seman	tic Analysis. and To	opic Models: Introduction is'	TART: Feedback	••			
	Systems iSTART: Evaluation of Feedback Systems Textual Signatures							
	Identif	ying Text-Types Us	ing Latent Semantic Analysis	s to Measure the				
	Cohes	on, Coh-Metrix,						
	Appro	aches to Analyzing	Texts, Latent Semantic Anal	ysis, Predictions,				
	Result	s of Experiments. Au	atomatic Document Separation	a: A Combination				
	of Pr	obabilistic Classific	ation and FiniteState Sequ	ence Modeling:				
	Introdu							

f C	Seque for S Guide	nce Ma emanti d Mod	ce Mapping Problem, Results. Evolving Explanatory Novel Patterns mantically-Based Text Mining: Related Work, A Semantically Model for Effective TextMining.							
5 I I ( V H	INFO Inform Classi valuat Resea	RMA' nation cal, N ion Le rch Co	10							
Cour	se				1	Descrint	ion	RBT		
Outcor	mes				-	Descript		Levels		
(	C <b>O</b> 1	Anal	yze the	e natural	l languag	e text.		R4		
(	C <b>O2</b>	Gene	rate the	e natural	l languag	e.		R3		
(	C <b>O</b> 3	Demo		R4						
(	C <b>O4</b>	Apply	y infori	mation 1	etrieval t	echnique	es	R3		
CO-PO Mappin	ng	PO 1	PO 2	PO3	PO4	PO5				
(	C <b>O1</b>	-	1	2	3	1				
(	C <b>O2</b>	-	-	2	2	3	-			
(	C <b>O3</b>	-	2	3	2	2				
(	C <b>O4</b>	-	-	2	3	3				
Strong	Strong -3 Medium -2 Weak -1									
<ul> <li>TEXT BOOK:</li> <li>1. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.</li> <li>2. Anne Kao and Stephen R. Poteet (Eds), "Natural LanguageProcessingandText Mining", Springer- Verlag London Limited 2007.</li> <li>REFERENCE BOOKS / WEBLINKS:</li> </ul>										
1. Daniel Jurafsky and James H Martin, "Speech and Language Processing: Anintroduction to										

Natural Language Processing, Computational Linguistics and SpeechRecognition", 2nd Edition, Prentice Hall, 2008. 2. James Allen, "Natural Language Understanding", 2nd edition, Benjamin/Cummings publishing company, 1995.

3. Gerald J. Kowalski and Mark.T. Maybury, "Information Storage and Retrieval systems", Kluwer academic Publishers, 2000.

4. Steven Bird, Ewan Klein, Edward Loper, "Natural Language Processing with Python," Publisher: O'Reilly Media, June 2009

5. Christopher D.Manning and HinrichSchutze, "Foundations of Statistical Natural Language Processing", MIT Press, 1999.

COURSE	Prof. Shamshekhar Patil
<b>COORDINATOR:</b>	

	<b>Course Title</b> : Data ware house and Data mining						
METTURE OF TOTOLOGY -		Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture he	ours/week :4		
		18SCS332					
- Sinch	Roal a manual strength	Exam Duration :	CIE+ SEE = 50+50=100	Total No. of Co	ntact Hours		
Aided By G	ETHA WELFARE TRUS	3 hours		: 52			
Co	urse		Description				
Obje	ctives:	1.Explain Data mini	ng principles and techniques a	nd Introduce DM a	is a cutting		
		edge business intelli	gence	an data			
		3. Classification for	the retrieval purposes	ge data			
		4.Explain clustering	techniques in details for better	r organization and	retrieval of		
		data					
Unit			Syllabus Content		No of		
No			·		Hours		
1	Introd	luction and Data P	reprocessing :Why data mini	ng, What is data	10		
	mining	g, What kinds of data	a can be mined, What kinds o	f patterns can be			
	mined	, Which Technologie	es Are used, Which kinds of	Applications are			
	Data d	cleaning. Data integra	ation. Data reduction. Data tra	ansformation and			
	data d	iscretization.	,				
2	Data	warehousing and on	line analytical processing. D	ata warehousing.	11		
-	Basic	concepts, Data ware	chouse modeling: Data cube a	and OLAP, Data	11		
	wareh	ouse design and us	sage, Data warehouse imple	ementation, Data			
2	genera	lization by attribute-	oriented induction	n trac induction	11		
3	Bavs (	Classification Method	ls, Rule-Based classification.	Model evaluation	11		
	and se	lection, Techniques to	o improve classification accura	icy			
4	Cluste	er Analysis: Basic	concepts and methods: C	Cluster Analysis,	10		
	Partiti	oning methods, Hiera Methods Evaluation	rchical Methods, Density-base	ed methods, Grid-			
5	Data	mining trends and r	esearch frontiers: Mining con	mplex data types.	10		
	other methodologies of data mining, Data mining applications, Data Mining						
and society.							
Course Description							
Outcomes				Levels			
	<b>CO1</b>	Demonstrate Storir	g voluminous data for or	lline processing,	R4		
		Preprocess the data for mining applications					
	<u> </u>	A 1 .1 . • •	1 0 1 1 1 1		DO		
	CO2	К3					

CO3	Design and deploy appropriate classification techniques	R4
CO4	Cluster the high dimensional data for better organization of the data	R4,R5
CO5	Discover the knowledge imbibed in the high dimensional system	R1,R5

CO-PO Mapping	PO 1	PO 2	PO3	PO4	PO5
CO1	-	-	2	3	1
CO2	-	2	2	3	2
CO3	-	-	3	2	2
CO4	2	-	2	3	3
CO5	1	2	2	3	2
Strong -3	Med	ium -2	W	eak -1	

# **TEXT BOOK:**

1. Jiawei Han, Micheline Kamber, Jian Pei: Data Mining Concepts and Techniques, ELSEVIER(MK) 3rd edition 2012.

# **REFERENCE BOOKS / WEBLINKS:**

1. Data Mining and Warehousing" by Khushboo and Sandeep

2. The Encyclopedia of Data Warehousing and Mining" by John Wang

Course Coordinator: Prof. Shamshekhar Patil

		Course Title: 0	Cryptography and Network	Security				
NAR INST	TUTE OF TEC	Course Code:	No. of Credits: 3 : 0 : 0	No. of lecture	hours/week :			
a + Dr. Allace	AMOLOGY - a	18SCS333	(L-T-P)	4				
Aided By G	CHA WELFARE TRUE	Exam Duration : 3 hours	CIE + SEE = 50+50=100	Total No. of Co : 52	ontact Hours			
Co	urse		Description					
Objec	ctives:	<ol> <li>Explain standard algorithms used to provide confidentiality, integrity and authenticity.</li> <li>Distinguish key distribution and management schemes.</li> <li>Deploy encryption techniques to secure data in transit across data networks</li> </ol>						
Unit			Syllabus Content		No of			
No					Hours			
	Crypta Cipher alphab standa Cipher data e examp Bit Ke design algorit	Mono-alphabetic etic Cipher, One Tir rd: Traditional block s, Motivation for the encryption standard, le, results, the avalar eys, the nature of the principles, number hm.	Cipher, Playfair Cipher, H ne Pad. Block Ciphers and th k Cipher structure, stream C e feistel Cipher structure, the f DES encryption, DES dec nche effect, the strength of D e DES algorithm, timing atta of rounds, design of function	Echniques, Caesar Hill Cipher, Poly ne data encryption Ciphers and block Feistel Cipher, The cryption, A DES ES, the use of 56- cks, Block cipher n F, key schedule				
2	Public-KeyCryptography and RSA:Principles of public-key11cryptosystems.Public-key cryptosystems.Applications for public-key11cryptosystems, requirements for public-key cryptosystems.Public-key11cryptanalysis.The RSA algorithm, description of the algorithm,11computational aspects, the security of RSA.Other Public-KeyCryptosystems:Diffiehellman key exchange, The algorithm, key exchangeprotocols, man in the middle attack, Elliptic curve cryptography, Analog of11Diffie-hellman key exchange, Elliptic curve encryption/decryption.11							
3	Key N Symm contro Decen distrib secret schem public X-509 User	protocols, man in the middle attack, Elliptic curve cryptography, Analog of Diffie-hellman key exchange, Elliptic curve encryption/ decryption.10Key Management and Distribution: Symmetric key distribution using Symmetric encryption, A key distribution scenario, Hierarchical key control, session key lifetime, a transparent key control scheme, Decentralized key control, controlling key usage, Symmetric key distribution using asymmetric encryption, simple secret key distribution, secret key distribution with confidentiality and authentication, A hybrid scheme, distribution of public keys, public announcement of public keys, publicly available directory, public key authority, public keys certificates, X-509 certificates. Certificates, X-509 version 3, public key infrastructure.						

	Authe Symn								
4	<ul> <li>Symmetric encryption, Nutual Authentication, one way Authentication.</li> <li>Wireless network security: Wireless security, Wireless network threats, Wireless network measures, mobile device security, security threats, mobile device security strategy, IEEE 802.11 Wireless LAN overview, the Wi-Fi alliance, IEEE 802 protocol architecture. Security, IEEE 802.11i services, IEEE 802.11i phases of operation, discovery phase, Authentication phase, key management phase, protected data transfer phase, the IEEE 802.11i pseudorandom function. Web Security Considerations: Web Security Threats, Web Traffic Security Approaches. Secure Sockets Layer: SSL Architecture, SSL Record Protocol, Change Cipher Spec Protocol, Alert Protocol and shake Protocol Cryptographic Computations</li> </ul>								
5	Electronic Mail Security: Pretty good privacy, notation, operational;10description, S/MIME, RFC5322, Multipurpose internet mail extensions, S/MIME functionality, S/MIME messages, S/MIME certificate processing, enhanced security services, Domain keys identified mail, internet mail architecture, E-Mail threats, DKIM strategy, DKIM functional flow. IP 								
Course							DRT		
Outc	omes		Levels						
CO	CO1		Analyze the vulnerabilities in any computing system and hence be able to design a security Solution.						
CO	02	Ident	R4						
CO3		Evalu theore	R4,R5						
CO-P	0	PO	PO	PO3	PO4	PO5			
Mapping		1	2						
CO1		1	1	3	3	2			
CO2		-	-	3	3	2			
CO3		-	-	3	2	2			
CO4		2	1	3	3	3	-		
<ul> <li><b>TEXT BOOK:</b></li> <li>1. William Stallings, Cryptography and Network Security, Pearson 6th edition.</li> <li><b>REFERENCE BOOKS / WEBLINKS:</b></li> </ul>									

1. V K Pachghare: Cryptography and Information Security

Course Coordinator: Prof. Shamshekar S. Patil

		Course Title : COMPUTATIONAL INTELLIGENCE							
		<b>Course Code:</b>	No. of Credits: 3 : 0 : 0	No. of lecture he	ure hours/week : 4				
		18SCS334	(L-T-P)						
		Exam Duration :	CIE+ SEE = 50+50=100	Total No. of Contact Hours					
Aided By Govt. of Karnataka		3 hours		: 52					
Cou Object	urse ctives:	1 T 1 4 14	1						
Objev		1. To understand the modeling, severation	works, neuro-						
		2. To comprehend	entation using						
		fuzzy rules, app	d fuzzy logic						
		3. To interpret the l	wn as genetic						
		algorithms and i	ts application to engineering of	ptimization problem	ms.				
Unit	Syllabus Contont No. of								
No		Synabus Content							
1	Comp	Computational Intelligence and Knowledge : What Is Computational 11							
	Applic	Intelligence?, Agents in the World, Representation and Reasoning Applications, Overview, A Representation and Reasoning System							
	:Introd	luction, Represent	ation and Reasoning Syste	ms ,Simplifying					
	Assum Answe	ptions of the Initial ers Proofs Extendir	RRS, Data log, Semantics	, Questions and Symbols					
2	Using	Definite Knowledge	e :Introduction, Case Study:	House Wiring,	10				
	Databa	ases and Recursion,	, Verification and Limitation	ns, Case Study:					
	Kepresenting Abstract Concepts, Case Study: Representing Regulatory Knowledge, Applications in Natural Language Processing : Representing								
	Knowledge : Introduction, Defining a Solution, Choosing a Representation								
	Language, Mapping from Problem to Representation, Choosing an Inference Procedure								
3	Knowledge Engineering , Introduction, Knowledge-Based System 10								
	Architecture, Meta- Interpreters, Querying the User, Explanation, Debugging Knowledge Bases, A Mote Interpreter with Search Unification								
	Beyond Definite Knowledge :Introduction, Equality ,Integrity Constraints								
	,Comp	,Complete Knowledge Assumption , Disjunctive Knowledge, Explicit							
4	Using Uncertain Knowledge ,Introduction , Probability , Independence 11								
	Assum	ptions, Making Dec	isions Under Uncertainty	_					
5	Learni	ng 08 Hours	Thoosing the Best Representat	ion Case-Rased	10				
	Reasoning, Learning								
	as Refining the Hypothesis Space, Learning Under Uncertainty, Explanation-Based Learning								
	Explai	ianon-based Learnin	8						

Course Outcomes	Description						RBT Levels
CO1	Identi	R3					
CO2	Apply various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction,genetic algorithms)					R4	
CO3	Exhibit the fundamental usage of knowledge representation (logic- based, frame-based, semantic nets), inference and theorem proving						R4,R5
CO4	Build simple knowledge-based systems						R4
CO5	Express working knowledge of reasoning in the presence of incomplete and/or uncertaininformation						R4
CO6	Apply knowledge representation, reasoning, and machine learning techniques to real-world problems						R4
CO-PO	PO	PO	PO3	PO4	PO5		
Mapping	1	2					
CO1	-	1	2	3	1		
CO2	-	-	2	3	2		
CO3	-	1	3	3	2		
CO4	-	-	2	3	3		
<b>Text Books:</b> 1. David Poole, Alan MAckworth, Randy Goebel: Computational Intelligence – a logical							

approach, Oxford University

**Reference Books:** 

1. Fundamentals of Computational Intelligence: Neural Networks, Fuzzy Systems, and Evolutionary

Computation, by James M. Keller, Derong Liu, David B. Fogel ISBN: 978-1-119-21434-2

Course Coordinator: Prof. Shamshekar S. Patil
# Dr. Ambedkar Institute of Technology, Bangalore-560056 An Autonomous Institution, Affiliated to VTU Department of CSE, M.Tech Programme



# Autonomous Syllabus for M.Tech 2017-2018 Batch

## M.Tech (CSE) First Semester

### **Total Credits: 26**

			CREDIT BASED					
Sub Code	Subject Name	Lecture	Duration	Marl	ks for		Total	
		Hrs/week	of exam in Hrs	CIE	SEE	Total	credits	
SCS11	Advances in Operating System	4	3	30	70	100	4	
SCS12	Cloud Computing	4	3	30	70	100	4	
SCS13	Advanced DBMS	4	3	30	70	100	4	
SCS14	Probability Statistics and Queuing Theory	4	3	30	70	100	4	
SCS15X	Elective I	4	3	30	70	100	4	
SCS16L	OS and ADBMS lab	3	3	30	70	100	2	
SCSS17	Seminar		-	50		50	2	
SCSM18	Mini Project		-	50		50	2	
Total		23	18	280	420	700	26	

#### **Elective Group - I**

- 1. Artificial Intelligence and Prolog Programming (SCS151)
- 2. Digital Image Processing(SCS152)
- 3. Advances in Storage Area Network (SCS153)

#### M.Tech (CSE) Second Semester

#### **Total Credits: 26**

			CREDIT BASED						
Sub	Subject Name	ject Name Lecture Duration of Marks for							
Code		Hrs/week	exam in Hrs	CIE	SEE	Total	Credits		
SCS21	Managing Big Data	4	3	30	70	100	4		
SCS22	Advanced Computer Networks	4	3	30	70	100	4		
SCS23	Advanced Algorithms	4	3	30	70	100	4		
SCS24X	Elective II	4	3	30	70	100	4		
SCS25X	Elective III	4	3	30	70	100	4		
SCS26L	Network/ Algorithms Lab	3	3	30	70	100	2		
SCS27	Research Methodologies	3	3	30	70	100	2		
SCSM28	Mini project		-	50		50	2		
Total		23	18	260	490	750	26		

# **Elective Group II**

- 1. Machine Learning Techniques(SCS241)
- 2. Computer Vision (SCS242)
- 3. Cyber Security(SCS243)

# **Elective Group III**

- 1. Information and Network Security(SCS251)
- 2. Soft Computing (SCS252)
- 3. Neural Networks (SCS253)

## M.Tech (CSE). Third Semester

#### **Total Credits: 24**

			CREDIT BASED						
Sub Code	Subject Name	Lecture	Duration of		Total				
		Hrs/week	exam in Hrs	CIE	SEE	Total	Credits		
SCS31	Internship	-	-	50	50	100	20		
SCSP32	Project Phase -I	-	-	50	-	50	2		
SCSS33	Seminar	-	-	50	-	50	2		
Total				150	50	200	24		

## M.Tech (CSE). Fourth Semester

### **Total Credits: 24**

		CREDIT BASED							
Sub Code	Subject Name	Lecture	Duration of		Marks	Total			
		Hrs/week	exam in Hrs	CIE	SEE	Total	Credits		
SCS41	<b>Internet of Things</b>	4	3	30	70	100	4		
SCS42X	Elective-IV	4	3	50	50	100	4		
SCSP41	Project Phase II	-	-	50	100	150	16		
Total				130	220	350	24		

# **Elective Group - IV**

- 1. Wireless networks and Mobile Computing (SCS421)
- 2. Advanced Data Structures (SCS422)
- 3. Agile Methodologies (SCS423)

		Course Title: Advances In Operating Systems								
STAR INSTI	TUTE OF ILC	Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture ho	ours/week : 4					
5 • Dr. All	OLOGY · a	SCS11	(L-T-P)							
Aided By Go	THE WELFARE THIS	Exam Duration : 3 hours	n: CIE+ SEE = 30+70=100 Total No. of Contact Hours : 52							
Co	urse		Description							
Obje	ctives:	1. To learn the fund	lamentals of Operating Systems	5.						
		2. To learn the mec communication	hanisms of OS to handle proce	esses and threads ar	nd their					
		3. To learn the mec	hanisms involved in memory n	nanagement in cont	emporary OS					
		4. To gain knowled architecture, Mut agreement protoc	ge on distributed operating syst tual exclusion algorithms, dead cols	tem concepts that in lock detection algo	ncludes rithms and					
		5. To know the con	ponents and management aspe	ects of concurrency	management					
		6. To learn program	nmatically to implement simple	OS mechanisms						
Unit			Svllabus Content		No of Hours					
No		··· · · · · · · · · · · · · · · · · ·		1.0	10					
1	Opera Systen Major What i Execut Manag Text B	Achievements, Devel a Process?, Process tion of the Operating S gement Book 2: Chapter 2 & 3	w, Process description & Contr tions, The Evolution of Operat opments Leading to Modern Of States, Process Description, Pro System, Security Issues, UNIX	rol: Operating ing Systems, perating Systems: ocess Control, SVR4 Process	10					
2	Threa Multip Manag Systen	ds, SMP, and Microl processing (SMP), Mic gement, Virtual Memo n Software, UNIX and	<b>kernel,</b> Processes and Threads, crokernel, Solaris Thread and S ry: hardware and control struct I Solaris Memory Management	Symmetric MP ures, Operating	10					
	Text B	Book2: Chapter 4 & 8								
3	3       Multiprocessor and Real-Time Scheduling: Multiprocessor Scheduling,       10         Real-Time Scheduling, Linux Scheduling, UNIX process Scheduling,       10         Distributed Operating System: Motivation, Types of Network-based OS,       Network structure,         Text Book 1: Chapter 10       Text Book 2: Chapter 16									
4	<b>Distril</b> File A Event Deadlo	buted File system: Ba ccess, State full and S Ordering, Mutual Exc ock Handling, Election	ackground, Naming and transpa tateless services. Distributed Sy lusion, Atomicity, Concurrency n algorithm and Reaching agree	arency, Remote ynchronization: y Control, ement	11					

	Text I	Book 1:	ook 1: Chapter 17 & 18								
5	<ul> <li>File Management: Overview, file Organization and access, file directories, File sharing, Record blocking, secondary storage management, File System Security, UNIX file Management.</li> <li>Case Study: Linux system, Design Principles, kernel modules, process management, scheduling, memory management, file system, input and output, inter process communication, network structure, security Text Book 1: Chapter 21</li> </ul>										
	•		-					1			
Cou	irse				]	Descripti	ion	<b>RBT</b> Levels			
Oute	omes					_					
	CO1	Analy involv	vze the ved in (	structur DS desig	re of OS a gn	and basic	e architectural components	R4			
	CO2	Analy proce	ze and ss or th	design read mo	the applic dels of d	ations to	o run in parallel either using OS	R4 & R5			
	CO3	Analy times	vze the haring	various and dist	device an ributed sy	d resour /stems	rce management techniques for	R4			
	CO4	Under protoc	Understand the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system								
	C05	Interp Appli	oret the cations	mechan	isms adoj	pted for	file sharing in distributed	R3			
	CO6	Conce OS	eptualiz	ze the co	omponent	s involve	ed in designing a contempary	R4,R5,R6			
CO-P Mapp	O ing	PO1	PO2	PO3	PO4	PO5					
	CO1	-	-	3	3	-					
	CO2	-	-	3	3	1					
	CO3	3 3 2									
	CO4	1									
	CO5	1	1 - 3 3 2								
	CO6	1	-	3	3	2					
Strong	<u>-3</u>	Mediu	m -2	Weak	-1						

TEXT BOOKS:
1. AviSilberschatz, Peter Baer Galvin, Greg Gagne, Operating System Concepts, 8th Edition,
John wiley& Sons, Inc. ISBN 978-1-118-06333-0, 2012
2. William Stallings, Operating Systems: Internals and Design Principles, 8 <sup>th</sup> edition Pearson
Education Limited, 2014 ISBN: 1292061944, 9781292061948
<b>REFERENCE BOOKS:</b>
<ol> <li>D.M Dhamdhere: Operating systems - A concept based Approach, 3rd Edition, Tata McGraw- Hill, 2012.</li> <li>P.C.P. Bhatt: Introduction to Operating Systems Concepts and Practice, 3rd Edition, PHI, 2010.</li> <li>Harvey M Deital: Operating systems, 3rd Edition, Pearson Education, 2011.</li> </ol>
COURSE COORDINATOR:Dr. K R Shylaja

		Course Title: Cloud Computing								
Star INST	TUTE OF TROP	<b>Course Code:</b>	No. of Credits: 4 : 0 : 0	No. of lecture hours/week :						
A + Dr. AMB	SCS12 (L-T-P) 4									
Aided By Ge	Exam Duration : 3 hoursCIE+ SEE = 30+70=100Total No. of Contact Ho52									
Obje	ctives:	1 To loom how	to use Cloud Services							
		2 To implement	<ol> <li>1. To learn how to use Cloud Services.</li> <li>2. To implement Virtualization</li> </ol>							
		3. To implement	t Task Scheduling algorithms.							
		4. Apply Map-I	Reduce concept to applications							
		5. To build Priv	vate Cloud.							
		<b>6.</b> Broadly educ	ate to know the impact of engi	ineering on legal an	d societal					
		issues involv	ed.	6 6						
Unit			Syllabus Content		No of Hours					
				. 1	10					
I	Introd	luction, Cloud Infras	structure: Network centric con er-to-peer systems. Cloud Com	nputing and	10					
	idea w	hose time has come. (	Cloud Computing delivery mod	lels & Services,						
	Ethica	l issues, Cloud vulner	abilities, Challenges, Cloud In	frastructure:						
	Amazo	on, Google, Azure & o	online services, open source pr	ivate clouds.						
	Storag	e diversity and vendo	r lock-in, inter-cloud, Energy u	ise & ecological						
	Respon	sibility sharing user	experience. Software licensing	agreement,						
2	Cloud	Computing: Applica	ation Paradigms.: Challenges	, existing and new	10					
	applica	ation opportunities, A	rchitectural styles of cloud app	lications: single,						
	multi,	hybrid cloud site, red	undant, non redundant, 3 tier, 1	multi tier						
	archite	ctures, Workflows co	ordination of multiple activitie	s, Coordination						
	based	on a state machine mo	e Hadoon A case study: the G	ren The Web						
	applica	ation. <b>Applications</b> : H	Healthcare. Energy systems, tra	nsportation.						
	manuf	acturing, Education, C	Government, mobile communic	ation, application						
	develo	pment.								
3	Cloud	Resource Virtualiza	tion: Definition, merits and de	emerits, types &	11					
	Techniques, Layering, Virtual machine monitors, Hardware support for									
	Optimization Case study: <i>Aen</i> -a VMINI based on para-virtualization,									
	paravirtualization targeting a x86-64 Itanium processor. A performance									
	compa	rison of virtual machi	nes, The darker side of virtuali	zation, Software						
	fault is	solation.		1 1 1						
4	Cloud	Kesource Managem	ent and Scheduling: Policies	and mechanisms	11					
	on a cl	oud. Stability of a two	p-level resource allocation arch	itecture.						
	Feedba	ack control based on c	lynamic thresholds, Coordinati	on of specialized						

autor web time dead mana	autonomic performance managers, A utility-based model for cloud-based web services, Resource bundling, combinatorial auctions, fair queuing, Start time fair queuing, borrowed virtual time, Cloud scheduling subject to deadlines, Scheduling mapreduce applications subject to deadlines, Resource management and application scaling										
5 Clou Evol File Mega Clou share	10										
Course Outcomes					Descript	ion	RBT Levels				
CO1	Obtai servic provie	n knov ce mod ded by	wledge lels, cha cloud se	on differ allenges ervice pro	rent asp & infras oviders.	ects of cloud computing like; structure and different services	R1, R2,R3				
CO2	Analy Virtua archit	Analyze the importance of virtualization and different features of Virtual Machine (VM) in cloud computing and understand cloud architectures and few standards followed in cloud computing.									
CO3	To ab	ole to ur	nderstan	d task co	mputing	on cloud environment.	R3				
CO4	Able platfo	to un orms us	derstand ed in In	l and de dustry.	emonstra	te different features of cloud	R3, R5				
CO5	Able federa	to unde ation st	erstand t ack.	echnolog	ies used	for Cloud federation with cloud	R5				
	PO1	DO1	DO2	DO4	DO5	1					
Mapping		r02	105	104	105						
CO1	-	-	3	2	2	1					
CO2	2	-	3	3	2	1					
CO3	CO3 3 3 3										
CO4	CO4 - 2 3 2 3										
CO5	-	3	2	3	3						
Strong -3	Mediu	m -2	Weak	-1							

#### **TEXT BOOKS:**

1. Dan C. Marinescu, Cloud Computing: Theory and Practice, Elsevier Science, 2013, 1st Edition, Print Book ISBN :9780124046276, eBook ISBN :9780124046412

<u>Chapter 1 - Introduction</u>*Pages 1-19*, <u>Chapter 2 - Parallel and Distributed Systems</u>*Pages 21-65*, <u>Chapter 3 - Cloud Infrastructure</u>*Pages 67-98*, <u>Chapter 4 - Cloud Computing</u>: <u>Applications and Paradigms</u>*Pages 99-130*, <u>Chapter 5 - Cloud Resource Virtualization</u>*Pages 131-161*, <u>Chapter 6 - Cloud Resource Management and Scheduling</u>*Pages 163-203*, <u>Chapter 8 - Storage Systems</u>*Pages 241-271*, <u>Chapter 9 - Cloud Security</u>*Pages 273-300*, <u>Chapter 11 - Cloud Application</u> <u>Development</u> *Pages 317-359* 

2. Cloud Computing : A hands on Approach, Arshdeep Bagha - Vijay Bagha Madisetti , 2013, ISBN/EAN13: 1494435144 / 9781494435141, web links: www.cloudcomputingbook.info. Chapter 1-1-19 pages, Chapter 4-64-93 pages, Chapter 5- 94-113 pages, Case studies and examples.

#### **REFERENCE BOOKS:**

1.Paul Goransson and Chuck Black, Software Defined Networks: A Comprehensive Approach, 1st edition, 2014, Morgan Kaufmann Publishers, Inc., San Francisco. ISBN-13: 978-0124166752, ISBN-10: 012416675X

2. T. Erl, R. Puttini, and Z. Mahmood, Cloud Computing: Concepts, Technology & Architecture • ISBN-10: 0133387526 • ISBN-13: 9780133387520 ©2013 • Prentice Hall • Cloth, 528 pp

3. Rajkumar Buyya , James Broberg, Andrzej Goscinski: Cloud Computing Principles and Paradigms, Willey 2014. ISBN: 978-0-470-88799-8

4. Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, Kai Hwang, Jack Dongarra and Geoffrey Fox, Morgan Kaufmann, 2011. ISBN-10: 0123858801 ISBN-13: 978-0123858801

5. Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, McGraw Fill, 2010 ISBN 10: 0070683514 ISBN 13: 9780070683518

COURSE	Dr. Siddaraju
<b>COORDINATOR:</b>	

	Course Title: Advanced DBMS										
SUR INSTITUTE OF ITE	Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture hours/week :								
PL VIII	SCS13	(L-T-P)	4								
Aided By Govt. of Karnataka	Exam Duration : 3 hours	CIE+ SEE = 30+70=100	Total No. of Contact Hours 52								
Courso		Description									
Course		Description									
Objectives:	1. Design and impl	lement advanced queries using	Structured Query Language								
	2. To study the usa	ge and applications of Object	Oriented database								
	3 To acquire know	vledge on variety of NoSOL d	atahases								
	5. To acquire knowledge on variety of NOSQL databases										
	4. To attain inquisitive attitude towards research topics in NoSQL databases										
	1										

Unit		Syllabus Content	No of Hours				
No							
1	Datab	ase System Concepts and Architecture, The Relational Data Model and	11				
	Relational Database Constraints, Language Fundamentals, Conditional and						
	Seque	ntial Control, Iterative Processing with Loops, String Datatypes,					
	Work	ing with Strings, Specifying String Constants, Using Nonprintable					
	Chara	cters, Concatenating Strings, Dealing with Case, Traditional					
	Search	ning, Extracting, and Replacing, Datetime Datatypes, Getting the					
	Curren	nt Date and Time, Datetime Conversions, From Strings to Datetimes,					
	From	Datetimes to Strings, Collection Methods, Introduction to Oracle's					
	Objec	t Features, Object Types by Example.					
2	Motiv	ations for Not Just/No SQL (NoSQL) Databases, Variety of NoSQL	11				
	Datab	ases, Introductionto Key-Value Databases, Key-Value Database					
	Termi	nology					
3	Introd	10					
4	Introduction to Column Family Databases, Column Family Database						
	Terminology						
5	5 Introduction to Graph Databases, Graph Database Terminology, Choosing a						
	database for your application.						
	•						
Cou	ırse	Description	<b>RBT</b> Levels				
Outc	omes						
	CO1	Acquiring the basic knowledge of ER-Diagram, Relational Database	R1, R2,R3				
		and SQL.					
	<u> </u>	Construct queries using D1/SOL officiently for developing detabase	D4 and D5				
	COZ	to developing database	K4 and K3				
		applications.					
	<b>CO3</b> Critically analyze and evaluate variety of NoSQL databases.		R3				
	004	Demonstrate the Investigation of IZ VII 141 D	D5				
	CO4	Demonstrate the knowledge of Key-Value databases, Document	кэ				
		based Databases, Column based Databases and Graph Databases.					

CO-PO	PO1	PO2	PO3	PO4	PO5	
Mapping						
C01	-	1	3	2	3	
CO2	_		3	3	3	
02		-		5		
CO3	-		3	2	1	
CO4	-	1	3	-	1	
Strong -3	Mediun	n -2	Weak	-1		
TEXT BOOK	S:					
1) RamezElr	nasri, S	Shamk	ant B	Navathe,	"Databa	se Systems: Models,Languages,Design and
Applicatio	on Progi	rammi	ng", 6 <sup>th</sup> ]	Edition, P	earson E	ducation, 2013.(ISBN-13:978-8131792476)
2) Steven Fe	euersteir	n, "Ora	acle PL/	SQL Pro	grammin	g", 6 <sup>th</sup> Edition, O'Reilly Media, 2014. (ISBN-
13: 978-14	4493244	452)				
3) Dan Sulli	van,"Nc	SQL	for Mer	e Mortals	",1 <sup>st</sup> Editi	on, Pearson Education, 2015. (ISBN-13: 978-
93325573	38)					
REFERENCE	BOOK	S:				
1) Michael N	Ast and	1.1	Junala I	Databasa	12° DI /	SOL Dragonominal 1stEdition Macrow Hill
T) Michael F	2014	IIIII, V (ISBN	13.07	$\int a a b a b a b c b$	120 FL/1 2436)	SQL Flogramming, T Edition, McGraw-Hin
2) Pramod I	Sadala	oe Ma	ertin For	vler "NoS	SOL Dist	illed: A Brief Guide to the Emerging World of
Polyglot F	Persister	nce" 1	stEdition	n Pearson	Educati	on $2012$ (ISBN-13: 978-8131775691)
i offgiot i	01515701	100,1	Laitio	ii, i cuisoi	Laucan	(i), 2012. (i)Di( 15. 976 0151775091)
COURSE		Sha	mshekh	ar patil		
COORDINAT	OR:					

		Course Title: Prob	oability Statistics And Queuin	ng Theory			
SURMIST	TUTE OF TROIT	Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture he	ours/week: 4		
s • Dr. Alli	SCS14		(L-T-P)				
Aided By Ge	THA WELFARE THIS	Exam Duration : 3 hours	CIE+ SEE = 30+70=100	ontact Hours :			
Co	urse		Description				
Obje	ctives:	1. To develop an and Queuing.	alytical capability and to impart k	nowledge of Probabi	ility, Statistics		
		2. The application	n of above concepts in Engineerin	ng and Technology.			
		<b>3.</b> Students acqu applications so	ire knowledge of Hypothesis testi o as to enable them to apply them	ng and Queuing meth for solving real worl	nods and their d problems		
Unit No			Syllabus Content		No of Hours		
1	Axioms of probability, Conditional probability, Total probability, Baye's10theorem, Discrete Random variable, Probability mass function, Continuous10Random variable. Probability density function, Cumulative Distribution10Function, and its properties, Two-dimensional Random variables, Joint pdf /10cdf and their properties10						
2	Probability Distributions / Discrete distributions: Binomial, Poisson10Geometric and Hyper-geometric distributions and their properties.10Continuous distributions: Uniform, Normal, exponential distributions and their properties.10						
3	Testing Hypothesis: Testing of Hypothesis: Formulation of Null hypothesis, critical 10 Hours region, level of significance, errors in testing, Tests of significance for Large and Small Samples, t-distribution, its properties and uses, F-distribution, its properties and uses, Chi-square distribution, its properties and uses, $\chi^2$ – test for goodness of fit, $\chi^2$ test for Independence11						
4	Random Processes: Classification, Methods of description, Special classes, Average values of Random Processes, Analytical representation of Random Process, Autocorrelation Function, Cross-correlation function and their properties, Ergodicity, Poisson process, Markov Process, Markov chain.11						
5	Symbo Law, 7 Queuin Finite	lic Representation of Types of Stochastic Pr ng System, The M/M/ buffers.	a Queuing Model, Poisson Queocesses, Birth-Death Process, 5 s Queuing System, The M/M/s	eue system, Little The M/M/1 Queuing with	10		

Course Outcomes		Description RBT Levels							
CO1	Demon charac functio	Demonstrate knowledge & use of probability and will be able to characterize probability models using probability mass (density)R1, R2,R3functions & cumulative distribution functions.							
CO2	Apply distrib	Apply the techniques of developing discrete & continuous probability R3 and R5 istributions and its applications.							
CO3	Descri functio	Describe a random process in terms of its mean and correlation R2 Functions.							
CO4	Apply	the m	ethods o	of Hypoth	esis test	ng for goodness	of fit.	R3	
C05	Unders theory variou	Understand the terminology & nomenclature appropriate queuing theory and also demonstrate the knowledge and understand the various queuing models.							
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5				
C01	-	-	3	2	3	-			
CO2	2	-	2	3	2	-			
CO3	2	2	2	3	3				
CO4	2	-	2	1	2	-			
CO5	-	-	2	3	3	-			
Strong -3	Medium	n -2	Weak	-1	1				
TEXT BOOK	S:								
<ol> <li>Probability, Statistics and Queuing Theory, V. Sundarapandian, Eastern EconomyEdition, PHI Learning Pvt. Ltd, 2009. Published by PHI Learning, New Delhi (2009) ISBN 10: 8120338448 ISBN 13: 9788120338449</li> </ol>									
REFERENCE	BOOK	S:							
1. Probabilit Kishor. S.	y & Sta Trivedi	tistics i , Prei	with Re ntice Ha	eliability, 11 of India	Queuing a ,2004.I	and Computer A SBN: 978-0-471	applications, 2nd -33341-8	Editionby	
COURSE COORDINAT	OURSE Dr. ShivaPrasana OORDINATOR:								

	Course Title: AD	BMS and OS Laboratory	
SUR INSTITUTE OF IFE	Course Code:	No. of Credits: 0 : 0 : 2	No. of lecture hours/week : 3
NOLOGY -	SCS16L	(L-T-P)	
Alded By Govt. of Karnataka	Exam Duration : 3 hours	CIE+ SEE = 30+70=100	Total No. of Contact Hours : 16
Course		Description	
Objectives: Note: The f other suitab	1. To understardatabase.         2. To understardatabase.         2. To understardatabase.         2. To understardatabase.         3. To acquire in the second s	ad the basic concepts and applied and work on areas like Stora riggers and other complex objective attitude towards reservative attitude towards reservative attitude on advance ractical knowledge on advance at the shell of Operating System <b>ADBMS LABORATORY V</b> may be implemented on MySC ort for Object features	ications of Object Oriented age, Retrieval, Multi valued ects earch topics in databases. ed databases and its applications. m. a concepts. <b>VORK</b> QL/ORACLE/PostgreSQL or any
1. Develog andCL	p a database applicat OB objects.	ion to demonstrate storing an	nd retrieving of BLOB
a) Wr dat the val fiel as a	ite a binary large object a, depending on the typ database, issue the app ue as an input parameted d, pass the BLOB as a a SQL Server image fite	et (BLOB) to a database as eith be of the field in your data sour propriate INSERT or UPDATH er. If your BLOB is stored as t string parameter. If the BLOB eld, pass an array of type byte a	her binary or character (CLOB) rce. To write a BLOB value to E statement and pass the BLOB ext, such as a SQL Server text B is stored in binary format, such as a binary parameter.
b) On acc	ce storing of BLOB an ordingly.	d CLOB objects is done, retrie	eve them and display the results

2. Develop a database application to demonstrate the representation of multi valuedattributes, and the use of nested tables to represent complex objects. Write suitablequeries to demonstrate their use.

Consider Purchase Order Example: This example is based on a typical business activity: managing customer orders. Need to demonstrate how the application might evolve from relational to object-relational, and how you could write it from scratch using a pure object-oriented approach.

- a) Show how to implement the schema -- Implementing the Application under the Relational Model -- using only MySQL/PostgreSQL/Oracle's built-in data types. Build an object-oriented application on top of this relational schema using object views.
- 3. Design and develop a suitable Student Database application by considering appropriate attributes. Couple of attributes to be maintained is the Attendance of a student in each

# subject for which he/she has enrolled and Internal Assessment Using TRIGGERS, write active rules to do the following:

- a) Whenever the attendance is updated, check if the attendance is less than 85%; if so, notify the Head of the Department concerned.
- b) Whenever, the marks in an Internal Assessment Test are entered, check if the marks are less than 40%; if so, notify the Head of the Department concerned.

## Use the following guidelines when designing triggers:

- Use triggers to guarantee that when a specific operation is performed, related actions are performed.
- Use database triggers only for centralized, global operations that should be fired for the triggering statement, regardless of which user or database application issues the statement.
- Do not define triggers that duplicate the functionality already available in any database (Oracle/MySQL/PostgreSQL, etc.). For example, do not define triggers to enforce data integrity rules that can be easily enforced using declarative integrity constraints.
- Limit the size of triggers (60 lines or fewer is a good guideline). If the logic for your trigger requires much more than 60 lines of PL/SQL code, it is better to include most of the code in a stored procedure, and call the procedure from the trigger.
- Be careful not to create recursive triggers. For example, creating an AFTER UPDATE statement trigger on the EMP table that itself issues an UPDATE statement on EMP causes the trigger to fire recursively until it has run out of memory.
- 4. Design, develop, and execute a program to implement specific Apriori algorithm for mining association rules. Run the program against any large database available in the public domain and discuss the results.

Association rules are if/then statements that help uncover relationships between seemingly unrelated data in a relational database or other information repository. An example of an association rule would be "If a customer buys a dozen eggs, he is 80% likely to also purchase milk".

# Part B : OPERATING SYSTEM LABORATORY

1. Design and Develop a UNIX/LINUX shell program that should support at least 10 commands(Assume suitable application). OR Design a front-end application upon click of a button corresponding shell command should be executed.

2. Design and develop a program to implement lazy buddy system algorithm.

3. Write a multi-class multithreaded program that simulates multiple sleeping barbers, all in one barbershop that has a finite number of chairs in the waiting room. Each customer is instantiated from a single customer class; each barber is instantiated from a single Barber class.

4. Create two process and demonstrate the usage of Shared segment by the above processes (use shmget, signal, fork etc. to simulate the working environment of the program).

Course	Description	<b>RBT</b> Levels
Outcomes		
CO1	Model and represent the real world data using object oriented	R1, R2,R3
	database.	

CO2	Embe minin	Embed the rule set in the database to implement data warehousing of mining.						
CO3	Choos intero	Choose and design database for recent applications database for better interoperability						
CO4	Use E appro	Use Binary search trees in any real time problem domains where appropriate.						
CO5	Use R	led –bl	ack tree	s for real	time pro	blems for optimization purpose.	R3	
CO6	Use h	ashing	techniq	ue for se	arching in	n any real time applications.	R3	
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5			
C01	2	2	3	2	3			
CO2	1	2	3	2	3			
CO3	2	2	3	2	3			
CO4	-	2	3	3	3			
CO5	1	2	3	3	3			
CO6	1	2	3	3	3			
Strong -3	Mediur	n -2	Weak	<b>-1</b>	·	·		
COURSE COORDINAT	FOR:	Dr.	K R Shy	ylaja				

		Course Title: Arti	ficial Intelligence and Prolog	Programming			
SOLAR INSTI	TUTE OF ILCOM	Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture he	ours/week : 4		
S		SCS151	(L-T-P)				
Aided By Go	anay the second	Exam Duration : 3 hours	CIE+ SEE = 30+70=100 Total No. of Contact Ho 52				
Co	urse		Description				
Objee	ctives:	1. To Implement nor	-trivial AI techniques in a relative	ely large system			
		2. To understand unc	certainty and Problem solving tech	niques.			
		3. To understand var reasoning tasks of	ious symbolic knowledge represe a situated software agent.	ntation to specify dor	nains and		
<ul> <li>4. To understand different logical systems for inference over formal domain representations, and trace how a particular inference algorithm works on a given problem specification.</li> </ul>							
		5. To understand how	v to write a Prolog programs for	Artificial Intelligence	;		
		<b>6.</b> Analyzing and So	lving Artificial Intelligence progr	ams by using Backtr	acking methods		
<b>T</b> T •/	1						
Unit No			Syllabus Content		No of Hours		
1	1       What is Artificial Intelligence: The AI Problems, The Underlying assumption,       10         1       What is an AI Technique?, The Level of the model, Criteria for success, real world       10         Problems, problem spaces and search: Defining, the problem as a state space       10         search, Production systems, Problem characteristics, Production system       10         characteristics, Issues in the design of search programs, Additional Problems.       10         Intelligent Agents: Agents and Environments, The nature of environments, The       10						
2	<ul> <li>structure of agents. (Text Book 1: Chapter 1 &amp; 2 Text Book 2: Chapter 2)</li> <li>Heuristic search techniques: Generate-and-test, Hill climbing, Best-first search, Problem reduction, Constraint satisfaction, Mean-ends analysis. Knowledge representation issues: Representations and mappings, Approaches to knowledge representation, Issues in knowledge representation, The frame problem. Using predicate logic: Representing simple facts in logic, representing instance and ISA relationships, Computable functions and predicates, Resolution, Natural Deduction. Logical Agents: Knowledge –based agents, the Wumpus world, Logic- Propositional logic, Propositional theorem proving, Agents based on propositional logic. (Text Book 1: Chapter 3, 4 &amp; 5 Text Book 2: Chapter 6)</li> </ul>						
3	Symbo Logic f solver, Statistic	lic Reasoning Under Ur for nonmonotonic reason Implementation: Depth cal Reasoning: Probabil	ncertainty: Introduction to nonmon ning, Implementation Issues, Aug -first search, Implementation: Bre ity and bayes Theorem, Certainty	notonic reasoning, menting a problem eadth-first search, factors and rule-	10		

1	based	systems	Bayes	ian Netw	vorks			
	T							
	Text I	Book 1:	ook 1: Chapter / & 8 Text Book 2: Chapter 13					
4	Prolog Programming for Artificial Intelligence, An Overview of Prolog, An11example program: defining family relations, Extending the example program by rules, A recursive rule definition, How Prolog answers questions, Declarative and procedural meaning of programs; Syntax and Meaning of Prolog Programs, Data objects, Matching Declarative meaning of Prolog programs, Procedural meaning, Example: monkey and banana, Order of clauses and goals, Remarks on the relation between Prolog and logic.11(Text Book 3: Chapters 1 & 2)							
5	<ul> <li>Lists, Operators, Arithmetic, Representation of lists, Some operations on lists, Operator notation, Arithmetic, Using Struclures: Example Programs, Retrieving structured information from a database, Doing data abstraction, Simulating a non- deterministic automaton, Travel planning, The eight queens problem, Controlling, Backtracking, Preventing backtracking, Examples using cut, Negation as failure, Problems with cut and negation, Input and Output, Communication with files. (Text Book 3: Chapter 3, 4, 5 &amp; 6)</li> </ul>						11	
	•							
Cor	ırse					Descript	ion	RBT Levels
Oute	comes							
	CO1	Desig	n intelli	gent ager	nts for pro	blem solv	ving reasoning planning decision	R3
	CO1	Design makin neede	n intelli g, and l d, desig	gent agen earning s n variant	nts for pro specific de s of existi	blem solvesign and ng algori	ving, reasoning, planning, decision performance constraints, and when thms.	R3, R4,R5,R6
	CO1 CO2	Design makin neede Apply	n intellig g, and l d, desig AI tech	gent agen earning s n variant nique of	nts for pro specific de ss of existin n current a	blem solvesign and ng algorit application	ving, reasoning, planning, decision performance constraints, and when thms. ns	R3, R4,R5,R6 R3
	CO1 CO2 CO3	Design makin neede Apply Proble	n intelli g, and l d, desig AI tech	gent agen earning s n variant nique of ng, knov	nts for pro specific de s of existi n current a vledge rep	oblem solvesign and ng algori application	ving, reasoning, planning, decision performance constraints, and when thms. ns on, reasoning, and learning.	R3, R4,R5,R6 R3 R4,R5
	CO1 CO2 CO3 CO4	Design makin needer Apply Proble	n intelli g, and l d, desig AI tech em solvi	gent agent earning s n variant mique or ng, know g how to	nts for pro specific de so of existi n current a vledge rep write a pr	oblem solvesign and ng algorit application presentation rograms f	ving, reasoning, planning, decision performance constraints, and when thms. ns on, reasoning, and learning. For Artificial Intelligence	R3, R4,R5,R6 R3 R4,R5 R3
	CO1 CO2 CO3 CO4 CO5	Design makin needed Apply Proble Demo Solvir	n intelli g, and l d, desig AI tech em solvi nstratin	gent ager earning s n variant inique or ng, know g how to sive prog	nts for pro specific de s of existi n current a vledge rep write a pr grams in P	oblem solvesign and ng algori applicatio presentatio rograms f	ving, reasoning, planning, decision performance constraints, and when thms. ns on, reasoning, and learning. for Artificial Intelligence	R3, R4,R5,R6 R3 R4,R5 R3 R4
	CO1 CO2 CO3 CO4 CO5 CO6	Design makin needed Apply Proble Demo Solvir Analy Backt	n intelli g, and l d, desig AI tech em solvi nstratin ng recurs zing and racking	gent ager earning s n variant inique or ng, know g how to sive prog d Solvin methods	nts for pro specific de s of existi n current a vledge rep write a pr grams in P	oblem solvesign and ng algori application presentation rograms f prolog al Intellig	ving, reasoning, planning, decision performance constraints, and when thms. ns on, reasoning, and learning. For Artificial Intelligence	R3, R4,R5,R6 R3 R4,R5 R3 R4 R4 R4
	CO1 CO2 CO3 CO4 CO5 CO6	Design makin needed Apply Proble Demo Solvin Analy Backt	n intelli g, and l d, desig AI tech em solvi nstratin ng recur zing and racking	gent ager earning s n variant mique or ng, know g how to sive prog d Solvin methods	nts for pro specific de s of existi n current a vledge rep write a pr grams in P	oblem solvesign and ng algori applicatio presentatio rograms f Prolog al Intellig	ving, reasoning, planning, decision performance constraints, and when thms. ns on, reasoning, and learning. For Artificial Intelligence	R3, R4,R5,R6 R3 R4,R5 R3 R4 R4
СО-Р Марр	CO1 CO2 CO3 CO4 CO5 CO6 O ing	Design makin needed Apply Proble Demo Solvir Analy Backt	n intelli g, and l d, desig AI tech em solvi nstratin ng recur zing and racking PO2	gent ager earning s n variant inique or ng, know g how to sive prog d Solvin methods	nts for pro specific de s of existi n current a vledge rep write a pr grams in P g Artificia	bblem solvesign and ng algori applicatio presentatio rograms f Prolog al Intellig PO5	ving, reasoning, planning, decision performance constraints, and when thms. ns on, reasoning, and learning. For Artificial Intelligence	R3, R4,R5,R6 R3 R4,R5 R3 R4 R4 R4
CO-P Mapp	CO1 CO2 CO3 CO4 CO5 CO6 O ing CO1	Design makin needed Apply Proble Demo Solvir Analy Backtr PO1 -	n intelli g, and l d, desig AI tech em solvi nstratin ng recurs zing and racking PO2	gent ager earning s n variant inique or ng, know g how to sive prog d Solvin methods <b>PO3</b> 3	nts for pro specific de s of existi n current a vledge rep write a pr grams in P g Artificia PO4 2	poblem solvesign and ng algori application presentation rograms f prolog al Intellig PO5 2	ving, reasoning, planning, decision performance constraints, and when thms. ns on, reasoning, and learning. For Artificial Intelligence	R3, R4,R5,R6 R3 R4,R5 R3 R4 R4
СО-Р	CO1 CO2 CO3 CO4 CO5 CO6 O ing CO1 CO2	Design makin needed Apply Proble Demo Solvir Analy Backtr PO1 - -	n intelli g, and l d, desig AI tech em solvi nstratin ng recurs zing and racking PO2 - -	gent ager earning s n variant inique of ng, know g how to sive prog d Solvin methods <b>PO3</b> <b>3</b> <b>3</b>	nts for pro specific de s of existi n current a vledge rep write a pr grams in P g Artificia PO4 2 2	pblem solvesign and         ng algori         application         presentation         rograms f         prolog         al Intellig         PO5         2         2         2         2         2	ving, reasoning, planning, decision performance constraints, and when thms. ns on, reasoning, and learning. for Artificial Intelligence ence programs by using	R3, R4,R5,R6 R3 R4,R5 R3 R4 R4
CO-P Mapp	CO1 CO2 CO3 CO4 CO5 CO6 O ing CO1 CO2 CO3	Design makin needed Apply Proble Demo Solvir Analy Backtr PO1 - -	n intelli g, and l d, desig AI tech em solvi nstratin ng recurs zing and racking PO2 - - -	gent ager earning s n variant inique or ng, know g how to sive prog d Solvin methods <b>PO3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b>	nts for pro specific de s of existi n current a vledge rep write a pr grams in P g Artificia PO4 2 2 2 2	pblem solvesign and         ng algori         application         presentation         rograms f         prolog         al Intellig         PO5         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2	ving, reasoning, planning, decision performance constraints, and when thms. ns on, reasoning, and learning. for Artificial Intelligence ence programs by using	R3, R4,R5,R6 R3 R4,R5 R3 R4 R4
СО-Р Марр	CO1 CO2 CO3 CO4 CO5 CO6 O ing CO1 CO2 CO3 CO4	Design makin needed Apply Proble Demo Solvir Analy Backtr PO1 - - -	n intelli g, and l d, desig AI tech em solvi nstratin ng recurs zing and racking PO2 - - -	gent ager earning s n variant inique of ng, know g how to sive prog d Solvin methods <b>PO3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b>	nts for prospecific des sof existing current a viedge reported write a programs in P g Artificia PO4 2 2 2 2 2 2 2 2	pblem solvesign and         ng algori         application         presentation         rograms f         prolog         al Intellig         PO5         2	ving, reasoning, planning, decision performance constraints, and when thms. ns on, reasoning, and learning. for Artificial Intelligence ence programs by using	R3, R4,R5,R6 R3 R4,R5 R3 R4 R4
СО-Р Марр	CO1 CO2 CO3 CO4 CO5 CO6 O ing CO1 CO2 CO3 CO4 CO5	Design makin needed Apply Proble Demo Solvir Analy Backtr PO1 - - - -	n intelli g, and l d, desig AI tech em solvi nstratin ng recurs zing and racking PO2 - - - - 1	gent ager earning s n variant mique or ng, know g how to sive prog d Solvin methods <b>PO3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b></b>	nts for prospecific de specific de so of existi n current a viedge reporte a programs in P g Artificia PO4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	pblem solvesign and         ng algori         pplication         presentation         prolog         al Intellig         PO5         2	ving, reasoning, planning, decision performance constraints, and when thms. ns on, reasoning, and learning. for Artificial Intelligence ence programs by using	R3, R4,R5,R6 R3 R4,R5 R3 R4 R4
СО-Р Марр	CO1 CO2 CO3 CO4 CO5 CO6 O ing CO1 CO2 CO3 CO4 CO5 CO6	Design makin needed Apply Proble Demo Solvir Analy Backtr PO1 - - - - - -	n intelli g, and l d, desig AI tech em solvi nstratin ng recur zing and racking PO2 - - - 1 1	gent agent earning s n variant mique of ng, know g how to sive prog d Solvin methods <b>PO3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b></b>	nts for prospecific de specific de so of existi n current a viedge reporter a programs in P g Artificia PO4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	pblem solvesign and         ng algori         upplicatio         oresentatio         rograms f         prolog         al Intellig         PO5         2	ving, reasoning, planning, decision performance constraints, and when thms. ns on, reasoning, and learning. for Artificial Intelligence ence programs by using	R3, R4,R5,R6 R3 R4,R5 R3 R4 R4

#### **TEXT BOOKS:**

1. Elaine Rich,Kevin Knight, Shivashanka B Nair:Artificial Intelligence, Tata CGraw Hill 3rd edition. 2013, ISBN 10: 0070087709 ISBN 13: 9780070087705

2. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, Pearson 3rd edition 2013, ISBN: 0-13-604259-7

3.Ivan BratkoProlog Programming for Artificial Intelligence , (International Computer Science Series) 4th Edition, Publisher: Pearson Education Canada; 4th edition, 2011, ISBN-10: 0321417461; ISBN-13: 978-0321417466

#### **REFERENCE BOOKS:**

1. Nils J. Nilsson: "Principles of Artificial Intelligence", Elsevier, ISBN-13: 9780934613101

COURSE	Dr. M.V. Vijayakumar
<b>COORDINATOR:</b>	

		Course Title: Dig	Course Title: Digital Image Processing						
SOLAR INST	TUTE OF IS CANE	Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture	hours/week :				
In Dr. All	LOGY · my	SCS152	(L-T-P)	4					
AMCHAURA NDYA	ETHA WELFARE TRUG	Exam Duration : 3 hours	CIE+ SEE = 30+70=100	Total No. of Con	ntact Hours :				
Aided By Ge	ovt. of Karnataka	5 nours		52					
Co	urse		Description						
Obje	ctives:	1. To understa	nd the image fundamentals	and mathematica	al transforms				
		necessary fo	or image processing and to	study the image	enhancement				
		techniques.							
		2. To understan	d the image segmentation and r	epresentation techr	iques.				
		3. To understan	d how image are analyzed to ex	tract features of int	terest.				
		4. To introduce	the concepts of image registrat	ion and image fusions	n. g with image				
		data sets.	the constraints in image proce	some when dealin	g with intage				
<b></b>	1								
Unit No			Syllabus Content		No of Hours				
1	Introd	uction: What is Dig	tal Image Processing, Origins	of Digital Image					
	<ul> <li>Processing, Examples of fields that use DIP, Fundamental Steps in Digital Image</li> <li>Processing, and Components of an Image Processing System. Digital Image</li> <li>Fundamentals: Elements of Visual Perception, A Simple Image Formation Model,</li> <li>Basic Concepts in Sampling and Quantization, Representing Digital Images, Spatial</li> <li>and Gray-level Resolution, Zooming and Shrinking Digital Images, Some Basic</li> </ul>								
2	Image Transfe Operat	Enhancement in t ormations, Histogram ions, Basics of Spatial F	<b>he Spatial Domain:</b> Some E Processing, Enhancement Using iltering, Smoothing Spatial Filters	Basic Gray Level Arithmetic/Logic	11				
3	3       Image Segmentation and Object Recognition: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation, Patterns and Pattern Classes, Methods.       10								
4	4 Image Restoration: A Model of the Image degradation/Restoration process, Noise Models, Restoration in the Presence of Noise Only–Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Function, Inverse Filtering.								
5	Morph Closing Image Detecti	ological Image Processi g, The Hit-or-Miss Tran Segmentation: Detection on, Thresholding, Region	ng: Preliminaries, Dilation and Eronsformation, Some Basic Morpholon of Discontinuities, Edge Linkon-Based Segmentation.	osion, Opening and logical Algorithms. ing and Boundary	10				
Cou Outc	ourse Description RBT Levels Itcomes								

C01	Under in per	role human visual system plays data.	R1, R2					
CO2	Apply (Four	Apply image processing techniques in both the spatial and frequency (Fourier) domains						
CO3	Desig and to	n imag o evalua	e analys ate the M	sis technio Methodolo	ques in th ogies for	ne form of image segmentation segmentation	R4, R5	
CO4	Cond techn	uct ind iques.	epender	nt study an	nd analys	sis of feature extraction	R4	
CO5	Unde	rstand t	the conc	epts of in	nage regi	istration and image fusion.	R5	
CO6	Analy data s	Analyze the constraints in image processing when dealing with image data sets and to apply image algorithms in practical applications						
	PO1	PO2	PO3	PO4	PO5			
Mapping		102	105		105			
C01	-	-	3	2	2			
CO2	-	-	3	2	2	-		
CO3	-	-	3	2	2			
CO4	-	-	3	2	2			
CO5	-	1	3	2	2	-		
CO6	-	1	3	2	2	]		
Strong -3	Mediu	m -2	Weak	x -1		1		
TEXT BOOK	S:							

#### 1. Rafel C Gonzalez and Richard E. Woods: Digital Image Processing, PHI 2nd Edition 2005 ISBN-13: 978-0201180756 ISBN-10: 0201180758

2. Scott.E.Umbaugh: Computer Vision and Image Processing, Prentice Hall, 1997 ISBN 81-7808-087-7

#### **REFERENCE BOOKS:**

A. K. Jain: Fundamentals of Digital Image Processing, Pearson, 2004. Published by Prentice-Hall of India Pvt.Ltd (2004) ISBN 10: 8120309294 ISBN 13: 9788120309296

2. Z. Li and M.S. Drew: Fundamentals of Multimedia, 2004. ISBN: 0130618721, Prentice-Hall,

3. S.Jayaraman, S.Esakkirajan, T.Veerakumar: Digital Image Processing, TataMcGraw Hill, 2014. ISBN 9780070144798.

COURSE	Prof Nithya.E
<b>COORDINATOR:</b>	

	Course Title: Advances in Storage Area Networks								
A CONTROL OF CONTROL O		Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture l	hours/week :				
		SCS154	(L-T-P)	4					
Aided By Ge	THA WELFARE THIS	Exam Duration : 3 hours	CIE+ SEE = 30+70=100	Total No. of Con 52	ntact Hours :				
Co	urse		Description						
Objectives:       1. To understand the fundamentals of storage centric and server centric         2. To understand the metrics used for Designing storage area networks         3. To understand the RAID concepts         4. To enable the students to understand how data centre's maintain with the         5. concepts of backup mainly remote mirroring concepts for both si complex systems									
Unit No	Syllabus Content No of Hours								
1	Introdu Centric with S Battle Intellig Storage	action: Server Centric c IT Architecture and torage Networks The for size and access gent Disk Subsystems e virtualization using	c IT Architecture and its Limi l its advantages. Case study: F e Data Storage and Data Acc . Intelligent Disk Subsystems s; Hard disks and Internal I/O RAID and different RAID leve	tations; Storage – Replacing a server sess problem; The s: Architecture of Channels; JBOD, els;	11				
2	I/O Te SCSI; Netwo Archite	I/O Techniques: The Physical I/O path from the CPU to the Storage System;SCSI; Fiber Channel Protocol Stack; Fiber Channel SAN; IP Storage.Network Attached Storage: The NAS Architecture, The NAS hardwareArchitecture							
3	Storage Virtualization: Definition of Storage virtualization; Implementation Considerations; Storage virtualization on Block or file level; Storage virtualization on various levels of the storage Network; Symmetric and Asymmetric storage virtualization in the Network.								
4	SAN Architecture and Hardware devices: Overview, Creating a Network for storage; SAN Hardware devices; The fiber channel switch; Host Bus Adaptors ;Putting the storage in SAN; Fabric operation from a Hardware perspective.								
5	Manag manag Interfa	ement of Storage N ement System, Sup ce	etwork: System Management oport by Management Syste	, Requirement of em, Management	10				

Course Outcomes		on	RBT Levels							
CO1	Identi it	Identify the need for performance evaluation and the metrics used for it								
CO2	Apply	the te	chnique	s used for	r data ma	intenance.	R3			
CO3	Realiz	ze stror	ng virtua	alization o	concepts		R4			
CO4	Devel syster	lop tec ns	hniques	for eval	uating p	olicies for LUN masking, file	R4 & R5			
СО-РО	PO1	PO2	PO3	PO4	PO5					
Mapping										
CO1	2	-	3	3	2					
CO2	2	-	3	-	2	-				
CO3	-	-	3	-	2	-				
CO4	-	2	3	2	-	-				
Strong -3	Mediur	n -2	Weak	-1		1				
TEXT BOOK	S:									
1. Ulf Tr India,2	oppens 2013. IS	s, Raine SBN 9	er Erken 78-81-2	s and Wc 265-1832-	olfgang N •6	Iuller: Storage Networks Explain	ed, Wiley			
REFERENCE	BOOH	KS:								
<ol> <li>Robert Spalding: "Storage Networks The Complete Reference", Tata McGraw-Hill, 2011. ISBN 978-0-07-053292-2</li> </ol>										
Subsystems, Applications, Management, and File Systems, Cisco Press, 2005.ISBN-10: 1-										
3. Richar	-162-1. rd Bark	ISBN-	13: 978- Paul M	1-58705- lassiglia:	162-3 "Storage	Area Network Essentials "A Co	mplete Guide			
to und	to understanding and Implementing SANs", Wiley India, 2006.ISBN: 978-0-471-03445-2									
COURSE COORDINAT	OR:	Pro	f Nithya	.E						

	Course Title: Managing Big Data								
		Course Code:	No. of Credits: 3 : 0 : 0: 1	No. of lecture	hours/week :				
		SCS21	(L-T-P-S)	4					
- Allicon	MEOD A	Exam Duration :	CIE+ SEE = 30+70=100	Total No. of Co	ntact Hours :				
Aided By Ge	THA WELFARE TRUS	3 hours		52					
Co	urse		Description						
Obje	ctives:	1. To Understa	nd big data for business intellig	ence					
		2. To Learn bus	siness case studies for big data	analytics					
		3. To understan	d the big data technologies and	l security issues.					
		4. To manage E	Big data without SQL	a Hadoon and relat	ted tools				
		5. To understan	ang map-reduce analytics using						
Unit			Syllabus Content		No of Hours				
No			·						
1	Under	standing Big Data:	What is big data – why is	s it important? –	10				
	indust	y examples of big d	ata – web analytics – big data	and marketing –					
	fraud a	ind big data – risk and	d big data— big data and health	ncare – big data in					
2	Big d	ne – advertising and t ata Technologies a	nd Data Privacy and Ethics	• Introduction to	10				
-	Hadoo	p – open source tech	nologies – cloud and big data	– mobile business	10				
	intellig	gence – Crowd sourci	ng analytics – inter and trans f	irewall analytics -					
-	Big Da	ta Technology Terms- I	Data Size. Data Privacy and Ethics	<u>S.</u>					
3	Basics	<b>Of Hadoop:</b> Data fo	rmat – analyzing data with Had	doop – scaling out	11				
	svstem	(HDFS) – HDFS cor	ncepts – Java interface – data f	low – Hadoop I/O					
	– data	integrity – compres	ssion – serialization – Avro	– file-based data					
	structu	res							
	Exerci	ise 1 HDFS	<b>X</b> 11 C 1 4 4 4	•,• • • •1 ,					
	Start b	by reviewing HDFS.	You will find that its compose m. You will use the hadoon f	s command when					
	interac	ting with HDFS.	in. Tou win use the hudbop f	s command when					
	1. Rev	iew the commands av	ailable for the Hadoop Distribu	ited File System:					
	2. Cop	y file foo.txt from loc	al disk to the user's directory in	n HDFS					
	3. Get	a directory listing of t	the user's home directory in HI	DFS					
	4. Get a directory listing of the HDFS root directory								
	5. Display the contents of the HDFS file user/fred/bar.txt								
	6. Move that file to the local disk, named as baz.txt								
	7. Crea	ate a directory called i	nput under the user's home dir	ectory					
	8. Dele	the directory input	old and all its contents in HDF	S					
-		ing the copy by listing		· · · · · · · · · · · · · · · · · · ·	10				
4	Mapre	educe Applications:	MapReduce workflows – unit 1 anatomy of MapReduce ich r	tests with MRUnit	10				
	reduce	– YARN – failures in	n classic Mapreduce and YARN	N - job scheduling					

	– shuffle and sort – task execution – MapReduce types – input formats –	
	output formats	
	Exercise 2 ManReduce	
	1. Create a JOB and submit to cluster	
	2. Track the job information	
	3 Terminate the job	
	4 Counters in MR Jobs with example	
	5. Man only John and generic man examples	
	5. Map only Jobs and generic map examples	
	0. Distributed cache example	
	7. Combiners, Secondary sorting and Job chain examples	
5	Hadoop Related Tools: Hbase – data model and implementations – Hbase clients	11
U	– Hbase examples – praxis. ZooKeeper – ZooKeeper Service. Pig – Grunt – pig data	
	model – Pig Latin – developing and testing Pig Latin scripts. Hive – data types and	
	file formats – HiveQL data definition – HiveQL data manipulation – HiveQL	
	queries.	
	Exercise 3 – Extract facts using Hive	
	Hive allows for the manipulation of data in HDFS using a variant of SQL. This	
	makes it excellent for transforming and consolidating data for load into a relational	
	database. In this exercise you will use HiveQL to filter and aggregate click data to	
	build facts about user's movie preferences. The query results will be saved in a	
	staging table used to populate the Oracle Database. The moveapp_log_json table	
	contains an activity column. Activity states are as follows:	
	1. RATE_MOVIE	
	2. COMPLETED_MOVIE	
	3. PAUSE_MOVIE	
	4. START_MOVIE	
	5. BROWSE_MOVIE	
	6. LIST_MOVIE	
	7. SEARCH_MOVIE	
	8. LOGIN	
	9. LUGUUI 10. DICOMPLETE MONIE	
	10. INCOMPLETE_MOVIE	
	hive> SELECT * FROM movieapp_log_json LIMIT 5;	
	hive> CDEATE EXTEDNAL TADLE moviesnen log ison (	
	nive> CREATE EXTERNAL TABLE movie app_log_json (	
	movieId INT,	
	genreId INT,	
	time STRING,	
	recommended STRING,	
	activity INT,	
	rating INT,	
	price FLOAT	
	ROW FORMAT SERDE 'org.apache.hadoop.hive.contrib.serde2.JsonSerde'	
	LOCATION '/user/oracle/moviework/applog/';	
	hive> SELECT * FROM movieapp_log_json LIMIT 20;	
	hive> SELECT MIN(time), MAX(time) FROM movieapp_log_json	
	1. PURCHASE MOVIE	

Course		Description	<b>RBT</b> Levels					
	stream data into user sessions.							
	3. Add a GROUP BY statement to the sessionize.pig script to process the click							
	2. Group the log sample by movie and dump the resulting bag.							
	Reduce jobs which are launched at execution of a DUMP or STORE statement.							
	with the click stream data. Note: Pig Latin statements are assembled into Map							
	1. Start the Grunt shell and execute the following statements to set up a dataflow							
	types i	n Pig Latin, Data Bags and Tuples.						
	In this	exercise you will learn basic Pig Latin semantics and about the fundamental						
	execut	ion plan.						
		TRATE command will provide sample results for each stage of the						
	nandle	rig s foreact and LOAD, and GENERATE statements. The EXPLAIN and will show the execution plan for any Pig Latin script. As of Pig 0.10, the						
	results	As with Hive, aggregation occurs largely in the reduce tasks. Map tasks						
	possib	le, and much like Hive, temporary storage is used to hold intermediate						
		command. Job construction is optimized to exploit as much parallelism as						
	transla	ted into a sequence of Map Reduce jobs on the execution of any STORE or						
	implen	nenting data flows over data stored in HDFS. Pig Latin statements are						
	operati	ons. For these situations, Pig Latin provides a convenient way of						
	some a	analysis is better described as the flow of data through a series of sequential						
	While	the SQL semantics of HiveQL are useful for aggregation and projection,						
	Exerci	se 4 Extract sessions using Pig						
	4. Nex	t, load the results of the queries into the staging table.						
	staging	g table:						
	3. Loa	d the results of the previous two queries into a staging table. First, create the						
	recent	rating for each movie.						
	2. Writ	te a query to select the customer ID, movie ID, recommended state and most						
	null. O	nly include the first 25 rows.						
	colum	n into integers where 'Y' is 1 and 'N' is 0. Also, ensure GENREID is not						
	Purcha	sing movies. Use a CASE statement to transform the RECOMMENDED						
	comple	eting, or						
	1. Writ	te a query to select only those clicks which correspond to starting browsing						
	on the	size of the leftmost table						
	operati	ons are flexible: they can be performed in the reducer or manners depending						
	operati	ons occur in man tasks, while aggregation is handled by reducers. Join						
	frame	s in HDFS. HiveQL statements can be mapped to phases of the Map Reduce						
		a un LLINEY Llava () atotomounta con he menned to mhoges of the Men Deduce						

Outcomes		
CO1	Learn, analyze and interpret big data and few of its use cases from	R2,R3,R4
	selected business domains, Health Care, Fraud Detection and Advertising.	
CO2	Analyze and apply NoSQL in big dataapplications.	R3 and R4
CO3	Apply map-reduce analytics using Hadoop.	R3

CO4	Analyze and develop applications using Hadoop and its related tools. R4, R5								
CO5	Broadly educate students to know the impact of engineering on legal R5 and societal issues involved.								R5
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5				
CO1	1	-	2	3	2				
CO2	-	-	2	3	3				
CO3	-	2	3	3	2				
CO4	2	3	2	3	3	-			
CO5	-	2	2	3	3	-			
Strong -3	Medium	ı -2	Weak	x -1					
<ol> <li>TexT BOOK</li> <li>Tom White 0. 1327616</li> <li>Michael M Intelligenc 3, 7 – Unit</li> </ol>	<ol> <li>TEXT BOOKS:</li> <li>Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012. ISBN: 978-1-449-31152- 0. 1327616795. (Chapter 2, 3, 4- Unit3, Chapter 5,6,7 – Unit 4, Chapter 11, 12, 13, 14 – Unit 5)</li> <li>Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.(Chapter 1, 2– Unit 1, Chapter 3, 7 – Unit 2)</li> </ol>								
<ol> <li>REFERENCE BOOKS:</li> <li>Vignesh Prajapati, Big data analytics with R and Hadoop, SPD 2013.</li> <li>Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.</li> <li>Alan Gates, "Programming Pig", O'Reilley, 2011</li> <li>Eric Sammer, "Hadoop Operations", O'Reilley, 2012. ISBN-10: 1449327052; ISBN-13: 978-1449327057</li> <li>E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.</li> </ol>									
COURSE COORDINAT	COURSE Dr. Siddaraju COORDINATOR:								

		Course Title: Advanced Computer Networks							
Added By Goxt. of Karnataka		Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture ho	ours/week: 4				
		SCS22							
		Exam Duration : 3 hours	CIE + SEE = 30+70=100	Total No. of Co 52	ntact Hours :				
Co	urse		Description						
Obje	ctives:	1. T	o become familiar with differ	ent Computer Netw	vorks and it's				
			ayering.	-					
		$\begin{array}{c} 2. \\ 3. \\ \end{array}$	o understand various end to end nalyse of Concepts of fundame	d Network architect	ures.				
		<b>4.</b> T	o understand the network traffi	c, congestion, contr	olling and				
		re	esource allocation						
Unit			Syllabus Content		No of Hours				
No			Synabus Content		no or nours				
1	Found	ation: Building a N	letwork, Requirements, Persp	pectives, Scalable	11				
	Conne Servic	es Manageability P	ve Resource sharing, Suppo rotocol layering Performance	ort for Common Bandwidth and					
	Latenc	cy, Delay X Bandwid	th Product, Perspectives on Co	onnecting, Classes					
	of Lin	ks, Reliable Transmiss	sion, Stop-and-Wait, Sliding V	Vindow,	10				
2	Switch	ning, Source Rout	ing, Bridges and LAN	Switches, Basic	10				
	Interne	etworking (IP), What	t is an Internetwork ?, Servio	ce Model, Global					
	Addre Config	sses, Datagram Forw puration(DHCP). Err	varding in IP, Address Transl or Reporting(ICMP), Virtua	ation(ARP), Host 1 Networks and					
	Tunne	ls.	(101), (101)						
3	Interne	etworking- II: Netwo	ork as a Graph, Distance V	vector(RIP), Link	10				
	Auton	omous systems(BGP)	,	s, Routing among					
4	End-to	-End Protocols: S	imple Demultiplexer(UDP),	Reliable Byte	11				
	Stream Establ	n(ICP), End-to-End ishment and Termin	a Issues, Segment Form ation, Sliding Window Revi	nat, Connecting sited, Triggering					
	Transr	nission, Adaptive Re	transmission, Queuing Discip	lines, FIFO, Fair					
	Queui	ng, TCP Congestion	n Control, Additive Increas	e/ Multiplicative					
5	Conge	stion Control and	Resource Allocation Cong	estion-Avoidance	10				
	Mechanisms, DEC bit, Random Early Detection (RED), SourceBased								
	Conge	Stion Avoidance. SMTP, POP, IMAP, MI	ne Domain Name System ME),World Wide Web(HTTP).	(DNS),Electronic					
<u> </u>	(<		,	,					
Cou	irse		Description		<b>RBT Levels</b>				
Oute	omes								
	CO1	Able to classify netw	ork services, protocols and arc	hitectures, explain	R3, R4				
	why they are layered.								

CO2	<b>CO2</b> Choose key Internet applications and their protocols, and apply to									
	develo	develop their own								
	Applic	Applications (e.g. Client Server applications, Web Services) using the								
	socket	s API.								
CO3	Devel	op effe	ective co	ommunic	ation me	chanisms using techniques like	R5			
	conne	ction e	stablish	ment. au	euing the	eorv. recoverv Etc.				
CO4	Interp	ret var	ious coi	ngestion of	control te	chniques.	R3			
	1									
CO5	Analy	se Net	work tra	affic, con	gestion c	ontrol and resource allocation	R4			
							1			
СО-РО	PO1	PO2	PO3	PO4	PO5					
Mapping										
<u> </u>			3	2	2	-				
	-	-			5					
CO2	-	2	3	3	2					
			2	2	1	-				
CO3	-	-	3	3						
CO4	-	-	3	3	1					
Strong -3	Mediun	n -2	Weak	x -1		1				
ТЕХТ ВООК	S:									
1. Larry	Peterso	n and	Bruce S	5 Davis "	'Compute	er Networks : A System Approach	h" 5th Edition			
Elsevi	er -201	4 ( ISE	BN -13 9	978-0123	850591)					
DEFEDENCE		<u>`</u>			,					
KEFERENCE	L BOOK	72:								
1) Dougl	as E C	omer.	"Interne	etworking	y with T	CP/IP. Principles. Protocols and	Architecture"			
6th Ec	lition, P	PHI – 2	014 (IS	BN - 978	013187671	2)				
2) Uvless	s Black	"Com	nuter N	etworks.	Protocol	S. Standards and Interfaces" 2nd	Edition – PHI			
(ISBN	(ISBN - 9780130908612)									
3) Behrouz A Forouzan "TCP/IP Protocol Suite" 3th Edition – Tata McGraw-Hill (ISBN –13										
- 978-	-978-0.07-060004 - 1)									
COURSE		Pro	ff Sham	shekhar l	Patil					
COORDINAT	COORDINATOR:									

State of the state	Course Title: Advanced Algorithms							
	Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture hours/week : 4					
	SCS23	(L-T-P)						
HELDI LEVEL RECORD	Exam Duration :	CIE+ SEE = 30+70=100	Total No. of Contact Hours :					
Aided By Govt. of Karnataka	3 hours		52					

Course	Description						
Objectives:	1. To learn implementing iterative and recursive optimized solutions						
	2. To learn the graph search algorithms.						
	3. To study network flow and linear programming problems.						
	4. To learn the hill climbing and dynamic programming design techniques.						
	5. To develop recursive backtracking algorithms. To get an awareness of NP completeness and randomized algorithms						

Unit No		Syllabus Content	No of Hours				
1	Revie notatio Soluti recurr Aggre	11					
2	<b>Graph Algorithms:</b> Bellman - Ford Algorithm; Single source shortest paths in a DAG; Johnson's Algorithm for sparse graphs; Flow networks and Ford- Fulkerson method; Maximum bipartite matching.						
3	<b>Number -Theoretic Algorithms</b> : Elementary notions; GCD; Modular Arithmetic; Solving modular linear equations; The Chinese remainder theorem;						
4	<b>String-Matching Algorithms:</b> Naïve string Matching; Rabin - Karp algorithm; String matching with finite automata; Knuth-Morris-Pratt algorithm; Boyer – Moore algorithms						
5	5 Probabilistic and Randomized Algorithms: Probabilistic algorithms; Randomizing deterministic algorithms, Monte Carlo and Las Vegas algorithms;						
Car							
Outc	urse comes	Description	KB1 Levels				
	CO1	Analyze, Design and apply iterative and recursive algorithms	R3, R4,R5				

CO2	Design applic	R4 and R5						
CO3	Design	R4, R5						
CO4	To app applic	R2, R3						
CO5	Desig	R4,R5						
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5			
CO1	-	-	3	3	3	-		
CO2	-	-	3	3	3	-		
CO3	-	-	3	3	3	-		
CO4	-	1	3	2	3			
C05	-	1	3	2	3			
Strong -3 Medium -2 Weak -1								
TEXT BOOK	S:							
<ol> <li>T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd Edition, Prentice-Hall of India, 2010. ISBN:9780262033848</li> </ol>								
REFERENCE BOOKS:								
<ol> <li>Ellis Horowitz, SartajSahni, S.Rajasekharan: Fundamentals of Computer Algorithms, 2nd Edition, Universities press, 2007, ISBN 8173716129, 9788173716126</li> </ol>								
COURSE Dr. K R Shylaja COORDINATOR:								

	Course Title: Computer Networks And Algorithms Laboratory								
		Course Code:	No. of Credits: 0 : 0 : 2	No. of lecture hours/week :					
		SCS26L	(L-T-P)	3					
		Exam Duration :	CIE+ SEE = 30+70=100	Total No. of Contact Hours :					
Aided By Govt.	of Karnataka	<b>5</b> nours		10					
Course Obiectives:		Description							
		<ol> <li>To understand concepts of fundamental protocols.</li> </ol>							
		<ol> <li>To understand the concepts of networks using simulation tool.</li> <li>To understand the network traffic conception controlling and recourse.</li> </ol>							
		allocation.	e network traine, congestion, e						
		Dout A.	Computer Networking Labor	atowy					
1	Write	e a program to transfe	r the contents of a requested file	e from server to the client using					
	TCP/IP Sockets (using TCP/IP Socket programming).								
2	Write a program to implement Link State Routing (Dijkstra Algorithm)								
2									
5	Write a program for implementing the error detection technique while data transfer in Unreliable network code using CRC (16-bits) Technique.								
4	Simulate a 3 node point to point network with duplex links between them. Set the Queue								
	and vary the bandwidth and find the number of packets dropped.								
5	Simulate a four-node point-to-point network, and connect the links as follows: $n0 > n2$ ,								
	<ul> <li>&gt;n2 and n2-&gt;n3. Apply TCP agent changing the parameters and determine the number of</li> </ul>								
	packets sent/received by TCP/UDP								
			rt B: Algorithms Laboratory	-11					
	Design, develop, and write a program to implement the Bellman-Ford algorithm and determine its performance. Give its applications.								
2	Desig prima	Design, develop, and write a program to implement a Monte Carlo algorithm to test the primality of a given integer and determine its performance.							
3	Desig appro	Design, develop, and write a program to solve string matching problem using naïve approach and the KMP algorithm. Compare their performances.							
4	Design, develop, and write a program to solve String matching problem using Finite Automata and determine its performance.								

5 Design, develop, and write a program to solve String matching problem using Robin Karp algorithm and determine its performance.								
Course Outcomes		RBT Levels						
C01	Classi they a	R4, R5						
CO2	Choose key Internet applications and their protocols, and apply to develop their own applications (e.g. Client Server applications, Web Services) using the sockets API.R3 a							
CO3	Under	Understand the network using Simulations tool.						
CO4	Under	R5						
CO5	Design and apply graph search algorithms.						R3 & R5	
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5			
CO1	2	2	3	2	3			
CO2	1	2	3	2	3	-		
CO3	2	2	3	2	3	-		
CO4		2	3	3	3			
CO5	2	2	3	3	3			
Strong -3 Medium -2 Weak -1								
COURSEDr. K R ShylajaCOORDINATOR:								

	Course Title: Machine Learning Techniques								
Alded By Govt. of Karnataka		Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture ho	ours/week: 4				
		SCS241	(L-T-P)						
		Exam Duration : 3 hours	CIE + SEE = 30+70=100	Total No. of Contact Hours : 52					
Co	urse	Description							
Obje	ctives:	1. To understan							
		2. To understan	les						
		3. To understan 4 To understan							
		5. To understan	d the linear-Gaussian models	,					
		6. To understan	d the graphical models and Infe	rence methods					
TL •4	1		Selleberg Correct d		N CTI				
Unit No		Syllabus Content							
1	Introdu	uction ,Example: Po	olynomial Curve Fitting, Pro	bability Theory,	11				
	Probab	oility densities, Exp	pectations and covariance's, p	robabilities, The					
	Gaussi	an distribution, Cur	ve fitting re-visited, Bayesia	in curve fitting,					
	Model Minim	Selection, The C	Curse of Dimensionality, D	ecision Theory,					
	reject option. Inference and decision Loss functions for regression								
	Information Theory, Relative entropy and mutual information.								
2	Proba	bility Distributions,	Binary Variables, The bet	a distribution ,	10				
	Multin	omial Variables, The	Dirichlet distribution ,The Gaus	ssian Distribution					
	Conditional Gaussian distributions, Marginal Gaussian distributions, Bayes'								
	theorem for Gaussian variables, Maximum likelihood for the Gaussian.								
3	Sequential estimation, Bayesian inference for the Gaussian, Student's t- distribution, Periodic variables, Mixtures of Gaussians, Exponential Family, Manimum likelihood and sufficient statistics. Conjugate using Name10								
	informative priors. Nonparametric Methods. Kernel density estimators								
	Nearest-neighbour methods.								
4	Neural	Networks, Feed-	forward Network Functions	, Weight-space	10				
	symmetries Network Training, Parameter optimization, Local quadratic								
	approximation, Use of gradient information, Gradient descent optimization,								
	Efficie	ncy of backpropagati	on, The Jacobian matrix.	1					
5	Graphi	cal Models, Bayesia	n Networks, Example: Polyn	omial regression	11				
	Genera	ative models, Discrete	variables Linear-Gaussian mo	dels, Conditional					
	Indepe	Independence Three example graphs, separation, Markov Random Fields,							
	Conditional independence properties, Factorization properties, Illustration:								
	Image	ae-noising to dire	cted graphs Interence in Gi	aphical Models,					
Infere max-s	nce on um algo								
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Course Outcomes	Description								
CO1	Analyz	ze and y	Apply	the curve	e fitting te	echniques and Probability	R3, R4		
CO2	Point	out the	salient	features	of Gauss	ian Distribution	R1, R2		
CO3	Under	stand a	and app	ly the sta	tistics me	ethods	R3, R6		
CO4	Under	stand a	and imp	lement 1	Neural ne	twork concepts	R5		
CO5	Analy	ze and	apply l	inear-Ga	ussian mo	odels	R3,R4		
CO6	Choos	e and	differen	tiate gra	phical m	odels and Inference methods	R4, R6		
	I								
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5				
CO1	-	-	3	2	2				
CO2	-	-	3	2	2				
CO3	-	2	3	2	2				
CO4	-	2	3	2	2				
CO5	-	-	3	2	2				
CO6	-	-	3	2	2				
Strong -3	Mediun	n -2	Weak	<b>-1</b>	·				
TEXT BOOK	S:								
1. Christoph 03873	er M. B Pu 10738	ishop' blishe	s <i>Patter</i> r: Sprir	<i>'n Recogn</i> nger Verl	<i>nition and</i> ag, Editio	<i>d Machine Learning</i> , on: 1st, 2010, ISBN: 9780387310	)732,		
<ul> <li><b>REFERENCE BOOKS:</b></li> <li>1. Tom M. Mitchell, "Machine Learning", McGraw-Hill Education (INDIAN EDITION), 2013, ISBN: 0070428077</li> <li>2. Ethem Alpaydin, "Introduction to Machine Learning", 2nd Ed., PHI Learning Pvt. Ltd., 2013., ISBN: 9780262012430</li> </ul>									
COURSE COORDINAT	OR:	Dr.	M V Vi	jayakuma	ar				

		Course Title: Computer Vision								
SHAR INST	TUTE OF IFC	Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture ho	ours/week: 4					
a + Dr. AMB	AUDGY -	SCS242	(L-T-P)							
Alucut	MEGD)	Exam Duration :	CIE+ SEE = 30+70=100	Total No. of Co	ntact Hours :					
Aided By G	ovt. of Karnataka	3 hours		52						
	urse ctives:	Description								
		1. To review in	age processing techniques for	computer vision						
		2. To understan	d Shape and region analysis	nnlications to detect	lines circles					
		ellinses	iu fiougii ffaiisiofiii aliu its a	pplications to detect	mics, cheres,					
		4. To understan	d three-dimensional image and	alvsis techniques						
		5. To understan	d motion analysis	J 1						
		6. To study son	ne applications of computer vi	sion algorithms						
Unit			Svllabus Content		No of					
No			v		Hours					
1	CAMI	ERAS: Pinhole Came	eras, Radiometry – Measurir	ng Light: Light in	11					
	Space,	, Light Surfaces, Imp	portant Special Cases, Sourc	es, Shadows, And	11					
	Shadır	ng: Qualitative Radior	netry, Sources and Their Effec	ets, Local						
2	Shadir Shadir	ng Models, Application								
	Repres	senting Color. A Mod	11							
	color.	senting color, A woo	der för innage Color, Surface	color nom mage						
3	Linear	· Filters: Linear Fil	ters and Convolution. Shift	Invariant Linear						
	System	ns, Spatial Frequency	and Fourier Transforms, Sam	pling and Aliasing,	10					
	Filters	as Templates, Edge I	Detection: Noise, Estimating D	Derivatives						
4	Detect	ing Edges, Texture:	Representing Texture, Analys	sis (and Synthesis)						
	Using	Oriented Pyramids,	Application: Synthesis by	Sampling Local	10					
	Model	s, Shape from Texture	2.							
5	Dynan	nic Models: Trackin	g as an Abstract Inference	Problem, Linear	10					
	Dynan	nic Models, Kalman	Filtering, Data Association,	Applications and	10					
	Exam	pies.								
Course Description DET Law										
Outc	omes		Description		NDI LEVEIS					
	CO1	Implement fundamer	ntal image processing techniqu	ies required for	R5					
		computer vision		Ĩ						
	CO2	Perform shape analys	sis		R3 and R4					
	CO3	Implement boundary	tracking techniques		R4					

CO4	Apply chain codes and other region descriptors	R3
CO5	Implement motion related techniques.	R4
CO6	Develop applications using computer vision techniques.	R5

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5
CO1	-	-	3	2	2
CO2	-	-	3	2	2
CO3	-	2	3	2	2
CO4	-	2	3	2	2
CO5	-	-	3	2	2

Weak -1

# Strong -3 Medium -2

#### **TEXT BOOKS:**

1. David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning (Indian Edition) ISBN-13: 978-0136085928 ISBN-10: 013608592X

## **REFERENCE BOOKS:**

1. E. R. Davies: Computer and Machine Vision – Theory, Algorithms and Practicalities, Elsevier (Academic Press), 4th edition, 2013.ISBN: 9780123869081

COURSE	Prof Nithya. E
COORDINATOR:	

		Course Title: Cyber Security							
ALAR INST	TUTE OF TEC	hours/week :							
AL OL ANDE	MOLOGY - m	SCS243 (L-T-P) 4							
-Sunching the	HEOD)	<b>Exam Duration :</b>	ntact Hours :						
Aided By G	d By Govt. of Karnataka 52								
Co	urse		1						
Obje	ctives:	To provide an under	standing Computer forensics	s fundamentals					
		2. To analyze variou	s computer forensics techno	logies					
		3. To provide compu	iter forensics systems						
		4. To identify metho	ds for data recovery.						
		5. To apply the meth	ods for preservation of digit	al evidence.					
Unit			Syllabus Contont		No.of				
No			Synabus Content		Hours				
1	Comp	uter Forensics Fund	amentals		10				
	Introd	uction to Computer	Forensics, Use of Compute	er Forensics in Law					
	Enforc	ement, Computer	Forensics Assistan	ce to Human					
	Resour	rces/Employment Pro	ceedings, Computer Forensi	cs Services, Benefits					
	of Pro	fessional Forensics M	ethodology.						
2	Types	of Computer Forens	sics Technology		11				
	Types	of Military Comp	outer Forensic Technolog	y, Types of Law					
	Enforc	ement: Computer For	ensic Technology, Types of	f Business Computer					
	Forens	ic Technology, Spec	ialized Forensics Technique	es, Hidden Data and					
	How to	o Find It, Spyware and	d Adware.	Data from Daing					
	Comp	romised Internet	Tracing Methods Security	rity and Wireless					
	Techn	ologies .Avoiding Pitf	alls with Firewalls Biometr	ic Security Systems.					
3	Types	of Computer Forens	sics Systems		11				
	Interne	et Security Systems,	Intrusion Detection System	ns, Firewall Security					
	Systen	ns, Storage Area N	letwork Security Systems	, Network Disaster					
	Recov	ery Systems, Public	Key Infrastructure Systems	s, Wireless Network					
	Securi	ty Systems.	tu Sustama Instant Mass	aging (IM) Sagurity					
	Systen	ie Eliciyption Securi ns Net Privacy Sys	tems Identity Management	aging (nvi) Security					
	.Identi	ty Theft . Biometric S	ecurity Systems.Homeland	Security Systems					
4	Data I	Recovery			10				
	Data F	Recovery Defined ,Da	ta Backup and Recovery ,Th	ne Role of Backup in					
	Data	Recovery ,The Data	a-Recovery Solution ,Hidi	ng and Recovering					
	Hidden	n Data	-4- S-'						
	Evidel Why C	nce Collection and D	ata Seizure	Types of Evidence					
	The F	Sules of Evidence V	olatile Evidence General I	Procedure Collection					
	and A	chiving, Methods of (	Collection, Artifacts.						

5	Dupli	cation	and P	reservat	tion of D	igital Ev	ridence	10		
	Preser	ving th	ing the Digital Crime Scene, Computer Evidence Processing Step.							
	Evider	ntial Au	ter intage vertication and Authentication special Needs of ial Authentication Practical Considerations							
Cou	ırse					Descript	ion	<b>RBT Levels</b>		
Outc	omes									
	CO1	Under	stand	the defin	nition of	computer	forensics fundamentals.	R3		
	CO2	Descri	ibe the	types o	f comput	ter forens	ics technology.	R1 and R2		
	CO3	Analy	ze var	ious con	nputer fo	rensics s	ystems.	R4		
	CO4	Illustra seizur	ate the e.	method	ls for data	a recover	y, evidence collection and data	R2		
	CO5	Summ	arize (	duplicat	ion and p	oreservati	on of digital evidence.	R6		
	0	DO1	DO1	DO2	DO4	DO5				
СО-Р Марр	0 ing	PUI	POZ	PO3	PO4	POS				
	CO1	-	-	3	3	-	-			
	CO2	-	-	3	3	1	-			
	CO3	-	-	3	3	2	-			
	CO4	1	-	3	3	2	-			
	CO5	1	-	3	3	2				
Strong	g -3	Mediun	n -2	Weak	-1	·	-			
TEXT	BOOK	S:								
1. Joł Charle	nn R. es,River	Vacca, Media	Comp , 2005	outer Fo ISBN-1	orensics: 3: 978-1	Comput 5845038	ter Crime Scene Investigation, 97	2nd Edition,		
<ul> <li><b>REFERENCE BOOKS:</b></li> <li>1. ChristofPaar, Jan Pelzl, Understanding Cryptography: A Textbook for Students and Practitioners, 2nd Edition, Springer's, 2010ISBN 978-3-642-04101-3</li> <li>2. Ali Jahangiri, Live Hacking: The Ultimate Guide to Hacking Techniques &amp; Countermeasures forEthical Hackers &amp; IT Security Experts, Ali Jahangiri, 2009ISBN-13: 978-0984271504</li> <li>3. Computer Forensics: Investigating Network Intrusions and Cyber Crime (Ec-Council Press Series:Computer Forensics), 2010ISBN-13: 978-1435483521</li> </ul>										
COUR COOR	COURSE Prof Madhu B COORDINATOR:									

		Course Title: Information And Network Security							
SUR INST	TUTE OF TECHN	Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture ho	ours/week: 4				
B + Dr. AM	OLOGY · m	SCS251	(L-T-P)						
Aided By Ge	Star The Welf Are Thus	Exam Duration : 3 hours	CIE+ SEE = 30+70=100	Total No. of Con 52	ntact Hours :				
Car			Description						
Course         Description           Objectives:         1. To understand the fundamentals of Cryptography           2. To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.           3. To understand the various key distribution and management schemes.           4. To understand how to deploy encryption techniques to secure data in tran across data networks           5. To design security applications in the field of Information technology									
Unit	Syllabus Content No								
1	NoHours1Classical Encryption Techniques: Symmetric Cipher Model, Cryptography, Cryptanalysis and Brute-Force Attack, Substitution Techniques, Caesar Cipher, Mono alphabetic Cipher, Play fair Cipher, Hill Cipher, Polyalphabetic Cipher, One TimePad. Block Ciphers and the data encryption standard: Traditional block Cipher structure, stream Ciphers and block Ciphers, Motivation for the feistel Cipher structure, the feistel Cipher, The data encryption standard, DES encryption, DES decryption, ADES example, 								
2	Public-Key Cryptography and RSA: Principles of public-key cryptosystems.Public key cryptosystems. Applications for public-key cryptosystems,requirements for public-key cryptosystems. public-key cryptanalysis. TheRSA algorithm, description of the algorithm, computational aspects, thesecurity of RSA. Other Public-Key Cryptosystems: Diffie-hellman keyexchange, The algorithm, key exchange protocols, man in the middle attack,Elgamal Cryptographic systems.								
3	Key M Symm session contro encryp keys,	Management and Di etric encryption, A ke n key lifetime, a tran l, controlling key usag tion, simple secret l public announcemen	stribution: Symmetric key d y distribution scenario, Hierarc sparent key control scheme, I ge, Symmetric key distribution key distribution scheme, distri- t of public keys, publicly av	listribution using chical key control, Decentralized key using asymmetric ibution of public railable directory,	10				

	public	ublic key authority, public keys certificates, X-509 certificates.								
4	Wireld Wireld device alliand IEEE key m	Wireless network security: Wireless security, Wireless network threats Wireless network measures, mobile device security, security threats, mobil device security strategy, IEEE 802.11 Wireless LAN overview, the Wi-F alliance, IEEE 802 protocol architecture. Security, IEEE 802.11i services IEEE 802.11i phases of operation, discovery phase, Authentication phase key management phase, and protected data transfer phase.								
5	<ul> <li>5 Electronic Mail Security: Pretty good privacy, notation, operational; description, S/MIME, RFC5322, Multipurpose internet mail extensions, S/MIME functionality, S/MIME messages, S/MIME certificate processing, enhanced security services, Domain keys identified mail, internet mail architecture, E-Mail threats.</li> </ul>									
Coi	irse					Descript	ion	<b>RBT</b> Levels		
Outc	omes					•				
	CO1	Analy able to	ze the o desig	vulnera n a secu	bilities in arity solu	n any con	nputing system and hence be	R4,R5		
	CO2	Identi	fy the	security	issues ir	n the netw	vork and resolve it.	R2		
	CO3	Evalu theore	ate sec etical	urity m	echanism	ns using r	igorous approaches, including	R4		
	CO4	Comp securi	are and	d Contra	ast differ	ent IEEE	standards and electronic mail	R4		
		1	<u> </u>							
CO-P	0	PO1	PO2	PO3	PO4	PO5				
Mapp	ing			2	-		_			
	COI	-	-	3	2	2				
	CO2	-	-	3	2	2				
	CO3	-	2	3	2	2	-			
	CO4	-	2	3	2	2				
Strong	g -3	Mediur	n -2	Weak	x -1	·				
TEXT	BOOK	S:								
1.	1. William Stallings: Cryptography and Network Security, Pearson 6th edition. 2013ISBN-10: 0133354695ISBN-13: 978-0133354690									
REFE	RENCE	BOOH	KS:							
1.	V k Pa 97881	achghai 203508	re: Cry 323	ptograp	hy and Ir	nformatio	on Security, PHE,2013.ISBN8120	350820,		
COUR COOF	COURSE Prof Nithya E COORDINATOR:									

	Course Title: Soft Computing									
SUBINST	TUTE OF TRON	Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture ho	ours/week: 4					
a + D. Alle	IOLOGY · m	SCS252 (L-T-P)								
Alded By Ge	and a state of the	Exam Duration : 3 hours	ntact Hours :							
	urse		Description							
Obje	ctives:	1. To learn the	key aspects of Soft computing							
		2. To know ab	out the components and build	ling block hypothes	sis of Genetic					
		algorithm.	algorithm. <b>3</b> To gain insight onto Nouro Euggy modeling and control							
		<b>4.</b> To gain know	vledge in machine learning three	ough Support vector	machines					
Unit No			Syllabus Content		No of Hours					
1	Introd	luction to Soft comp	outing: Neural networks, Fuz	zy logic, Genetic	11					
	algorit	hms, Hybrid systems	and its applications. Fundar	mental concept of						
	ANN,	Evolution, basic Mo	del of ANN, Terminologies u	ised in ANN, MP						
			1.1 1 .1 .1	<b>D</b> 1	11					
2	Adapt	tive linear neuron, Mu ork (Theory Archited	altiple adaptive linear neurons,	learning factors	11					
	testing	and applications of a	ll the above NN models).	ieuning iueccis,						
3	Introd	luction to classical set	s and fuzzy sets: Classical relat	tions and fuzzy	10					
	relatio	ns, Membership funct	ions.	-						
4	Fuzzy	decision making, and	applications.		10					
5	Ganati	is algorithms. Introdu	ution Dasia anomationa Trad	itional algorithma	10					
5	Simple	e GA General gener	tic algorithms, The schema	theorem, Genetic	10					
	progra	mming, applications.								
Cor			Description		DDT L avala					
Outc	comes		Description		KDI Levels					
	CO1	Analyze the basics of	f soft computing, ANN and Ter	rminologies to	R3,R4					
		relate and understand	the real time problems							
	CO2	Apply supervised an	d unsupervised learning repres	sentations for	R3 and R4					
		analyzing real time p	roblems							
	CO3	Analyze and adopt fu	zzy logic in implementing sof	t computing	R4					

	applications.									
CO4	Analyze and apply genetic algorithms to solve the optimization problems							tion	R3, R4	
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5					
CO1	-	-	3	3	3					
CO2	-	-	3	3	3					
CO3	1	3	3	2	2					
CO4	2	2	3	3	2					
Strong -3	Mediun	n -2	Weak	1						
TEXT BOOK	S:									
1. Principles 97881265	of S 27410,	oft cc 2011 (	omputin Chapter	g, Shiva rs 1, 2, 3(	nandam, Upto 3.5)	, Dee 5), 7, 8	epa S. , 9, 10,	N Wil 13, 15 (u	ey India, upto 15.6 d	) ISBN 13: & 15.9,15,10)
REFERENCE	BOOK	KS:								
Neuro-fuzzy and soft computing, J.S.R. Jang, C.T. Sun, E. Mizutani, Phi (EEE edition), 2012, ISBN 0-13-261066-3										
COURSE COORDINAT	COURSE COORDINATOR:									

		Course Title: Neural Networks							
ALA WETITUTE OF ICC.		Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture ho	ours/week : 4				
ALE - DI-AM	DLOGY - m	SCS253	(L-T-P)						
A COLOR AND A COLO		Exam Duration :	CIE + SEE = 30+70=100	Total No. of Co	ntact Hours :				
Aided By Ge	ovt. of Karnataka	5 11001 5		52					
	urse		Description						
Obje	ctives:	1. To understan	orithms.						
		2. To understand the perceptron convergence theorem, and the relationship between the perceptron and the Bayes classifier operating in a Gaussian Environment.							
		3. To understan organization.	d SOM development which fol	lows the principles	of Self-				
		4. To understan	d dynamical systems and HOP	FIELD Model					
Unit	nit Svllabus Content								
No					Hours				
1	1INTRODUCTION - what is a neural network? Human Brain, Models of a10Neuron, Neural networks viewed as Directed Graphs, NetworkArchitectures, Knowledge Representation, Artificial Intelligence and NeuralNetworks LEARNING PROCESS 1 – Error Correction learning, Memorybased learning, Hebbian learning.								
2	2 LEARNING PROCESS 2: Competitive, Boltzmann learning, Credit Assignment Problem, Statistical nature of the learning process, SINGLE LAYER PERCEPTRONS – Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perception – convergence theorem, Relation between perception and Bayes classifier for a Gaussian Environment.								
3	3 MULTILAYER PERCEPTRON – Back propagation algorithm XOR 11 problem, Heuristics, Output representation and decision rule, Computer experiment, feature detection, BACK PROPAGATION - back propagation and differentiation, Hessian matrix, Generalization, Cross validation, Network pruning Techniques, Virtues and limitations of back propagation learning, Accelerated convergence, supervised learning.								
4	SELF Self-or simula Hierar	<b>ORGANIZATION</b> ganization map, SON tions, learning vector chal Vector quantilize	<b>MAPS</b> – Two basic feature I algorithm, properties of feature or quantization, Adaptive pate or, contexmel Maps.	mapping models, are map, computer ter classification,	10				

5	NEURO DYNAMICS – Dynamical systems, stability of equilibrium states,	10
	attractors, neuro dynamical models, manipulation of attractors' as a recurrent	
	network paradigm, HOPFIELD MODELS – Hopfield models, computer experiment.	

Course Outcomes	Description	RBT Levels
CO1	Choose the learning techniques with basic knowledge of Neural networks.	R6
CO2	Apply effectively neural networks for appropriate applications.	R3
CO3	Apply Bayer's techniques and derive effectively the learning rules.	R3
CO4	Design organized topographic maps with several useful properties.	R5

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5
CO1	-	-	3	2	2
CO2	-	-	3	2	2
CO3	-	2	3	2	2
CO4	-	2	3	2	2
Strong -3	Mediur	n -2	Weak	-1	

## TEXT BOOKS:

Neural networks a comprehensive foundations, Simon Haykin, Pearson Education 2nd Edition 2004ISBN 10: 0023527617 ISBN 13: 9780023527616

#### **REFERENCE BOOKS:**

1. Artificial neural networks - B.Vegnanarayana Prentice Hall of India P Ltd 2005ISBN:8120312538

2. Neural networks in Computer intelligence, Li Min Fu TMH 2003 ISBN 0079118178, 9780079118172

3. Neural networks James A Freeman David M Skapura Pearson Education 2004 ISBN 10: 0201513765 ISBN 13: 9780201513769

COURSE COORDINATOR:	Dr. Siddaraju

		Course Title: Res	earch Methodology					
OUR INST	TUTE OF TECH	Course Code:	No. of Credits: 2 : 0 : 0	No. of lecture ho	ours/week: 4			
2 • D. AND	MOLOGY - m	RM27	(L-T-P)					
Aided By Govt. of Karnataka		Exam Duration : 3 hours	CIE + SEE = 30+70=100	Total No. of Co 26	ntact Hours :			
		1						
Cou Obied	urse ctives:	1 Have a basia	Description	an principles of a	untitativa and			
Objectives.		<ol> <li>Have a basic qualitative res</li> <li>Identify the o report.</li> <li>Choose the m question</li> <li>Gain a overvie analysis</li> </ol>	<ol> <li>nave a basic understanding of the underlying principles of quantitative and qualitative research</li> <li>Identify the overall process of designing a research study from its inception to its report.</li> <li>Choose the most appropriate research method to address a particular research question</li> <li>Gain a overview of a range of quantitative and qualitative approaches to data analysis</li> </ol>					
Unit No			Syllabus Content		No of Hours			
1	Unit – Resear introdu Review Second second	<b>I, Overview of Rese</b> rch and its types, id uction to different rese w. Basic principles dary Data, methods lary data, designing qu	arch lentifying and defining resear earch designs. Essential constitu of experimental design, Pr of primary data collection, uestionnaires and schedules.	ch problem and ents of Literature imary data and classification of	08			
2	Unit – II, Sampling Methods       06         Probability sampling: simple random sampling, systematic sampling, stratified sampling, cluster sampling and multistage sampling. Non-probability sampling: convenience sampling, judgment sampling, quota sampling. Sampling distributions       06							
3	Unit – III, Processing and analysis of Data       06         Statistical measures and their significance: Central tendencies, variation, skewness, Kurtosis, time series analysis, correlation and regression, Testing       06         of Hypotheses: Parametric (t and Chi Square)       06							
4	Unit- Essent Signiff the Re Plagia	-IV, tial of Report writing icance of Report Writi search Report, Ethica rism, Publishing.	<b>g and Ethical issues</b> : ing, Different Steps in Writing l l issues related to Research, Pla	Report, Layout of giarism and self-	06			
Cou Outc	urse omes		Description		RBT Levels			
CO1       Describe a range of quantitative and qualitative research designs and identify the advantages and disadvantages associated with these designs       R1, R2								

CO2	Choose appropriate quantitative or qualitative method to collect data							R6
CO3	Analy		R4					
CO4	4 Design an appropriate mixed-method research study to answer a research question							R5
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5			
CO1	-	-	3	2	2			
CO2	-	-	3	2	2	-		
CO3	-	2	3	2	2	-		
CO4	-	2	3	2	2			
Strong -3	Mediu	m -2	Weal	x -1	1			
REFERENCI	E BOO	KS:						
1. Krishn Pearso	aswami on Educ	i, K.N., ation: N	Sivakum ew Delh	nar, A. I. ni.	and Math	irajan, M., Management	Research	Methodology,
2. Kotha Publis	ri C.R., hers, 2 <sup>n</sup>	Resea d editior	rch Me າ	thodolog	y Methoo	ls and techniques by,	New Age	e International
3. Levin,	R.I. and	l Rubin,	D.S., Sta	itistics for	Managen	nent, 7th Edition, Pearsor	education	n: New Delhi.

COURSE	Dr. Chandrakanth poojari
<b>COORDINATOR:</b>	

		Course Title: Internet of Things						
OVAR INST	TUTE OF TRO	Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture	hours/week :			
Aldel By Govt. of Karnataka		SCS41	(L-T-P)	4				
		Exam Duration : 3 hours	CIE+ SEE = 30+70=100	Total No. of Co 52	Contact Hours :			
Col	Course Description							
Obje	ctives:	1. To understar Logical desig	id the basic concepts of IoT w	vith overview of its	Physical and			
		2. To understan	d and analyze different IoT ena	bling Technologies	5			
		3. To understan	d different IoT levels and their	deployment templa	ites			
		4. To understan	d application of 101 for different	nt domains. defined networking	and Network			
		virtualization	function from IoT perspective					
		<b>6.</b> To discuss an	nd analyze a case study for Env	ironment monitorir	ig using IoT			
	1		~					
Unit No			Syllabus Content		No of Hours			
1	INTRODUCTION & CONCEPTS: Definition & Characteristics of IoT,10Physical Design of IoT: Things in IoT, IoT Protocols10Logical Design of IoT: IoT Functional Blocks, IoT Communication10Models, IoT Communication APIs10IoT Enabling Technologies: Wireless Sensor Networks, Cloud Computing,10Big Data Analytics Communication Protocols Embedded Systems10							
2	IoT L Level-	evels & Deploymer 3, IoT Level-4, IoT L	<b>It Templates:</b> IoT Level-1, evel-5,IoT Level-6	IoT Level-2, IoT	11			
	<b>Doma</b> Applia	in Specific IoTs: nces,, Intrusion Detec	<b>Home Automation</b> : Smart etion, Smoke/Gas Detectors.	Lighting, Smart				
	Cities: Monito	Smart Parking, Sn pring, Surveillance, Er	nart Lighting, Smart Roads, mergency Response.	Structural Health				
	<b>Envir</b> Polluti	onment: Weather Mon Monitoring, Fores	Monitoring, Air Pollution M t Fire Detection, River Floods I	onitoring, Noise Detection.				
3	Doma Energ Retail Logist Monito Agricu Indust	in Specific IoTs.: ( C y: Smart Grids, Rener : Inventory Managem ics: Route Generation pring, Remote Vehicle alture: Smart Irrigation try: Machine Diagnos	ontd) wable Energy Systems, Prognos ent, Smart Payments, Smart Ve on & Scheduling, Fleet Tra e Diagnostics. on, Green House Control. sis & Prognosis, Indoor Air Qua	stics. ending Machines. lecking, Shipment ality Monitoring.	11			
4	IoT ar	<b>d M2M</b> : Difference	$\alpha$ runess wonitoring, wearab	ie Electronics.	10			
	SDN a	and NFV for IoT: S	oftware Defined Networking, 1	Network Function	10			

	Virtua	lizatio	n.					
5	IoT D Specif Specif View Integr Specif	Design Design Design Design Fication Fication Specifi ation, A fication	Methoo , Do , Servi ication, Applica n wise	dology: omain ice Spec Operat ition De Case St	Purpose Model cification ional Vie velopmen udy: Env	& Requ Specifi ns, IoT I ew Speci nt vironme	irements Specification, Process cation, Information Model Level Specification, Functional fication, Device & Component <b>nt Monitoring</b>	10
Cou	urse					Descript	ion	<b>RBT</b> Levels
Outc	Outcomes							
	CO1	Under	rstand	the con	cepts of	IoT wit	h overview of its Physical and	R3, R4 &R5
		Logic	al desig	gn.				
	CO2	Anal	yze dif	fferent T	Fechnolog	gies used	in IoT	R3 and R6
	CO3	Interp	oret diff	erent do	omain spo	ecific Io7	diagrams and illustrations	R2 & R3
	CO4	Analy IoT	ze spec	cificatio	on docum	ent for E	nvironment Monitoring using	R4
CO-P	0	PO1	PO2	PO3	PO4	PO5		
Марр	ing							
	CO1	-	-	3	3	3		
	CO2	2	2	3	2	2		
	CO3	2	1	3	2	3		
	CO4	-	-	3	2	3		
Strong	g -3	Mediur	m -2	Weak	-1		1	
TEXT	BOOK	S:						
1. 2.	Vijay Jean-F Kaufn	Madise hilippe nann Pu	etti, Ars Vasse ublishe	shdeepB eur & A rs, 2010	Bahga "Ir dam Dur )	nternet of nkels "Int	Ethings, A hands-on-approach" 20 terconnecting smart objects with	)14 IP", Morgan
REFE Cu	<b>RENCE</b>	<b>BOOH</b> er, "Ge	<b>S</b> :	tarted w	vith the Ir	nternet of	Things", Maker Media Inc, 2011	tion 2012

Adrian Mcewen and Hakim, Designing the Internet of Things, whey publication, 2015
 Zhao, Feng, and Leonidas J. Guibas., "Wireless sensor networks: an information processing approach", Morgan Kaufmann, 2004.

4. Karl, Holger, and Andreas Willig, "Protocols and architectures for wireless sensor networks", John Wiley & Sons, 2007.

5. Dargie, Waltenegus W., and Christian Poellabauer, "Fundamentals of wireless sensor Networks: theory and practice", John Wiley & Sons, 2010.

6. McKinsey Glo	bal Institute report, "Unlocking the potential of the Internet of Things".
COURSE COORDINATOR:	Dr. Prakash

		Course Title: Wir	eless Networks And Mobile C	omputing		
STUR INST	TUTE OF TEGH	Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture	hours/week :	
s • Dr. AMB	OLOGY -	SCS421	(L-T-P)	4		
Added By Govt. of Karnataka		Exam Duration : 3 hours	CIE+ SEE = 30+70=100	Total No. of Co 52	ntact Hours :	
Co	urse		Description			
Obje	ctives:	<ol> <li>To introduce</li> <li>To unders</li> <li>To unders</li> <li>To learn vari for CLDC, N</li> </ol>	the concepts of wireless comm tand CDMA, GSM, Mobile IP, tand Different Mobile OS. ous Markup Languages and CE IIDlet model and security conce	unication WImax. DC, CLDC, MIDP; erns	Programming	
Unit No			Syllabus Content		No of Hours	
1	Mobile Computing Architecture: Architecture for Mobile Computing, 3-tier11Architecture, Design Considerations for Mobile Computing. Wireless11Architecture, Design Considerations for Mobile Communication (GSM and Short11Service Messages (SMS): GSM Architecture, Entities, Call routing in GSM,11PLMN Interface, GSM Addresses and Identities, Network Aspects in GSM,11Mobility Management, GSM Frequency allocation. Introduction to SMS,11SMS Architecture, SM MT, SM MO, SMS as Information bearer,11applications, GPRS and Packet Data Network, GPRS Network Architecture,11GPRS Network Operations, Data Services in GPRS, Applications for GPRS,11					
2	Mobile phones handhe Tunne	e Client: Moving bey s and their features, eld devices. Mobil ling, Cellular IP.	ond desktop, Mobile handset PDA, Design Constraints in e IP: Introduction, discove	overview, Mobile applications for ry, Registration,	10	
3	Mobile Client: Messa Messa Linux	e OS and Computing User Interface, Dat ging. The Server: E ging. Mobile Operational and Proprietary OS.	g Environment: Smart Client A a Storage, Performance, Data Data Synchronization, Enterpri- ing Systems: WinCE, Palm C	Architecture, The Synchronization, ise Data Source, OS, Symbian OS,	10	
4	Buildi Middle Applic Langu	ng, Mobile Internet A eware, messaging Se cations Protocol (W. ages, HDML, WML,	pplications: Thin client: Archit rvers, Processing a Wireless AP) Overview, Wireless Lar HTML, cHTML, XHTML, Vo	ecture, the client, request, Wireless guages: Markup ceXML	11	
5	J2ME: model event APIs;	Introduction, CDC, C, Provisioning, MIDI handling, GUI in M Communication in M	CLDC, MIDP; Programming for et lifecycle, Creating new app IDP, Low level GUI Compon IDP, Security Considerations in	or CLDC, MIDlet plication, MIDlet ents, Multimedia MIDP.	10	
Cor Outc	urse comes		Description		RBT Levels	

CO1	Work	Work on state of art techniques in wireless communication							
CO2	CO2 Explore CDMA, GSM, Mobile IP, WiMax.								
СО3	Work let mo	on Dif odel and PO2	fferent M d securi PO3	Mobile O ty concer PO4	S, Develo	op program for CLDC, MII	DP R4		
Mapping									
CO1	3	1	-	1	2	1			
CO2	2	1	3	-	1				
CO3	1	<b>_</b>	2	1	3	1			

Strong -3 Medium -2 Weak -1

## **TEXT BOOKS:**

1. Ashok Talukder, RoopaYavagal, Hasan Ahmed: Mobile Computing, Technology, Applications and Service Creation, 2nd Edition, Tata McGraw Hill, 2010.

2. Martyn Mallik: Mobile and Wireless Design Essentials, Wiley India, 2003

### **REFERENCE BOOKS:**

1. Raj kamal: Mobile Computing, Oxford University Press, 2007.

2. ItiSahaMisra: Wireless Communications and Networks, 3G and Beyond, Tata McGraw Hill, 2009.

COURSE	Prof Shamshekhar patil
<b>COORDINATOR:</b>	

	Course Title: Advances Data structure						
		Course Code:	No. of Credits: 3 : 0 : 0 : 1 No. of lect		ours/week: 4		
		SCS422	(L-T-P-S)				
		Exam Duration :	CIE + SEE = 30+70=100	ntact Hours :			
Aided By Go	THA WELFARE TRUS	3 hours		52			
Cou Obied	urse ctives:	1 To understand use	Description	and linked list and the			
Objectives.		1. To understand using	ies, finked list and tre	ees			
		2. To understand has	shing technique and heaps				
		3. To understand the	binary search trees and their appli	cations			
		4. To understand B-t	rees and their applications				
		<b>5.</b> To demonstrate th	e implementation of the basic to a	dvanced data structur	es		
	1		~ ~ ~ ~				
Unit No			No of Hours				
1	Eleme pointe	10					
2	Hash	Tables, Direct-addres	ss tables, Hash tables, Hash	functions, Open	11		
	addressing, Perfect hashing, Heaps Maintaining the heap property, Building						
	a neap	, The heapsort algorith	im, Priority queues	1. 1	11		
3	Binary tree, I Trees,	Search Trees, What insertion and deletion Properties of red-bla	s a binary search tree? Queryir , Randomly built binary search ck trees, Rotations, Insertion D	ng a binary search trees, Red-Black eletion	11		
4	B-Tree	es, Definition of B-tre	es, Basic operations on B-trees	s, Deleting a key	10		
	from a	B-tree, Structure of F	ibonacci heaps Mergeable-heap	operations			
5	Laboratory Exercises: Implementation using C++ or higher languages on 10						
	To implement functions of Dictionary using Hashing.						
	• To perform various operations i.e, insertions and deletions on AVL						
	<ul> <li>To perform various operations i.e., insertions and deletions on binary</li> </ul>						
	search tree.						
	<ul> <li>To implement operations on binary heap</li> <li>To create and implement insertion, deletion and rotations on red-</li> </ul>						
	_						
	•	10 create and impler	nem operations on B-Trees				
Cou Outc	irse omes		RBT Levels				

CO1	To app time ap	R4					
CO2	To den time pr	R3 and R4					
CO3	To app perform	R3					
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5		
C01	-	-	3	2	2	-	
CO2	-	2	3	2	2	-	
CO3	-	-	3	2	2	_	
Strong -3	Mediun	n -2	Weak	x -1	·		
TEXT BOOK	S:						
1. T. H. Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd Edition, Prentice-Hall of India, 2010. ISBN:9780262033848							
REFERENCE	E BOOK	S:					
<ol> <li>E. Horowitz, s. Sahni and dineshmehta, fundamentals of data structures in c++, Galgotia, 2006. ISBN8175152788, 9788175152786</li> <li>Ellis Horowitz, SartajSahni, S.Rajasekharan: Fundamentals of Computer Algorithms, 2nd Edition, Universities press, 2007, ISBN 8173716129, 9788173716126</li> </ol>							
COURSE Dr. K R Shylaja COORDINATOR:							

		Course Title: Agile Methodologies							
		Course Code:	No. of Credits: 4 : 0 : 0	No. of lecture	' lecture hours/week :				
		SCS423	(L-T-P)	4					
		Exam Duration :	CIE + SEE = 30+70=100	Total No. of Co	ntact Hours :				
Aided By Ge	ovt. of Karnataka	5 11001 \$		52					
	urse		Description						
Objectives:		1. To understand how an iterative, incremental development process leads to faster							
		delivery of m	delivery of more useful software						
		3. To understand	d the principles and practices of	extreme programmi	ng				
		4. To understand	d the roles of prototyping in the s	software process					
		5. To understand	d the concept of Mastering Agin						
TT •4	1				NI CII				
No			Sylladus Content		No of Hours				
1	Why A	Agile?: Understanding Success, Beyond Deadlines, The Importance of 10							
	Make Y	Organizational Success, EnterAgility, <b>How to Be Agile?:</b> Agile Methods, Don't Make Your Own Method. The Road to Mastery. Find a Mentor							
2	Understanding XP: The XP Lifecycle, The XP Team, XP Concepts, 10								
	Adopti	ng XP: Is XP Right fo	or Us?, Go!, Assess Your Agili	ty					
3	Practic Works	<b>cing XP:Thinking:</b> H pace Root-Cause Ar	Pair Programming, Energized Valvsis Retrospectives Collabo	Work, Informative	11				
	Togeth	er, Real Customer	Involvement, Ubiquitous La	nguage, Stand-Up					
	Meetings, Coding Standards, Iteration Demo, Reporting, Releasing: "Done Done", No Bugs, Version Control, Ten-MinuteBuild, Continuous Integration								
	Collective Code Ownership, Documentation. <b>Planning:</b> Vision,								
	ReleasePlanning, The Planning Game, Risk Management, Iteration Planning, Slack, Stories, Estimating.								
4	Mastering AgilityValues and Principles: Commonalities, About Values, 10 Principles and Practices Further Pending Improve the Process: Understand								
	Your	Project, Tune and A	dapt, Break the Rules, <b>Rely</b>	on People :Build					
	Proces	veRelationships, Let t s for the People, Elimi	he Right People Do the Right nate Waste :Work in Small, Re	Things, Build the versible Steps, Fail					
	Fast, N	laximize Work Not Do	one, Pursue Throughput	1 /					
	Dell	Valaas Es 1 's V	A silitar Only D 1 11 C 1	Use Value D 1	11				
5	Busine	r value: Exploit Your ss Results, DeliverFr	equently, Seek Technical Exce	ellence : Software	11				
	Doesn'	t Exist, Design Is for Great Design University	Understanding, Design Tradec	offs, Quality with a in Practice Pursue					
	Mastery								

Course Outcomes		RBT Levels							
CO1	Unders	Understand The XP Lifecycle, XP Concepts, Adopting XP							
CO2	Work Plannir	Work on Pair Programming, Root-Cause Analysis, Retrospectives,							
CO3	Implen	nent C	oncepts	to Elimin	ate Wast	e	R3, R5, R6		
CO-PO Mapping	PO1         PO2         PO3         PO4         PO5								
CO1	-	-	3	2	2	-			
CO2	-	2	3	2	2				
CO3	-	-	3	2	2	-			
Strong -3	Medium	-2	Weak	x -1	•				
TEXT BOOK	S:								
1. The Art of Agile Development (Pragmatic guide to agile software development), James shore, Chromatic, O'Reilly Media, Shroff Publishers & Distributors, 2007 ISBN 978-159-904-68-39									
REFERENCE	BOOK	S:							
<ol> <li>Agile Software Development, Principles, Patterns, and Practices, Robert C. Martin, Prentice Hall; 1<sup>st</sup>edition, 2002</li> <li>"Agile and Iterative Development a Manger's Guide", Craig Larman Pearson Education, First Edition,India, 2004.</li> </ol>									
COURSE Prof Nithya E COORDINATOR:									