# Final Year B. Tech 2022-23 Department of Information Technology Odd Semester

	Walchand College of Engineering, Sangli				
	(Government Aided Autonomous Institute)				
AY 2022-23					
Course Information					
Programme	B.Tech. (Information Technology)				
Class, Semester	Final Year B. Tech., Sem VII				
Course Code	5IT401				
Course Name	Data Mining				
Desired Requisites:					

Teaching	g Scheme	Examination Scheme (Marks)					
Lecture	2 Hrs/week	MSE ISE ESE To					
Tutorial -		30	20	50	100		
	-	Credits: 2					

	Course Objectives					
1	To introduce basic concepts, principles and techniques of data mining					
2	To make students to develop skills to use and implement data min	ing tools				
3	To handle and propose solution to real world problem.					
	Course Outcomes (CO) with Bloom's Taxonomy Level					
At the	end of the course, the students will be able to,					
СО	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description			
CO1	Summarize the basic concepts, techniques and algorithms of	II	Understanding			

001	Data Mining		
CO2	Apply skills of using data mining techniques for solving real life	III	Applying
02	problems		
CO2	Recognise real world problems for independent study and	V	Evaluating
005	research		

Module	Module Contents	Hours
Ι	<b>Introduction : Basic Concepts in Data Mining</b> Data mining background, classification of Data Mining, Data Mining Techniques. Data Pre-processing, Applications	4
П	<b>Data Mining Primitives</b> Data Mining Primitives, Architecture of Data Mining, Knowledge representation, Data generalization & summarization.	4
III	Association Rule mining, Frequent item set generation, Association Rule generation, correlation analysis, constraint based Association mining.	5
IV	<b>Classification &amp; Prediction</b> Issues, Decision Tree, Bayesian classifier, Back propagation, Classification methods, Prediction, ensemble classification	5
V	<b>Cluster analysis</b> similarity metrics, Clustering methods, (partitioning based, hierarchical based, density based, grid based),	4
VI	<b>Introduction to Mining Complex Data sets</b> Mining spatial data, temporal data, Mining time series, mining text datasets, web mining	4

	Text Books				
1	Jiawei Han and Micheline Kamber, "Data Mining – Concepts and Techniques", 3 <sup>rd</sup> Edition, The				
1	Morgan Kaufmann Series in Data Management Systems, 2011				
2	M.H. Dunham, "Data Mining: Introductory and Advanced topics", 2 <sup>nd</sup> Edition, Pearson, 2003				
3	Ian Witten, Eibe Frank and Mark Hall, "Data Mining: Practical Machine Learning Tools and Techniques", 3 <sup>rd</sup> Edition, 2011				
	References				
1	Rajan Chattamvelli, "Data Mining Methods : Concepts & Applications", Narosa Publishing House				
1	International Publisher, 2010				
2	Sushmita Mitra, Tinku Acharya, "Data Mining Multimedia, Soft Computing and Biometrics",				
2	WILEY Publication, 2003				
3					
	Useful Links				
1	https://nptel.ac.in/courses/106/105/106105174/				

CO-PO Mapping															
	Programme Outcomes (PO)										PSO				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	2						1							
CO2	3										2	2			
CO3			2		3			2							
CO4															
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High															
Each CO	Each CO of the course must map to at least one PO.														

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of

assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

Walchand College of Engineering, Sangli					
	(Government Aided Autonomous Institute)				
AY 2022-23					
Course Information					
Programme	B.Tech. (Information Technology)				
Class, Semester	Final Year B. Tech., Sem. VII				
Course Code	5IT402				
Course Name	Cryptography & Network Security				
Desired Requisites:	Computer Networks				

Teachi	ng Scheme	Examination Scheme (Marks)						
Lecture	2 Hrs/week	MSE ISE ESE To						
Tutorial	1 Hrs/week	30	20	50	100			
	-	Credits: 3						

	Course Objectives					
1	To describe the fundamental concepts of network security using confidentiality, integrity and availability (CIA) of the information					
2	To impart various encryption techniques					
3	To apprise security mechanisms and services against threats					

To apprise security mechanisms and services against threats

# Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

со	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Generalize information security aspects and outline CIA requirements	П	Understanding
CO2	Practice various encryption algorithms by examining crypt- complexity	III	Applying
CO3	Compare access control mechanisms and authentication services resolving the security issues	IV	Analysing

Module	Module Contents	Hours
Ι	Security Overview: Services, Mechanism and Attacks, The OSI Security Architecture, Classical Encryption Techniques, Substitution Techniques, Transposition Techniques, Steganography	4
Ш	<b>Block Cipher:</b> Block Cipher Design Principles, Modes of Data Transfer, Symmetric Cipher Model, Data Encryption Standard, Security of 2DES, 3DES & AES	4
Ш	<b>Public Key Encryption:</b> Principles of Public-Key Cryptosystem, RSA Algorithm, Distribution of Public Keys, Diffie-Hellman Key Exchange	5
IV	Authentication Functions and Services: Hash Functions, Message Authentication Codes, Digital Signatures Kerberos, X.509 Certificates	4
V	IP & Web Security: IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations Web Security Considerations, Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction	4

N	VI	<b>Perimeter Security:</b> Intruders, Intruder Detection, Password Management, Malwares Firewall Configurations, Trusted Systems, Honeypots	5			
		Text Books				
1	Willi Publi	am Stallings, "Cryptography and Network Security, Principles and Pracation, 8 <sup>th</sup> Edition 2020	ectices", Pearson			
2	2 Atul Kahate, " <i>Cryptography and Network Security</i> ", McGraw Hill Education India, 4 <sup>th</sup> Education 2017					
		References				
1	Mene CRC	ezes, A. J., P. C. Van Oarschot, and S. A. Vanstone, " <i>Handbook of Applied</i> Press, 2 <sup>nd</sup> Edition, 2018	d Cryptography",			
2	Schn 2015	eier, Bruce, "Applied Cryptography: Protocols & Algorithms", Wiley Public	ation,2 <sup>nd</sup> Edition,			
		Useful Links				
1	https: _for_	//www.researchgate.net/publication/26585503_Network_Security_Policies_ Effective_Network_Management	_and_Guidelines			
2	https:	//www.tutorialspoint.com/information_security_cyber_law/network_security	y.htm			
3	https:	//cis-india.org/internet-governance/publications/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/it-act/short-note-on-amendations/	ment-act-2008			

CO-PO Mapping														
		Programme Outcomes (PO)											PSO	
	1	1 2 3 4 5 6 7 8 9 10 11 12 1 2												
CO1		3					1							2
CO2	2				3								1	
CO3														
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High														
Each CO	Each CO of the course must map to at least one PO.													

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#### Assessment

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assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

			Walchand Colle	ege of Engineering, San	ngli te)						
			(Oovernineni M	Y 2022-23	ic)						
	Course Information										
Progra	amme		B.Tech. (Informat	ion Technology)							
Class,	Seme	ster	Final Year, Sem-V	/II							
Cours	e Cod	e	5IT403								
Cours	e Nan	ne	Humanities-4: Les	gal. IPR and Safety							
Desire	d Rec	uisites:		<u>, , , , , , , , , , , , , , , , , , , </u>							
		L									
Т											
Lectu	re	1 Hrs/week	T1	T2	ESE	Total					
Tutor	ial	-	10	10	30	50					
Practi	cal	-									
Intera	ction	-		Credits:	1						
			1								
			Cou	rse Objectives							
1	1 To disseminate fundamental aspects of Legal, IPR and Safety										
2	To p	rovide awarene	ss of IPR and gover	nment policies							
3	3 To propagate IPR as tangible property										
		Cou	irse Outcomes (CO	) with Bloom's Taxono	omy Level						
At the	At the end of the course, the students will be able to,										
CO		Cou	irse Outcome State	ment/s	Bloom's Taxonomy	Bloom's Taxonomy					
CO1	Iden	tify the intellect	tual work and apply	IPR		Applying					
COI	Ana	lyse the intellect	ctual work for econo	omical moral ethical		Analysing					
CO2	issue	es and social in	portance of tangible	e property	IV	i mary sing					
CO3	Dist	inguish and Exr	plain various forms of	of IPRs	IV	Analysing					
		8									
Modu	ıle		Modu	le Contents		Hours					
Ι	N I F I C	Module 1: Fund ntroduction to II Property right(I nstruments rel Convention, TR	<b>damentals of IPR(I</b> PR: Definition, Type PR) protection of ating to the prote IPS, The Patents Ac	ntellectual Property rig es of IPR, IPR Acts, Natu F IP, IPR and Econom ection of IP:Berne Co t, 1970 overview.	ght) ure of Intellectual ic Development, onvention, Paris	2					
п	Module 2: Patent and patentability         Introduction to patent: Definition, concepts, Patentability Criteria: How to         II       Identify whether my invention is patentable?,Criteria for obtaining patents:         Novelty, Inventive step, Utility, Non patentable inventions, Patentability         checking tools, Prioir art and patent. (Section 3 of , The Patents Act, 1970 )										
III	checking tools, Prioir art and patent. (Section 3 of , The Patents Act, 1970 )Module 3: Patents procedures and filing Procedure for registration/filing (forms) , Term of patent , Rights of patentee, Basic concept of Compulsory license and Government use of patent, Infringement of patents and remedies. Important sections of form2. Drafting restants and alaima										

		]							
IV	<ul> <li>Module 4: Copyright, Trademark, Designs and Geographical Indication(GI)</li> <li>Copy right :Ownership of copyright, Term of copyright, Rights of owner: Economic Rights, Moral Rights, Assignment and license of rights, Performers rights and Broadcasters rights, Infringement of copyright, Fail use and Fair Dealing concepts</li> <li>Trademark: Categories of Trademark: Certification Mark, Collective Mark , Well known Mark and Non-conventional Marks, Concept of distinctiveness, Doctrine honest user, registration and protection.</li> <li>Design: Concept of original design, Difference between GI and Trade Marks, Concept of Authorized user, GI: Homonymous GI.</li> </ul>	2							
V	Module 5: Patent LicensingCompulsory Licensing; Compulsory Licensing—Working of Patents,Grounds for Grant of Compulsory License, Revocation; Patent Licensing.	2							
VI	Module 6: Important acts and laws The Information Technology Act, 2000 overview and Cyber law in India, General Data Protection Regulations	2							
1 Howard B. Kockman, "Intellectual Property Law for Engineers and Scientists" Wiley, fi edition, May 2004.									
2	2 JeffreyG. Sheldon, How to Write a Patent Application, Third Edition, Practising La Institute, 2016.								
	References								
1	Indian Patents Act, 1970								
2	Ove Granstrand, The Economic and management of Intellectual Property,	1999							
3	Narayanan, V. K., Managing technology and innovation for competitive ad edition, Pearson education, New Delhi, 2006	vantage, first							
4	Idris, K., Intellectual property: a power tool for economic growth, second e publication no. 888,Switzerland, 2003	dition, WIPO							
5	Additional Reading - WIPO - http://www.wipo.int/patents/en/								
	Useful Links								
1	https://nptel.ac.in/courses/110105139								
2	https://onlinecourses.nptel.ac.in/noc22_hs59/preview								
3	https://cis-india.org/internet-governance/files/gdpr-and-india								
4	https://www.indiacode.nic.in/handle/123456789/1999								
5	https://www.infosecawareness.in/cyber-laws-of-india								
6	https://www.meity.gov.in/content/cyber-laws								

	CO-PO Mapping														
		Programme Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	2		1												
CO2					3							2			
CO3	2										1	2			
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High															
Each CO	of the	course	must r	nap to	at leas	t one F	Ю.								

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

			Walchand Colleg (Government Aid	ge of Engineering, S led Autonomous Insti	angli (tute)						
			Α	Y 2022-23	,						
			Cours	e Information							
Progra	Programme         B.Tech. (Information Technology)										
Class,	Semest	ter	Final Year B. Tech	h., Sem VII							
Cours	e Code		5IT451								
Cours	e Name	9	Data Mining Lab								
Desire	d Requ	iisites:	Basic computer pr	ogramming, Statistic	cs						
Teaching SchemeExamination Scheme (Marks)											
Practi	cal	2 Hrs/Week	LA1	LA2	Lab ]	ESE	Total				
Intera	ction	-	30	30	4(	)	100				
		-		Credit	ts: 1						
			Cour	se Objectives							
1	To de	monstrate basic	concepts of data pr	rocessing							
2	To int	roduce data mi	ning algorithm	11 11							
3	To ap	ply data mining	g algorithms for real $constants$	world problem	nomy						
At the	end of	the course the	students will be able	e to	nomy						
						Bloom's	Bloom's				
CO		Со	urse Outcome Stat	ement/s		Taxonomy	Taxonomy				
						Level	Description				
CO1	Sumn	narize data proc	essing tools				Applying				
CO2	Imple	ment data mini	ng algorithms	41			Analysing				
COS	Evalu	ate leasibility of	of data mining argori	ithin to various data t	ypes	V	Evaluating				
			List of Experi	ments / Lah Activiti	ies						
List of	f Exner	iments:	List of Experi								
Experi	ment 1	Perform data s	smoothing.								
Experi	ment 2	Perform data t	ransformation.								
Experi	ment 3	Perform data	normalization.								
Experi	ment 4	Finding summ	ary for dataset.	_							
Experi	ment 5	Plotting variou	us types of graphs fr	om dataset.							
Experi	ment 7	: Data Preparati	Metrics and Assessn	visualization Technic pent Metrics for Pred	iques	and Classific	ation				
Experi	ment 8	: Supervised Le	earning Methods Cla	ssification			ation				
Experi	ment 9	Supervised Le	earning Methods Log	gistic Regression							
Experi	ment 10	0: Unsupervised	d Learning Methods	S: Association Rules							
Experi	ment 1	1: Unsupervised	d Learning Methods	: Cluster Analysis							
Experi	ment 12	2: Perform vari	ous data mining tasl	ks using WEKA and	KNIMI	EOSS					
Experi	ment 1.	3: Using some s	sample data sets imp	plement and test data	mining	g techniques.					
			T								
	Liawa	i Han and Mial	T heline Kamber "Da	ext Books	ts and '	Techniques"	3 <sup>rd</sup> Edition The				
1	Morg	an Kaufmann S	eries in Data Manag	pement Systems 201	із апа . 1	i ecnniques ,	5 Edition, The				
2	Ian W	vitten, Eibe Fra	ink and Mark Hall	, "Data Mining: Pra	tical l	Machine Lea	rning Tools and				
3	Techn	nques", 3 <sup>ru</sup> Edit	tion, 2011								

References

1	Chris Pal, Ian Witten, Eibe Frank, and Mark Hall, " <i>Data Mining: Practical Machine Learning Tools and Techniques</i> ", Morgan Kaufmann Series in Data Management Systems, 4 <sup>th</sup> Edition, 2013
2	Bostjan Kaluza, "Instant Weka How-to", Packt Publishing Limited, June 2013
	Useful Links
1	https://nptel.ac.in/courses/110/107/110107092/
2	https://nptel.ac.in/courses/110/107/110107095/
3	

	CO-PO Mapping														
		Programme Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2				1										
CO2		3									1	2			
CO3			3		2			2							
CO4															
The stren	gth of	mappi	ng is to	be wr	itten as	\$ 1.2.3:	where	. 1: Lo	w. 2: 1	Mediur	n. 3: H	igh			

Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment								
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%								
Assessment	Based on	Conducted by	Typical Schedule	Marks				
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30				
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30				
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40				
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable								

performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

			Walchand Co (Government	Ollege of Engineeri Aided Autonomous AY 2022-23	<b>ng, Sangli</b> 5 Institute)						
			Co	urse Information							
Progr	amme		B.Tech. (Inform	nation Technology)	1						
Class,	Semes	ter	Final Year B. T	ech., Sem VII							
Cours	Course Code 5IT452										
Course Name Open Source Software Lab											
Desire		visites.	Unix Operating	Systems Software	Engineerin	a Computer N	letwork Web				
Desire	ctwork, web										
			Teennology								
Т	aachino	Scheme		Examinatio	n Scheme (	Marks)					
Practi	ical	2 Hrs/week	LA1	L'Allinatio	L.ah	FSE	Total				
Intono	otion	2 1115/ WEEK	20	20	Lau	10	100				
Intera		1 ПІ	50	30		+0	100				
				C	redits: 2						
			0								
1	T	<u> </u>	C	ourse Objectives							
	Тосо	nfigure the ope	en source softwar	e .							
2	Тосо	ntribute or dev	elop software in o	open source enviror	nment						
3	To us	e FOSS for sof	tware engineering	g	<b>T</b>						
A 1	1 0	Cou	irse Outcomes (C	<b>CO) with Bloom's</b>	Taxonomy	Level					
At the	end of	the course, the	students will be a	able to,							
00		Bloom's	Bloom's								
CO	CO Course Outcome Statement/s Taxonomy										
<u> </u>	E		- 1 <u>6</u>	1 1 +			Description				
	COT         Exercise the FOSS tools in software development         III         Applying										
CO2	Analy	ze the econom	ics of FOSS				Analysing				
003	Creat	e new FOSS of	Contribute to ex	isting FOSS		VI	Creating				
Modu	ile		Moo	dule Contents			Hours				
	In	troduction									
	In	roduction to o	open sources- Ne	ed of Open Sourc	es- Advanta	iges of Open					
	Sc	ources-Applica	tions of Open Sc	ources- commercial	l aspects of	Open source					
т	m	ovement, Noti	on of Communit	y, Guidelines for a	effectively v	vorking with	3				
1	FC	OSS communi	ty, Benefits of	Benefits of Community based Software Development							
	Re	equirements for	or being open, fr	being open, free software, open source software, FOSS							
	Li	censing Model	ls –GPL, AGPL,	LGPL, FDL, Econo	omy of FOS	S, History of					
	Li	nux, Kernel V	ersions.								
	0	pen source de	velopment and F	OSS languages	-	-					
П	Pr	oprietary sof	tware developm	ent model vs.	Open Sour	ce software	2				
	de	velopment mo	del, models for I	FOSS- Cathedral n	nodel and B	azaar model.	-				
	So	oftware packag	e management: R	PM, DEB – buildin	ng.						
	In	troduction to	collaborative de	velopment							
Ш	De	eveloper comm	nunities, mailing	lists, IRC, wiki, vei	rsion control	l (git/github),	2				
	bu	g tracking,	handling non-tec	chnical issues, lo	calization,	accessibility,					
	do	cumentation F	OSS code by dox	tygen.							
	0	pen source Vi	rtualization and	FOSS	T		2				
IV		ontainerization	technologies:	docker, Container	Images, a	Iternative to	2				
	VI	rtualization: ro	cket, etc, Contain	erization of FOSS	tools						
		onfiguration o	of Network servic	ces	<b>T</b> 1		2				
V		HCP, DNS, W	INES, NFS, NIS,	web server, Ftp S	erver, Telne	et Server, etc.	2				
	G	UI contiguratio	on tools: webmin	or usermin.							
	W	eb Server Too	ols and FOSS CN	MS							
VI	In	stallation and	Administration o	t Web Servers- L	AMP, XAM	IPP, Apache,	2				
V I	m	ysql, etc. Instal	lation of Content	Management Syste	ms – WordP	ress, Joomla,	2				
			371 77 -								

# List of Experiments / Lab Activities 1. Compare the various Linux Distributions and their usage 2. Comparison of various Open Source tools : Project management 3. Comparison of various Open Source tools: bug tracking 4. Comparison of various Open Source tools: version control system 5. Comparison of various Open Source tools: CMS 6. Compilation and installation of Linux Kernel 7. Creation Of RPM/DEB packages

8. Excise the development of Open Source Software:-Develop simple software for basic needs such as calculator, editor or any small noticeable contribution in existing FOSS.

- 9. Configuration of Server based services and their uses
- 10. Docker container : An open source software development platform

#### **Text Books**

- 1Andrew M. St. Laurent , "Understanding Open Source and Free Software Licensing", First edition,<br/>O'Reilly Media, Inc, ISBN:9780596005818
- 2 Paul Kavanagh, "*Open Source Software: Implementation and Management*", First edition, Digital Press, 2004, ISBN: 9780080492001.
- 3 Stefan Koch, "*Free/Open Source Software Development*", First edition, Idea Group Publishing, 2004.

#### References

	<b>KUTUTUTUTU</b>								
1	Zhao Jiong, "A Heavily Commented Linux Kernel Source Code", Third edition, Old Linux Publications, 2019								
2	Stefan Koch · "Free/Open Source Software Development", First edition, IGI Publishing, 2004, ISBN-13: 978-1591403692								
3									
	Useful Links								

1	https://bitnami.com/							
2	https://labs.play-with-docker.com/							
3	https://github.com/mit-pdos/xv6-public							
4	https://www.gnu.org/software/fsfe/projects/ms-vs-eu/halloween1.html							

CO-PO Mapping														
	Programme Outcomes (PO)									PS	50			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1			1		3								2	
CO2									2		3			
CO3												2		

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activities, as p	ci the nature and	requirement of the lab co	uise. The experimental lab shall ha	lvC				

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	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)													
	AY 2022-23													
	Course Information													
Progr	Programme         B.Tech. (Information Techology)													
Class,	Class, Semester Final Year B. Tech., Sem VIII													
Cours	e Code			5IT45	3									
Cours	e Nam	e		Techr	no-Soci	io Acti	vity							
Desire	ed Req	uisites:					•							
Т	eaching	g Schen	ne				Ex	amina	tion Sc	heme (	Mark	s)		
Practi	cal		-		LA1			LA2		Lab	ESE		Tot	al
Intera	ction	1 Hrs	/week		15			15		2	20		50	)
									Credi	ts: 1				
		1												
						Cour	se Ob	jective	S					
1	To pr	opose a	structu	red and	ration	al solu	tion to	addres	ss the r	elevant	skills			
2	To m	otivate	students	toward	is the c	desirou	s need	of ind	ustry, e	conom	y and	society	/	
3	To pr	ovide o	pportun Cou	ity to ii	ntegrat	$e \Pi ba$	sed so	lutions	with v	arious (	enterp	rises		
At the	end of	the cou	rse the	student	ts will	be able	e to	DIUUIII	s rax	JIIOIIIY	Leve	L		
			<u>150, the</u>	studen	.5 111		,				B	loom's	B	loom's
СО			Co	ourse C	Outcon	1e Stat	ement	:/s			Ta	xonom	y Ta	konomy
											]	Level	Des	cription
CO1	Enga	ge the p	rogram	me for	welfare	e of so	$\frac{1}{1}$	nd env	ironme	nt		III	Aj	oplying
CO2	comp	use p etitions	ragmati	C SK11	18 10	r nat	ional	and	interna	ational		IV	An	alysing
CO3	Reco	nmend	and pr	ropose	engine	ering	solutio	on for	industr	y and		V	Eva	aluating
	comn	nunity				CO		onning	-					
				p	rogra			apping nos (Di	; ())				D	50
	1	2	3	1	10g1a	6				10	11	12	1	2
COI			1		3	0	/	0		10	11	12	2	2
			1		5				2		3			
	- }										5	2		
The st	, renoth	of manr	ing is t	n he wr	itten av	s 1 2 3	where	• 1·I (		/ledium	3 · H	ioh		
Each (	CO of t	ne cours	se must	map to	at leas	st one F	PO. and	d prefe	rably to	o only c	one P(	).		
				L	ist of l	Experi	ments	/ Lab	Activit	ties				
Assess	sment i	s based	on the	rubric	decid	ed by	depart	ment						
	Stude	ent can u	undertal	ke any t	echno-	-socio a	activit	y as lis	ted belo	ow but	not lir	nited to	o:	
	1. E	ach stu	dent or g	group o	f stude	nts ma	y work	for the	e welfa	re of the	e envi	ronmer	nt, society	y through
	programmes such as tree plantation, blood donation campaigns etc.													
	2. Each student or group of students participating in technical events/competition/exhibition.													
	J. C	vith indu	istrv			uises (	ocyon	u syna	<i>bus)</i> / 1	Togram	ming	compe		
	4. Ľ	evelop	ing any	innova	tive ga	dget / s	solutio	n / syst	tem and	ł techno	ology	transfe	r in the i	nterest of
	Natio	n / Soci	ety / In	stitute (	WCE)			-						
	5. P c	ublishii ontribut	ng pape tions	ers /art	icles i	n nati	onal /	inter	nationa	l confe	erence	s / joi	urnals or	similar
	6. C	oordina	ating stu	idents'	clubs /	servic	es like	SAIT	/WLUC	J/Lab a	dmini	stratio	n or any o	other
	7. (	rganizi	ng techi	10-SOCI	o activ	ity for	the stu	dents /	comm	inity in	rural	areas, i	unprivile	ged areas

		Assessment						
There are three IMP: Lab ESE	e components of la	ab assessment, LA1, LA2 a d of passing.(min 40 %), L	nd Lab ESE. A1+LA2 should be min 40%					
Assessment	Based on	Conducted by	Typical Schedule	Marks				
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30				
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30				
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40				
Week 1 indicates experiments, in the nature and experiments and experiments and the experiments are specific to the second secon	tes starting week on nini-project, prese requirement of th nd related activitie	of a semester. Lab activities entations, drawings, program e lab course. The experime es if any.	s/Lab performance shall include per mming, and other suitable activities, ental lab shall have typically 8-10	forming , as per				
		Text Books						
1								
		Dé						
References								
1								
		Useful Links						
1								

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)										
A \$7,2022,22										
			AY 202	2-23						
D			Course Info	rmation						
Program	me		B. lecn. (Information Technology)							
Class, Sei	mester		Final Year B.	Tech., Sem VII						
Course C	code		5IT491							
Course N	ame		Project I							
Desired F	Requisite	es:								
]	<b>Feaching</b>	Scheme		Examination Sc	theme (Marks)					
Practical		6 Hrs/Week	LA1	LA2	Lab ESE	Total				
Interactio	on	-	30	30	40	100				
				Credi	its: 3					
			Course Ob	jectives						
1	To help	o students to identif	y real life needs	and discuss proje	ct requirements.					
2	To give	e technical solutions	s through latest	design & developi	nent tools.					
3	To dire	ect students to comp	are and analyze	the IT platforms f	for efficient solu	tions.				
A 4 41	1 - 6 - 1	Course Outcon	mes (CO) with	Bloom's Taxonor	ny Level					
At the end	1 of the c	course, the students	will be able to,		Dloom's	Dloom's				
СО		Course Out	come Statemen	nt/s	Taxonomy Level	Taxonomy Description				
CO1	Integra life cyc	te project at each st ele	age of the softw	vare development	III	Applying				
CO2	Recom challen	mend project pl lges	ans that add	lress real-world	V	Evaluating				
CO3	Develo	p successful sof	ftware projects	s that support	VI	Creating				
	program	n's strategic goals a	and satisfies the	customer needs						
		τ	с <b>Г</b>							
List of Fr	manima	LISU	or Experiments	/ Lad Activities						
	sperimer									
P	roject is	to be carried out in	a group of maxi	mum 5 to 6 stude	nts.					
E	ach grou	p will carry out a p	roject by develo	ping any applicati	on software base	ed on the				
fo	ollowing	areas.								
	1. Aj	pplication can be ba	ased on any tren	ding new technolo	ogy.					
	2. Aj	pplication can be ex	tension to previ	ious projects.						
	3. Pr	oject group should	achieve all the p	proposed objective	es of the problem	and testing				
	4. 11 an	ie work should be c	ngineering prac	aspects of design,	Implementation	and testing				
	5. Pr	oject reports shou	ld be prepared	and submitted i	n soft and hard	form along				
	wi	ith the code and ot	ther dependency	documents. Prefe	rable use online	code				
	re	positories (github/b	itbucket)							
	6. Pr	oject will be evalua	ated continuousl	y by the guide/par	nel as per assessr	nent plan.				
	7. Pr	resentation and repo	ort should use sta	andard templates p	provided by depa	rtment.				
P	roject rep	port (pre-defined ter	mplate) should b	be prepared using	Latex/Word and	submitted				
w m	ith soft c	copy on CD/DVD (vor	with code, PPT,	PDF, Text report	document & ref	erence				
01	n an onli	ne repository.								
S	tudents s	hould maintain a pr	roject log book o	containing weekly	progress of the	project.				

Course Contents for BTech Programme, Department of Information Technology, AY2022-23

Text Books									
1	Rajendra Kumbhar, "How to Write Project Reports, Ph. D. Thesis and Research Articles", Universal Prakashan, 2015								
2	Marilyn Deegan, "Academic Book of the Future Project Report", A Report to the AHRC & the British Library, 2017								
	· · · ·								
	References								
1	https://www.youtube.com/watch?v=0oSDa2kf5I8 (report writing )								
2									
	Useful Links								
1	https://pats.cs.cf.ac.uk/wiki/lib/exe/fetch.php?media=project-report.pdf								
2	http://users.iems.northwestern.edu/~hazen/Writing%20Project%20Reports%202004a.pdf								
3	https://www.upgrad.com/blog/java-project-ideas-topics-for-beginners/								
4	https://www.geeksforgeeks.org/computer-science-projects/								

CO-PO Mapping														
		Programme Outcomes (PO)										PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		1	2		2							3		
CO2										2			2	
CO3							3				2			1
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High														
Each CO o	f the c	ourse	must	map to	o at le	ast on	e PO,	and p	orefera	ably to	only	one PO	Э.	

	Assessment									
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%										
Assessment Based on Conducted by Typical Schedule										
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30						
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30						
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40						

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli							
(Government Aided Autonomous Institute)							
AY 2022-23							
Course Information							
Programme	B. Tech. (Information Technology)						
Class, Semester	Final Year B. Tech., Sem VII						
Course Code	50E485						
Course Name	Open Elective - 5: Data Visualization and Interpretation						
<b>Desired Requisites:</b>	Desired Requisites: Programming Fundamentals						

Teaching	g Scheme	Examination Scheme (Marks)							
Lecture	3 Hrs/week	MSE	ISE	ESE	Total				
Tutorial	-	30	20	50	100				
	-	Credits: 3							

	Course Objectives							
1	To explain the concept supervised and unsupervised machine l	earning techniqu	es.					
2	To introduce various machine learning algorithms.							
3	To discuss problem solving approaches using appropriate machine learning techniques.							
	Course Outcomes (CO) with Bloom's Taxonomy Level							
At the	At the end of the course, the students will be able to,							
		Bloom's	Bloom's					
1								

CO	<b>Course Outcome Statement/s</b>	Taxonomy	Taxonomy	
		Level	Description	
CO1	Summaries various machine learning algorithms with data for	II	Understanding	
COI	Regression and Classification.			
CO2	Apply appropriate learning algorithm for particular problems.	III	Applying	
CO3	Structuring Machine Learning algorithms with performance	IV	Analysing	
003	parameters.			

Module	Module Contents	Hours
Ι	<b>Introduction:</b> Introduction to Data Science, Overview of the Data Science process, Introduction to Data Science technologies, Introduction to Machine Learning, Regressions, Classification, Clustering, Recommendation systems	7
П	Working with Data: Variables, Vectors, Matrices, lists & Data frames, Logical vectored operators Image data type, Image representation, categorical data using Factors in R.	6
III	<b>Data/Image Visualization:</b> Using graphs to visualize data, Basic plotting in R, Manipulating the plotting window, Advanced plotting using lattice library in R. Image visualization in using Image processing tools.	7
IV	Models in Machine Learning: Regression Models, Classification Models, Unsupervised Learning Models, Recommendation Models. Models considered: – Linear regression: lm() – Logistic regression: glm() – Poisson regression: glm() – Survival analysis: Surv(), coxph() – Linear mixed models: lme()	7
V	<b>Data Reporting using LaTex:</b> LATEX Software installation, LATEX typesetting basics, LATEX math typesetting, Tables and matrices, Mathematics in Latex.	6
VI	<b>Case Studies</b> – Titanic Survival analysis, face detection, Housing price prediction analysis, Customer segmentation analysis, Iris data analysis	6
	Text Books	

Course Contents for BTech Programme, Department of Information Technology, AY2022-23

1	Dr. Mark Gardner, Beginning R:statistical Programming Languages, Wrox (Amazon), Mar2013							
2	Griffithas, Higham, Learning LATEX, Amazon, 2014							
	References							
1	Basic Data Analysis Tutorial, by Jacob Whitehill, Department of Computer Science, University of							
1	the Western Cape, 24/07/2009 [UWCDataAnalysisTutorial.pdf]							
2	NPTEL,edx,COURSERA (MOOC courses)							
	Useful Links							
	Module I							
1	https://www.coursera.org/learn/what-is-datascience?specialization=introduction-							
	datascience#syllabus							
	Module II, III, IV and VI							
2	https://onlinecourses.nptel.ac.in/noc21_cs23/preview							
2	https://www.coursera.org/learn/r-programming/home/welcome							
3	Module V							
5	https://www.overleaf.com/learn/latex/Free_online_introduction_to_LaTeX_(part_1)							

CO-PO Mapping															
	Programme Outcomes (PO)											PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3		1										2		
CO2		2													
CO3	2		1											1	
The stren	The strength of mapping is to be written as 1: Low, 2: Medium, 3: High														
Each CO	Each CO of the course must map to at least one PO.														

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of

assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

Walchand College of Engineering, Sangli							
	(Government Aided Autonomous Institute)						
	AY 2022-23						
Course Information							
Programme	B.Tech. (Information Technology)						
Class, Semester	Final Year B. Tech., Sem VII						
Course Code	5IT411						
Course Name	Professional Elective – 3: Cloud Computing						
<b>Desired Requisites:</b>	Computer Networks						
_							

Teachir	ng Scheme	Examination Scheme (Marks)								
Lecture	3 Hrs/week	MSE	ISE	ESE	Total					
Tutorial	-	30	20	50	100					
	-	Credits: 3								

		Course Objectives						
1	To introduce fundamentals of virtualization							
2	To impart various service and deployment model in cloud computing							
3	3 To acquaint the significance of virtualization in data center							
		Course Outcomes (CO) with Bloom's Taxonomy	<sup>v</sup> Level					
At the	end o	of the course, the students will be able to,						
СО		Bloom's Taxonomy Description						
CO1	Cor	mprehend the fundamentals of cloud computation	II	Understanding				
CO2	Cho infr	pose virtualization techniques to deploy the service on cloud astructure	III	Applying				
CO3	Ana	alyze service models for data center applications	IV	Analysing				
				• •				
Modu	le	Module Contents		Hours				
Ι		AAS, PAAS, and Hybrid	7					
II		<b>Virtualization</b> Hosted and Bare-Meta, Server Virtualization, Desktop V Application Virtualization, Storage Virtualization	Virtualization,	6				
III		Network Functions Public Cloud Networking: Route53, Content Delivery Networks Infrastructure, Virtual Network Functions: Cloud Firewall, DNS Balancers, Intrusion Detection Systems	, Resilience , Load	6				
IV		Virtual Private Clouds (VPC) VPC fundamentals, Public and Private Subnets, Security Groups Access Control List, Network Address Translation.	s, Network	7				
V		<b>Cloud Management</b> Service Management in Cloud Computing, Data Management ir Computing, Resource Management in Cloud	n Cloud	7				
VI	Advances in Cloud Computing           VI         cloud security, Microservices: Containers, Kubernetes, Resource           Management in Microservices							
	<b>D</b> .	Text Books	1 1					
1	Raj Hil	kumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Masteria I Education, 3rd Edition, 2011	ng cloud compu	uting", Mc Graw				
2	Tho Arc	omas Erl, Zaigham Mahmood and Ricardo Puttini, "Cloud Comp chitecture", Pearson, 1st Edition, 2010	uting: Concept	s, Technology &				

	References							
1	Richardo Puttini, Thomas Erl, and Zaigham Mahmood, "Cloud Computing: Concepts, Technology							
1	& Architecture", Pearson Prentice Hall, 2nd edition, 2013							
2	Srinivasan, J. Suresh, "Cloud Computing: A practical approach for learning and implementation",							
2	Pearson, 2nd Edition, 2012							
	Useful Links							
1	Module: I, II, IV, V, VI							
1	https://nptel.ac.in/content/syllabus_pdf/106105167.pdf							
0								

2 https://aws.amazon.com/

CO-PO Mapping															
	Programme Outcomes (PO)											PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1		2										2		
CO2			3												
CO3	2													3	
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High															
Each CO	Each CO of the course must map to at least one PO.														

Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of

assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

Walchand College of Engineering, Sangli						
AV 2022-23						
Course Information						
Programme	B.Tech. (Information Technology)					
Class, Semester	Final Year B. Tech., Sem VII					
Course Code	5IT412					
Course Name	Professional Elective – 3: Fundamentals of System Programming					
<b>Desired Requisites:</b>	Data Structures and Operating Systems					

Teaching	g Scheme	Examination Scheme (Marks)							
Lecture	3 Hrs/week	MSE	ISE	ESE	Total				
Tutorial	-	30	20	50	100				
	-	Credits: 3							

	Course Objectives										
1	To introduce basic concepts in systems programming.										
2	To study the structure and design of assemblers, linkers and loaders.										
3	To explain the concepts and theory behind the implementation of high level prog languages.										
	Course Outcomes (CO) with Bloom's Taxonomy Level										
At the	At the end of the course, the students will be able to,										
СО	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description								
CO1	Apply the knowledge about execution process of HLL programs.	III	Applying								
CO2	Analyse the working of scanners and parsers.	IV	Analysing								
CO3	Evaluate various system software's.	V	Evaluating								

Module	Module Contents	Hours
Ι	<b>Overview of System Software:</b> Introduction, Software, Software Hierarchy, Systems Programming, Machine Structure, Interfaces, Address Space, Computer Languages, Tools, Life Cycle of a Source Program, Levels of System Software, Overview of Language Processors Programming Languages and Language Processors, Language Processing Activities, Program Execution, Fundamental of Language Processing, Symbol Tables	7
П	Assemblers: Elements of Assembly Language Programming, Design of the Assembler, Assembler Design Criteria, Types of Assemblers, Two-Pass Assemblers, One-Pass Assemblers, Single pass Assembler for Intel x86, Algorithm of Single Pass Assembler, Multi-Pass Assemblers, Advanced Assembly Process, Variants of Assemblers Design of two pass assembler,	7
III	<b>Macro and Macro Processors:</b> Introduction, Macro Definition and Call, Macro Expansion, Nested Macro Calls, Advanced Macro Facilities, Design Of a Macro Pre-processor, Design of a Macro Assembler, Functions of a Macro Processor, Basic Tasks of a Macro Processor, Design Issues of Macro Processors, Features, Macro Processor Design Options, Two-Pass Macro Processors, One-Pass Macro Processors	6
IV	<b>Linkers and Loaders:</b> Introduction, Relocation of Linking Concept, Design of a Linker, Self-Relocating Programs, Linking in MSDOS, Linking of Overlay Structured Programs, Dynamic Linking, Loaders, Different Loading Schemes, Sequential and Direct Loaders, Compile-and-Go Loaders, General Loader Schemes, Absolute Loaders, Relocating Loaders, Practical Relocating Loaders, Linking Loaders, Relocating Linking Loaders, Linkers v/s Loaders	7

v	<ul> <li>Scanning and Parsing: Programming Language Grammars, Classification of Grammar, Ambiguity in Grammatic Specification, Scanning, Parsing, Top Down Parsing, Bottom up Parsing, Language Processor Development Tools, LEX, YACC, Compilers: Causes of Large Semantic Gap, Binding and Binding Times, Data Structure used in Compiling, Scope Rules, Memory Allocation, Compilation of Expression, Compilation of Control Structure, Code Optimization</li> <li>Interpreters &amp; Debuggers: Benefits of Interpretation, Overview of</li> </ul>								cation rsing, oment nding Rules, ontrol	6					
VI	Interpreters & Debuggers: Benefits of Interpretation, Overview of Interpretation, The Java Language Environment, Java Virtual Machine, Types of Errors, Debugging Procedures, Classification of Debuggers, Dynamic/Interactive Debugger									w of chine, ggers,		6			
							T								
1	D	MD	omdha	ro Gu	tom Dr	oonan	T	ext Bo MoGre	OKS	Dublid	nation	coond	Irouico	dadition	2000
2		imant	a Dal	Svstam	Progr	ogram immin	$\frac{1}{\alpha} O v f$	ord Un	iversit	v Press	$\frac{2000}{2000}$	second	1 10 1150		1, 2009
2	R	K. Ma	a i ai, t	k A G	odbole	. Svste	m Pro	gramm	ing an	d Com	niler (	Constru	uction.	Dreamte	ch Press.
3	2014														
References															
1	1 Leland L. Beck, <i>System Software – An Introduction to Systems Programming</i> , Pearson Education Asia, 3 <sup>rd</sup> edition, 2000														
2	Sa	antanu	Chatte	opadhy	ay, Sys	tem Sc	oftware	, Prent	tice-Ha	all Indi	a, 2007	7			
3	R	КМа	aurya a	nd An	and A	Godbo	ole Sys	tem Pr	rogram	ming d	and Co	mpiler	· Const	truction (	Includes
	La	abs), E	Dreamt	ech Pre	ess, 201	.4									
							Us	eful Li	inks						
1	W	ww.cs	.jhu.ed	$\frac{u}{\sim sco}$	$\frac{tt/pl/le}{1}$	ctures/	parsing	g.html	•						
2	W	ww.en	1.WIKIP	in/acu	g/W1K1	Syster	$n_{prog}$	gramm	ing						
5	III	tps.//II	pter.ac	.111/000	1585/10	0/100			nning						
					P	rograi	nme (		ipping 106 (P(	ונ				P	50
		1	2	3	1	5	6 6		8	)   0	10	11	12	1	2
		1	1	2 2	+	5	0	/	0	2	10	11	12	1	
		1	1	<u> </u>		r							1	2	
$-\frac{\text{CO2}}{\text{CO2}}$	4 2	1	2			∠ 1									
	)	1	<u> </u>		1	1	1.T		/ / - 1'	2.11	- 1-				
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High															
Each	.0	of the	course	must i	nap to	at leas	t one P	U.							

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of

assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)								
AY 2022-23									
Course Information									
Progra	amme		B.Tech. (Informa	tion Technology)					
Class, Semester Final Year B. Tech., Sem VII									
Cours	e Code	9	5IT413						
Cours	e Nam	e	Professional Elec	tive – 3: Mobile Ad-h	oc Networks & Se	ensors			
Desired Requisites: Computer Networks, Wireless Network									
Te	aching	g Scheme		Examination Sche	eme (Marks)				
Lectu	re	3 Hrs/week	MSE	ISE	ESE	Total			
Tutor	ial	-	30	20	50	100			
		-		Credits	: 3				
			Cou	rse Objectives					
1	To di	scuss differen	t wireless technolog	gies.	. 1				
2	To in	troduce variou	is protocols used in	Adhoc and Sensor Ne	etworks.				
3	To de	esign sensor ne	etwork scenario	)	T1				
At the	and of	Cour the course the	se Outcomes (CO	) WITH BIOOM'S I AXOI	iomy Level				
At the		the course, the	e students will be a	.010 10,	Bloom's	Bloom's			
CO		Course Outcome Statement/s Taxonomy							
00				Level	Description				
CO1	Illustrate different wireless network issues through ad-hoc III								
COI	concepts.								
CO2	Analysing								
02									
CO3	Evaluating								
Modu	le		Modu	le Contents		Hours			
1120000	Ir	ntroduction M	Iobile Adhoc Netw	vorks(MANETs):					
т	In	troduction: W	ireless Ad Hoc Net	tworks, Self-organizin	g Behaviour of	6			
1	W	/ireless Ad Ho	c Networks Coope	ration in Mobile Ad H	oc Networks,	0			
	N	IAC Protocols	in MANETs						
	R	outing in MA	NETs:						
II	R	outing in MAI	NETs, Multicasting	in MANETs, Mobility	Models for	7			
		IANETS, Trans	sport Protocols for	MANEIS					
		prortunistic N	r Nelworks: Jobile Networks I	JAV Networks Intro	luction Wireless	6			
111		pportumstic N ansor Natwork		SAV Networks, Indo	identifii. Whereas	0			
	vc V	Vinalaga Sanga	.s r Notwork Monog	amanti					
	N N	INCOVERAGE	& Placement Ton	ology Management in	Wireless Sensor				
IV	N	etwork	ce i lacement, rop	ology Management III	Whereas bensor	7			
	N	Iobile Wireless	s Sensor Networks,	Medium Access Cont	rol in Wireless				
	Networks								
V	R	outing in WS	N:						
•	R	outing in Wire	eless Sensor Networ	rks, Congestion and F	ow Control	7			
	C	hallenges in 5	G:						
VI	U	nderwater Ser	nsor Networks, Un	derwater Sensor Netw	orks, Security of	-			
		Ireless Sensor	r Networks, Hardw	vare Design of Sensor	Node, Real Life	6			
	D	eproyment of	VV DIN						

Text Books										
1	C.K Toh, "Ad hoc Mobile Wireless Networks Protocols and Systems", Pearson Education, 1									
1	Edition, 2002									
2	KazemSoharby, Daniel Minoli,, TaiebZnati,"Wireless Sensor Networks, Technology,									
	Protocols and applications", Wiley, 1st edition, 2007									
	References									
1	Xiang-Yang Li, "Wireless Ad Hoc and Sensor Networks", Cambridge University press, 1st									
1	edition, 2008									
	Useful Links									
1	Module I, II, III, IV, V, VI									
1	https://nptel.ac.in/courses/106/105/106105160/									

	CO-PO Mapping														
		Programme Outcomes (PO)											PSO		
	1 2 3 4 5 6 7 8 9 10 11 12 1 2									3					
CO1	3		1										2		
CO2		2													
CO3	2		1											1	
The stren	The strength of mapping is to be written as 1: Low, 2: Medium, 3: High														
Each CO	of the	course	must 1	nap to	at leas	st one F	Ю.			_					

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of

assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

	Walchand College of Engineering, Sangli									
(Government Aided Autonomous Institute)										
	AY 2022-25 Course Information									
Duo an	Programme B Tech (Information Techology)									
Close	Somo	tor	Einel Voor B. Tool	h Som VII (sovon)						
Class,	o Code		FILIAL LEAL D. LECL							
Course Name Professional Elective - 3: Basics of Visual Computing										
Desire	puting									
Desire	u Kcy	uisites.	Computer Graphie							
Т	eaching	g Scheme		Examination So	cheme (I	Marks)				
Lectu	re	3 Hrs/week	MSE	ISE	Ε	SE	Total			
Tutor	ial	-	30	20	4	50	100			
		-		Credi	its: 3					
			1							
	1		Cou	irse Objectives						
1	To in	troduce theory	of data structure and	d levels for representa	ation					
2	To di	scuss the princ	iples of Animation a	and how to apply it						
3	To pi	ovide compreh	ensive introduction	to computer modellin	ng, anim	ation and ren	dering			
A1	1 0		urse Outcomes (CC	D) with Bloom's Tax	onomy	Level				
At the	end of	the course, the	students will be abl	le to,		Dia a ma?a	Dla am?a			
CO		BI00III'S Taxonomy								
	Course Outcome Statement/s I axonomy						Description			
CO1	Disti	Understanding								
CO2	O2 Interpret the effects of rendering III									
COA	Justify the use of OpenGL for object visualization and V						Evaluating			
COS	manipulation									
	mam	pulation								
Madu		pulation	Madad	la Contonta			Harring			
Modu		putation	Modul	le Contents & Modelling			Hours			
Modu	ıle Iı	ntroduction to	Modul Image Processing of data representation	le Contents & Modelling – Traditional & hierary	chical da	ata structure	Hours			
Modu	ile Ile L L Ir	ntroduction to evel of image nage Enhance	Modul Image Processing data representation, ement in spatial	le Contents & Modelling – Traditional & hierard domain, 3-D Mod	chical da	ata structure Basic 3-D	Hours 5			
Modu	Inam Ile In L Ir P	ntroduction to evel of image nage Enhance rogramming pr	Modul Image Processing of data representation, ement in spatial inciples	<b>le Contents &amp; Modelling –</b> Traditional & hierard domain, 3-D Mod	chical da lelling,	ata structure Basic 3-D	Hours 5			
Modu	Ile Ile L In P	ntroduction to evel of image nage Enhance rogramming pr raphics Progr	Modul Image Processing of data representation, ement in spatial inciples ramming	le Contents & Modelling – Traditional & hierard domain, 3-D Mod	chical da lelling,	ata structure Basic 3-D	Hours 5			
Modu	Ile Ile In L Ir P G Ir	ntroduction to evel of image nage Enhance rogramming pr raphics Progr atroduction to C	Modul Image Processing of data representation, ement in spatial inciples ramming DpenGL, Primitives a	<b>le Contents</b> & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin	chical da lelling, ng, contro	ata structure Basic 3-D ol functions,	Hours 5 8			
Modu I II	Ile Ile In In Ir P G Ir sa	ntroduction to evel of image nage Enhance rogramming pri troduction to C imple program	Modul Image Processing of data representation, ement in spatial inciples camming DpenGL, Primitives a in OpenGL	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin	chical da lelling, ng, contro	ata structure Basic 3-D ol functions,	<b>Hours</b> 5 8			
Modu I II	Ile In L Ir P G Ir Sa 2	ntroduction to evel of image nage Enhance rogramming pri araphics Progr attroduction to C ample program D Transforma	Modul Image Processing of data representation, ement in spatial inciples ramming DpenGL, Primitives a in OpenGL tion	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin	chical da lelling, ng, contro	ata structure Basic 3-D ol functions,	<b>Hours</b> 5 8			
Modu I II III	Ile In L In L Ir P G Ir Sa 21 B S	<b>ntroduction to</b> evel of image nage Enhance rogramming pr <b>craphics Progr</b> attroduction to C umple program <b>D Transforma</b> asic Transforma	Modul Image Processing of data representation, ement in spatial inciples famming OpenGL, Primitives a in OpenGL tion ations, Homogeneou pation window to state	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin us representation of 2	chical da lelling, ng, contro 2d transfo	ata structure Basic 3-D ol functions, prmation,	Hours 5 8 6			
Modu I II III	Ile In L Ir P G Ir Sa 21 B S S	ntroduction to evel of image nage Enhance rogramming pr troduction to C umple program D Transforma asic Transform hear Transform	Modul Image Processing of data representation, ement in spatial inciples ramming DpenGL, Primitives a in OpenGL tion ations, Homogeneous ation, window to vie	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin us representation of 2 ewport Transformatic	chical da lelling, ng, contro 2d transfo	ata structure Basic 3-D ol functions, ormation,	Hours 5 8 6			
Modu I II III	lle L L Ir P G Ir sz 2 B S 3 T	ntroduction to evel of image nage Enhance rogramming pr araphics Progr troduction to C ample program D Transforma asic Transform hear Transforma formation sc	Modul Image Processing of data representation, ement in spatial inciples ramming DpenGL, Primitives a in OpenGL tion sations, Homogeneou ation, window to vio tion caling Rotation of	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin us representation of 2 ewport Transformatio	chical da lelling, ng, contro 2d transfo ons	ata structure Basic 3-D ol functions, ormation,	Hours 5 8 6			
Modu I II III IV	Ile In L In L Ir P G Ir S S S S S T T tr	ntroduction to evel of image nage Enhance rogramming pr troduction to C ample program D Transforma asic Transform hear Transforma ranslation, sc ansformations,	Modul Image Processing of data representation, ement in spatial inciples amming DpenGL, Primitives a in OpenGL tion ations, Homogeneou pation, window to via tion caling, Rotation of OpenGL Transform	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin us representation of 2 ewport Transformatic o 3D objects, co nation Matrix, Alpha	chical da lelling, ng, contro 2d transfo ons ompositio blending	ata structure Basic 3-D ol functions, ormation, on of 3D a, Modelling	Hours 5 8 6 8			
Modu I II III IV	Ile In L In L Ir P G Ir S 2 B S S 3 T T tr a	ntroduction to evel of image of nage Enhance rogramming pri- traphics Program troduction to Comple program D Transforma asic Transforma hear Transforma ranslation, sc ansformations, coloured cube.	Modul Image Processing of data representation, ement in spatial inciples ramming DpenGL, Primitives a in OpenGL tion ations, Homogeneou ation, window to vio tion caling, Rotation of OpenGL Transform	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin us representation of 2 ewport Transformatic o 3D objects, co nation Matrix, Alpha	chical da lelling, ng, contro 2d transfo ons ompositio blending	ata structure Basic 3-D ol functions, ormation, on of 3D g, Modelling	Hours 5 8 6 8			
Modu I II III IV	Ile In L In L Ir P G Ir Sc 20 B S S 3. T tr tr a L	ntroduction to evel of image nage Enhance rogramming pr araphics Progr troduction to C ample program D Transforma asic Transforma hear Transforma ranslation, sc ansformations, coloured cube. ighting and su	Modul Image Processing of data representation, ement in spatial inciples camming DpenGL, Primitives a in OpenGL tion ations, Homogeneou ation, window to vio tion caling, Rotation of OpenGL Transform	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin us representation of 2 ewport Transformatic o 3D objects, con nation Matrix, Alpha	chical da lelling, ag, contro 2d transfo ons ompositic blending	ata structure Basic 3-D ol functions, ormation, on of 3D g, Modelling	Hours 5 8 6 8			
Modu I II III IV	Ile In L L Ir P G Ir S S S S S S S I L L L	ntroduction to evel of image nage Enhance rogramming pr traphics Progr atroduction to C ample program D Transforma asic Transforma hear Transforma ranslation, sc ansformations, coloured cube. ighting and su ight and matter	Modul Image Processing of data representation, ement in spatial inciples amming DpenGL, Primitives a in OpenGL tion ations, Homogeneou hation, window to vio tion caling, Rotation of OpenGL Transform arfacing – r, the phone lighting	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin us representation of 2 ewport Transformatic b 3D objects, co nation Matrix, Alpha T g model; computation	chical da lelling, ng, contro 2d transfo omposition blending of vector	ata structure Basic 3-D ol functions, ormation, on of 3D g, Modelling	Hours 5 8 6 8			
Modu I II III IV V	Ile In L In L Ir P G Ir S 2 B S S 3 T T tr a L L S	ntroduction to evel of image nage Enhance rogramming pri- raphics Progra- troduction to C ample program D Transforma asic Transforma hear Transforma ranslation, sc ansformations, coloured cube. ighting and su ight and matter nading; Approx	Modul Image Processing of data representation, ement in spatial inciples ramming DpenGL, Primitives a in OpenGL tion ations, Homogeneou lation, window to vio tion caling, Rotation of OpenGL Transform urfacing – r, the phone lighting timation of sphere b	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin us representation of 2 ewport Transformatic p 3D objects, co nation Matrix, Alpha 1 g model; computation by recursive subdivisio	chical da lelling, ng, contro 2d transfo omposition blending of vector on; Ligh	ata structure Basic 3-D ol functions, ormation, on of 3D g, Modelling ors; polygon at sources in	Hours 5 8 6 8 6			
Modu I II III IV V	Ile In L L Ir P G Ir Sc 22 B S S 3. T T tr a L L L S f C C C C C C C C C C C C C C C C C C	<b>ntroduction to</b> evel of image nage Enhance rogramming pr <b>raphics Progr</b> atroduction to C ample program <b>D Transforma</b> asic Transform <b>D Transforma</b> ranslation, sc ansformations, coloured cube. <b>ighting and su</b> ight and matter nading; Approx	Modul Image Processing of data representation, ement in spatial inciples camming DpenGL, Primitives a in OpenGL tion ations, Homogeneou tation, window to via tion caling, Rotation of OpenGL Transform urfacing – r, the phone lighting timation of sphere b fication of material in	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin us representation of 2 ewport Transformatic o 3D objects, co hation Matrix, Alpha I g model; computation by recursive subdivision n OpenGL	chical da lelling, ng, contro 2d transfo ons ompositic blending of vecto on; Ligh	ata structure Basic 3-D ol functions, ormation, on of 3D g, Modelling ors; polygon at sources in	Hours 5 8 6 8 6			
Modu I II III IV V	Ile In L L Ir P G Ir S 2 2 B S 3 3 T T tr a L L S S V V V	ntroduction to evel of image rogramming pr troduction to C ample program D Transforma asic Transforma ranslation, sc ansformations, coloured cube. ighting and su ight and matter pading; Approx penGL; Specifi isible Surface	Modul Image Processing of data representation, ement in spatial inciples amming DpenGL, Primitives a in OpenGL tion ations, Homogeneou ation, window to vio tion caling, Rotation of OpenGL Transform rfacing – r, the phone lighting cimation of sphere b ication of material in Determination	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin us representation of 2 ewport Transformatic o 3D objects, co nation Matrix, Alpha I g model; computation by recursive subdivision of OpenGL	chical da lelling, ng, contro 2d transfo ompositio blending of vecto on; Ligh	ata structure Basic 3-D ol functions, ormation, on of 3D g, Modelling ors; polygon at sources in	Hours 5 8 6 8 6			
Modu I II III IV V VI	International states of the state of the sta	ntroduction to evel of image nage Enhance rogramming pr araphics Progr atroduction to C ample program D Transforma asic Transforma asic Transforma franslation, sc ansformations, coloured cube. ighting and su ight and matter hading; Approx penGL; Specif isible Surface	Modul Image Processing of data representation, ement in spatial inciples camming DpenGL, Primitives a in OpenGL tion ations, Homogeneou ation, window to via tion caling, Rotation of OpenGL Transform urfacing – r, the phone lighting simation of sphere b ication of material in Determination m, Visible surface R	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin us representation of 2 ewport Transformatic D 3D objects, con nation Matrix, Alpha 1 ; model; computation by recursive subdivision n OpenGL	chical da lelling, ag, contro ed transfo ons omposition blending of vecto on; Ligh	ata structure Basic 3-D ol functions, ormation, on of 3D g, Modelling ors; polygon at sources in techniques,	Hours 5 8 6 8 6			
Modu I II III IV V VI	Ile In L L Ir P G Ir S 2 2 B S S 3 3 T T tr a L L S S C V V Z S S	<b>htroduction to</b> evel of image rogramming pr <b>traphics Progr</b> attroduction to C umple program <b>D Transforma</b> asic Transform hear Transform <b>D Transforma</b> ranslation, sc ansformations, coloured cube. <b>ighting and su</b> ight and matter hading; Approx penGL; Specif <b>isible Surface</b> buffer algorithm	Modul Image Processing of data representation, ement in spatial inciples amming DpenGL, Primitives a in OpenGL tion ations, Homogeneou ation, window to via tion caling, Rotation of OpenGL Transform affacing – r, the phone lighting cimation of sphere b fication of material in Determination m, Visible surface R hm	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin us representation of 2 ewport Transformatic o 3D objects, co hation Matrix, Alpha I g model; computation by recursive subdivision of OpenGL and Tracing, Area sub	chical da lelling, ng, contro 2d transfo ons omposition blending of vecto on; Ligh odivision	ata structure Basic 3-D ol functions, ormation, on of 3D g, Modelling ors; polygon at sources in techniques,	Hours 5 8 6 6 6 6			
Modu I II III V V	Ile In L L Ir P G Ir S S S S S S S S S S S S S S S S S S	ntroduction to evel of image of nage Enhance rogramming program troduction to Comple program D Transforma asic Transforma asic Transforma ranslation, sc ansformations, coloured cube. ighting and su ight and matter nading; Approx penGL; Specifi isible Surface buffer algorithm can line algorithm	Modul Image Processing of data representation, ement in spatial inciples ramming DpenGL, Primitives a in OpenGL tion ations, Homogeneou lation, window to vise tion caling, Rotation of OpenGL Transform urfacing – r, the phone lighting timation of sphere b fication of material in Determination m, Visible surface R hm	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin us representation of 2 ewport Transformatic o 3D objects, co nation Matrix, Alpha I g model; computation by recursive subdivision of OpenGL ay Tracing, Area sub Text Books	chical da lelling, ng, contro 2d transfo omposition blending of vecto on; Ligh odivision	ata structure Basic 3-D ol functions, ormation, on of 3D g, Modelling ors; polygon at sources in techniques,	Hours 5 8 6 6 6			
Modu I II III IV V VI	Ile In L L In L Ir P G G Ir Sc 22 B S S 3 3 T T tr tr a L L L S S C V V Z S S S	ntroduction to evel of image nage Enhance rogramming pr araphics Progr attroduction to C ample program D Transforma asic Transform bear Transforma ranslation, sc ansformations, coloured cube. ighting and su ight and matter hading; Approx penGL; Specif isible Surface buffer algorithm can line algorithm	Modul Image Processing of data representation, ement in spatial inciples camming DpenGL, Primitives a in OpenGL tion ations, Homogeneous tation, window to vio tion cation, window to vio tion cation of sphere b fication of material in Determination m, Visible surface R hm	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin us representation of 2 ewport Transformatic o 3D objects, co hation Matrix, Alpha I ; model; computation by recursive subdivision of OpenGL and Tracing, Area sub Text Books Graphics: A Top-Dow	chical da lelling, ng, contro 2d transfo ons omposition blending of vecto on; Ligh odivision	ata structure Basic 3-D ol functions, ormation, on of 3D g, Modelling ors; polygon at sources in techniques,	Hours 5 8 6 6 6 6			
Modu I II III IV V VI	Ile In L L Ir P G Ir S S 3 3 T T tr a L L L S S C V V Z S C	ntroduction to evel of image of nage Enhance rogramming program troduction to Comple program D Transforma asic Transforma asic Transforma ranslation, sc ansformations, coloured cube. ighting and su ight and matter nading; Approx penGL; Speciff isible Surface buffer algorithm can line algorithm and Angel, "Inta of CL", 4th edition	Modul Image Processing of data representation, ement in spatial inciples amming DpenGL, Primitives a in OpenGL tion ations, Homogeneou ation, window to via tion caling, Rotation of OpenGL Transform rfacing – r, the phone lighting cimation of sphere b fication of material in Determination m, Visible surface R hm	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin us representation of 2 ewport Transformatic o 3D objects, co nation Matrix, Alpha I g model; computation by recursive subdivision openGL ay Tracing, Area sub Text Books Graphics: A Top-Dow 2005	chical da lelling, ng, contro 2d transfo ompositio blending of vecto on; Ligh odivision	ata structure Basic 3-D ol functions, ormation, on of 3D g, Modelling ors; polygon at sources in techniques, <i>each with</i>	Hours 5 8 6 6 6			
Modu I II III IV V VI VI 1 2	Ile In L L In L Ir P G G Ir Sa S S S S S S S S S S S S S S S S S S	ntroduction to evel of image nage Enhance rogramming pr araphics Progr atroduction to C ample program D Transforma asic Transform D Transforma ranslation, sc ansformations, coloured cube. ighting and su ight and matter nading; Approx penGL; Specif isible Surface buffer algorithm can line algorithm can line algorithm and Angel, "Inta aGL", 4th edition	Modul Image Processing of data representation, ement in spatial inciples camming DpenGL, Primitives a in OpenGL tion ations, Homogeneou ation, window to vio tion caling, Rotation of OpenGL Transform urfacing – r, the phone lighting cimation of sphere b ication of material in Determination m, Visible surface R hm	le Contents & Modelling – Traditional & hierard domain, 3-D Mod and attributes, Viewin us representation of 2 ewport Transformatic o 3D objects, co hation Matrix, Alpha I ; model; computation by recursive subdivision openGL ay Tracing, Area sub Text Books Graphics: A Top-Dow 2005 s with OpenGL", CEN	chical da lelling, ag, contro ed transfo ons ompositic blending of vecto on; Ligh adivision <i>m Appro</i> NAGE, 2	ata structure Basic 3-D ol functions, ormation, on of 3D g, Modelling ors; polygon at sources in techniques, <i>each with</i> 2019.	Hours         5         8         6         8         6         6         6         6			

	References								
1	F. S. Hill Jr. and S. M. Kelley, "Computer Graphics using OpenGL (3/e)", Pearson, 2007								
2	ShalliniGovil-Pai, "Principles of computer Graphics", Springer, first edition, 2005								
3	Rechard Wright & Sweet, "OpenGLSuperBible", QUE, 2 <sup>nd</sup> Edition, 2000								
	Useful Links								
1	https://www.coursera.org/learn/computer-vision-basics#syllabus								
2	https://www.classcentral.com/course/udacity-introduction-to-computer-vision-1022								
3	https://www.classcentral.com/course/introduction-computer-vision-watson-open-13849								

	CO-PO Mapping													
	Programme Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1				2							2		1	
CO2		1												1
CO3											3	3		
The stren	The strength of mapping is to be written as 1: Low, 2: Medium, 3: High													
Each CO	of the	course	must r	nap to	at leas	st one P	Ю.							

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of

assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

	Walchand College of Engineering, Sangli						
(Government Aided Autonomous Institute)							
AY 2022-23							
	Course Information						
Programme	B.Tech. (Information Technology)						
Class, Semester	Final Year B. Tech., Sem VII						
Course Code	5IT415						
Course Name	Professional Elective - 3: Digital Image Processing						
<b>Desired Requisites:</b>							

Teachi	ng Scheme	Examination Scheme (Marks)								
Lecture 3 Hrs/week		MSE	ISE	ESE	Total					
Tutorial	-	30	20	50	100					
	-	Credits: 3								

		Course Objectives								
1	То	explain image fundamentals and mathematical transforms for im	age processing							
2	То	describe and explain image enhancement techniques								
3	<b>3</b> To elaborate image processing applications									
	Course Outcomes (CO) with Bloom's Taxonomy Level									
At the	end	of the course, the students will be able to,								
СО		Bloom's Taxonomy Level	Bloom's Taxonomy Description							
CO1	Dis	scuss fundamental concepts of a digital image processing system	Π	Understanding						
CO2	Inte	erpret image segmentation and representation techniques	III	Applying						
CO3	An	alyze images in the frequency domain using various transforms	IV	Analysing						
Modu	le	Module Contents		Hours						
I	Introduction and Pixel RelationshipNeed for Image Processing ,Some Applications of Image Processing-IFundamental steps in DIP, Components of digital image processing, sampling,quantization, Pixel Relationships in images, Distance measurements, Datastructure for image representation									
II		<b>Image Operations and Interpolations</b> Arithmetic operations, Logical operations, Geometrical operation interpolation techniques	tions, Image	7						
III		Image Transformation Need of transformation, DFT and properties, convolution Theorem	em, DCT	6						
IV		Image Enhancement Point operations ,Spatial filtering techniques, Frequency domain	filtering	6						
V		<b>Image Segmentation</b> Classification of Image segmentation, Edge detection, techniques, Region growing techniques	Thresholding	7						
VI		<b>Image Morphology</b> Mathematical Morphology, structuring elements, Dilation, eros closing operations, properties of morphological operations.	ion, opening,	6						
		Text Books	1							
1	S.S	Shridhar, "Digital Image Processing", Oxford Unversity Press,2 <sup>n</sup>	<sup>d</sup> Edition,2016.							
2	2 Millan sonka, Vaclav Hiavac, Roger Boyle, " <i>Image Processing Analysis and Machine Vision</i> ", CL Engineering, 3rd Edition, 2013.									
		References								

1	S. Jayraman, S Esakkiarajan, Veerakumar, "Digital image processing", MGH,1st Edition,2017.														
2	Rafel C. Gonzalez, Richard E. Woods, "Digital Image Processing", 3rd Edition, Pearson Education, 2008														
2															
						Us	seful L	inks							
1	Module I,II,III														
1	https://nptel.ac.in/courses/117/105/117105079/														
2	Modu	le IV,V													
2	https:/	/nptel.ac	c.in/cou	urses/10	06/105	/10610	5223/								
3	Modu	le VI													
3	Vlabs	iitb.ac.i	n												
						<b>CO-</b> ]	PO Ma	apping	<u>ç</u>						
				Р	rograi	mme O	Outcon	nes (PC	<b>)</b>					PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	. 1		2										2		
CO2			3												
CO3	2													3	
The str	rength o	of mappi	ng is to	be wr	itten as	s 1: Lo	w, 2: N	Iediun	n, 3: Hi	gh					

Each CO of the course must map to at least one PO.

#### Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of

assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

			Walchand (Governme	College of Engineer ent Aided Autonomou	ring, Sangli us Institute)						
				Course Information	1						
Progr	amme	•	B.Tech. (Inform	nation Technology)	-						
Class,	Seme	ster	Final Year, Sen	n-VIII							
Cours	e Cod	le	5IT455								
Cours	e Nar	ne	Humanities-3:F	Project Management							
Desire	ed Re	quisites:		U							
	eachir	ig Scheme	T 4 1	Examinati	on Scheme (M	Iarks)	<b>T</b> ( )				
Practi		-		SE	Total						
Intera	iction		50								
		Credits: 1									
				Course Objectives							
1	Тот	inderstand the fi	indamental conce	epts of project manage	gement and pla	nning					
2	Τοι	inderstand the p	rocesses in the kr	nowledge areas and i	nter dependen	cies between t	hem				
3	Τοι	se hands on dif	ferent tools to ens	sure the smooth plan	ning and execu	ution					
		С	ourse Outcomes	(CO) with Bloom's	s Taxonomy L	Level					
At the	end c	f the course, the	students will be	able to,							
00				G4_44		Bloom's	Bloom's				
CO		Taxonomy Description									
	Und	Understanding									
CO1	exec	Onderstanding									
coa	Identify the resources needed for each stage, including involved										
02											
CO3	Plan	and manage the	e scope, cost, timi	ing, and quality of th	e project	III	Applying				
Madu	Ja		М	adula Contonta			Haung				
wiodu	ше 1	ntroduction to	NI Software Projec	odule Contents			Hours				
		Project. project	management(PM)	). role of project ma	nager, project	management					
Ι	I	profession, syste	em view of PM,	organization, stakel	olders, projec	t phases and	3				
	Î	ifecycle, contex	t of IT projects	, process groups, n	napping proce	ss groups to					
	1	nowledge areas		-							
		Project Integrat	tion and Scope N	Management							
	1	strategic planni	ng and project se	tion monitoring an	d controlling	ents, project					
II	i	ntegrated chang	e control. closing	project. software as	sistance scope	planning and	2				
	5	cope manageme	ent plan, scope d	lefinition and projec	t scope statem	ent, creating					
	t	he work breakd	own structure, sco	ope verification and	control, softwa	are assistance					
		Project Time ar	nd Cost Manage	ment							
ш		mportance of g	project schedule	s, activity - definit	tion, sequenci	ng, resource	2				
III		issistance Impo	tance basic prin	ciples cost estimati	ing budgeting	and control	2				
	5	oftware assistar	ice	leipies, cost estimati	ing, budgeting	und control,					
	]	Project Quality	and Human Res	source Managemen	t						
	(	Quality planning	g, assurance and c	control tools and tech	nniques, moder	rn quality					
IV	1	nanagement an	d improving IT	project quality, so	ftware assista	nce, keys to	2				
	1	nanaging people	e, human resource	e planning, acquiring	g, developing a	nd managing					
	1	Project Commu	inication and Rid	sk Management							
		Communication	planning, inform	ation distribution. pe	erformance ren	orting.					
V	1	nanaging stake	holders, risk n	nanagement plannir	ng, sources of	of risk, risk	2				
	i	dentification, qu	ualitative and qua	antitative risk analys	sis, risk respor	nse planning,					
	1	isk monitoring a	and control								

VI	<b>Project Procurement Management</b> planning purchases and acquisitions, planning contracting, requesting seller responses, selecting sellers, administering the contract, closing the contract Tools used – JIRA, Agile Methodology, Network diagrams, GitHub, GitLab	2						
	List of Experiments / Lab Activities							
<ol> <li>Surveying of common project management tools and techniques and preparing a report on it</li> <li>Developing the project charter for the project topic</li> <li>Collecting functional and behavioural requirements using different techniques</li> <li>Developing project schedule using network model diagram</li> <li>Developing entire schedule of project by estimating activity resources and estimated time</li> <li>Preparing the cost estimate by using different cost estimation techniques</li> <li>Developing the project quality document</li> <li>Developing communication management plan for the project</li> <li>Identifying the risk involved in the project and preparing a risk portfolio document</li> </ol>								
10	Developing the SOW for the procurement of the project							
	Text Books							
1	Project Management - Mantel Jr., Meredith, Shafer, Sutton with Gopalan (Wiley India	a Edition)						
2	Effective Project Management: Traditional, Agile, Extreme – Robert K Wyosaki (Seve Edition) Wiley India	enth						
	References							
1	Project Management (4th Edition) - Kathy Schwalbe, (Cengage Learning - India Edit	ion)						
	Useful Links							
1	https://www.coursera.org/specializations/engineering-project-management#courses							
2	https://onlinecourses.nptel.ac.in/noc22_mg60/preview?user_email=mullatahseen@gm	ail.com						
3	https://onlinecourses.nptel.ac.in/noc22_cs107/preview							
4								

	CO-PO Mapping													
		Programme Outcomes (PO)												<b>50</b>
	1	1 2 3 4 5 6 7 8 9 10 11 12										1	2	
CO1			1		3								2	
CO2									2		3			
CO3												2		
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High														
Each CO	of the	course	must r	nap to	at leas	t one P	O, and	l prefei	rably to	o only	one PC	).		

	Assessment											
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%												
Assessment Based on Conducted by Typical Schedule Marl												
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30								
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30								

Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40								
Week 1 indicates performing experiences	Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable											
activities, as p	er the nature and	requirement of the lab co	urse. The experimental lab shall ha	ive								

typically 8-10 experiments and related activities if any.

# Final Year B. Tech 2023-24 Department of Information Technology Even Semester

	Walchand College of Engineering, Sangli									
(Government Aided Autonomous Institute)										
AY 2022-23										
Course Information										
Programme	B.Tech. (Information Techology)									
Class, Semester	Final Year B. Tech., Sem VIII									
Course Code	5IT471									
Course Name	Agile Software Tools and Practice Lab									
Desired Requisites:	Software Engineering									

Teaching	Scheme		Examination Scheme (Marks)								
Practical	-	LA1	LA2	Lab ESE	Total						
Interaction	3 Hrs/week	30	30	40	100						
		Credits: 3									

	Course Objectives					
1	To define basics of Software Testing and techniques.					
2	To discuss project management cycle for software development.					
3	To illustrate Agile development techniques for software development	nt.				
	Course Outcomes (CO) with Bloom's Taxonomy	' Level				
At the	end of the course, the students will be able to,	1				
СО	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description			
CO1	Demonstrate use of automation testing tools	III	Applying			
CO2	Implement project management techniques like planning, risk analysis, scheduling.	III	Applying			
CO3	Evaluate software development life cycle using Agile tools and DevOps.	V	Evaluating			
Modu	e Module Contents		Hours			
Ι	Software Testing Introduction:Introduction, Importance of Software testing, How to conduct Software testing,Basic terminology of Software testing, Manual Testing Process, Differencebetween Manual and Automated Testing, Software testing Roles andResponsibilities, V Model of Software Development					
II	Test Case Design Techniques:Static Techniques, Dynamic Techniques, Black-box Test Techni box Test Techniques, Experience-based Test Techniques, Leve Testing, Test Driven Development	niques, White- ls of Software	6			
III	<ul> <li>Types of Software Testing:</li> <li>i) Functional Testing: Unit Testing, Integration Testing, System User Acceptance Testing, Sanity/Smoke Testing, Regression Te</li> <li>ii) Non Functional Testing: Performance Testing. (Load, Stress Endurance Testing), Usability Testing, Compatibility Testing, R</li> <li>Testing, Security Testing</li> </ul>	n Testing, sting. s, Spike and celiability	7			
	<b>Project Management:</b> Software Product Management, Requirements Analysis/Design,	Planning and				

Scheduling, Monitoring, Risk Analysis, Project Leadership, Teamwork,

Project Organization and Team Structures, Resource Allocation, Software

Quality Management Software Testing Standards

IV

6

V	Agne testing: The Fundamentals of Agile Software Development, Extreme Programming, Aspects of Agile Approaches, The Differences between Testing in Traditional and Agile Approaches, Status of Testing in Agile Projects, Role and Skills of a Tester in an Agile Team, Agile Testing Methods, Assessing Quality Risks and Estimating Test Effort, Techniques in Agile Projects, Tools in Agile Projects, JIRA Tool, Scum										
	DevOps Testing:										
	DevOps, Version control with Git, Git, Jenkins, Maven, Integration with										
VI	Jenkins, Continuous Integration and Continuous Delivery CI/CD: Jenkins	7									
	Creating pipelines, Setting up runners Containers and container orchestration	7									
	(Dockers and Kubernetes) or application development and deployment.										
	List of Experiments / Lab Activities										
List of	Experiments:										
	1. Demonstrate Debugging Tool.										
	2. Implement White Box Testing(Manual)										
	3.Implement Black Box Testing(Manual)										
	4.Implement Unit Testing(Automated): TestNG 5.Implement Derformance Testing(Automated) using IMatra:										
	6. Demonstrate Test Management Tool:TestStuff										
	7. Demonstrate Test Management Tool: TestStuff										
	8. Demonstrate Web-Test Automation Tool- Selenium IDE										
	9. Demonstrate Web-Test Automation Tool- Selenium Web-Driver										
	10.Demonstrate Project Management Tool:JIRA										
	11. Implement Test automation using DevOps.										
	12. Demonstrate project life cycle using Agile framework.										
	Text Books										
	Glenford J. Myers, Corey Sandler, Tom Badgett, "The Art of Software Testing"	. Third edition.									
1	Wiley, 2011, ISBN: 978-1-118-13315-6	,,									
2	Ron Patton, Corey Sandler, Tom Badgett, "Software Testing", Second edition, San	ns, 2005									
3	Lisa Crispin and Janet Gregory, "Agile Testing: A Practical Guide for Testers and First edition, Addison-Wesley Signature Series, 2009.	d Agile Teams",									
4	Teresa Luckey, Joseph Phillips, "Software Project Management For Dummies"	', First edition,									
	Wiley, 2006, ISBN: 9780471749349.										
	References	1.11 2002									
1	Lee Copeiand, "A Practitioner's Guide to Software Test Design", First edition, Arter ISBN-13: 978-1580537919.	cn House, 2003,									
2	Joakim Verona " <i>Practical DevOps</i> ", First edition, Artech House, 20 9781785886522, 1785886525.	)16, ISBN-13:									
2	Henry. "Software Project Management: A Real-World Guide To Success", First ed	ition, Pearson									
3	Education, 2004, ISBN- 9788131717929, 8131717925.										
	Useful Links										
1	https://www.javatpoint.com/software-testing-tutorial										
2	https://www.guru99.com/software-testing.html										
3	https://www.getzephyr.com/insights/developing-devops-testing-strategy-benefits-b	est-practices-									
4	tools	and tasting									
4	nups.//www.sonwaretestingnerp.com/agne-scrum-methodology-tot-development-a	mu-testing/									

	CO-PO Mapping													
	Programme Outcomes (PO)													0
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1			1		3								2	

CO2									2		3		
CO3												2	
The stren	gth of 1	mappir	ng is to	be wri	itten as	; 1,2,3;	where	, 1: Lo	w, 2: N	/lediun	n, 3: H	igh	

Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment								
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%								
Assessment	Based on	Conducted by	Typical Schedule	Marks				
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30				
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30				
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40				
Week 1 indica	Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include							

performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)								
	AY 2022-23							
			Course In	formation				
Program	nme		B.Tech. (Inform	nation Technology	7)			
Class, S	emester		Final Year B. 7	Tech., Sem VIII				
Course	Code		5IT492					
Course	Name		Project – II					
Desired	Requisit	tes:	Project – I					
			1					
Г	eaching	Scheme		<b>Examination S</b>	cheme (Marks)			
Practica	ıl	12 Hrs/Week	LA1	LA2	Lab ESE	Total		
Interact	ion	-	30	30	40	100		
		-	its: 6					
			Course O	bjectives				
1	To help	o students to ident	ify real life need	s and discuss proje	ect requirements			
2	To give	e technical solution	ons through latest	design & develop	ment tools.	•		
3	To dire	ect students to con	npare and analyz	e the IT platforms	for efficient solu	itions.		
At the er	nd of the	course the stude	comes (CO) with	n Bloom's Taxon	omy Level			
At the el		course, the studen		),	Bloom's	Bloom's		
СО		Course O	utcome Stateme	nt/s	Taxonomy	Taxonomy		
					Level	Description		
CO1	Integra life cyc	te project at each	III	Applying				
CO2	<b>Recommend</b> project plans that address real-world V Evaluating challenges							
CO3	CO3Develop successful software projects that support program's strategic goals and satisfies the customer needsVICreating							
		Li	st of Experimen	ts / Lab Activities	5			

List of E	Experiments:								
I t	Project is to be carried out in a group of maximum 5 to 6 students. Project is to be carried based research paper from journals.								
1	Each group will carry out a project by developing any application software based on the following areas								
1	1 Application can be based on any trending new technology								
	<ol> <li>Application can be extension to previous projects</li> </ol>								
	<ul> <li>3 Results of the project is to be tested and validated against standard data set</li> </ul>								
	<ul> <li>A Project group should achieve all the proposed objectives of the problem statement</li> </ul>								
	<ol> <li>The work should be completed in all aspects of design, implementation and testing and follow software engineering practices.</li> </ol>								
	6. Project reports should be prepared and submitted in soft and hard form along with the code and other dependency documents. Preferable use online code repositories (github/bitbucket)								
	7. Project will be evaluated continuously by the guide/panel as per assessment plan.								
	8. Presentation and report should use standard templates provided by department.								
	9. Preferably student should present/publish article.								
	along with soft copy on CD/DVD (with code, PPT, PDF, Text report document & reference naterial) or on an online repository. Students should maintain a project log book containing weekly progress of the project.								
	Text Books								
1	Rajendra Kumbhar, "How to Write Project Reports, Ph. D. Thesis and Research Articles", Universal Prakashan, 2015								
2	Marilyn Deegan, "Academic Book of the Future Project Report", A Report to the AHRC & the British Library, 2017								
	References								
1	https://www.youtube.com/watch?v=0oSDa2kf5I8 (report writing )								
2									
1	Useful Links								
1	nups://pais.cs.cr.ac.uk/wiki/iib/exe/ietcn.pnp/media=project-report.pdi								
2	http://users.iems.northwestern.edu/~nazen/writing%20Project%20Reports%202004a.pdf								
5	https://www.upgrad.com/blog/java-project-ideas-topics-for-beginners/								
4	nttps://www.geekstorgeeks.org/computer-science-projects/								

CO-PO Mapping														
	Programme Outcomes (PO) PSO													
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		1	2		2							3		
CO2										2			2	
CO3							3				2			1
The strenge	th of		a ia ta	ha www	tton or	1 2 2.	xx la ana	1.1.	<b>7.</b> N	1 adim	· 2. II	i a h		

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO, and preferably to only one PO.

#### Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks			
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30			
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30			
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40			
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.							

			Walchand Coll	ege of Engineering, Sangli					
	Course Information								
Progre									
Close	Somo	ton	Einel Veer Som						
Class,				V III					
Course			511431						
Course		e	Professional Elec	$\frac{1}{1}$ $\frac{1}{2}$ $\frac{1}$	e Management				
Desire	a keq	uisites:	Computer networ	ks, Operating System					
T	٦.								
Te	eaching	g Scheme		Examination Scheme	(Marks)				
Lectur	e	3 Hrs/week	MSE	ISE	ESE	Total			
Tutori	al	-	30	20	50	100			
		-		Credits: 3					
			Cou	ırse Objectives					
1	To ir	troduce Storag	e technologies						
2	To a	equaint with Sto	orage system archit	ectures					
3	To ca	ategorize backu	p and recovery tech	nnologies					
		Cou	irse Outcomes (CO	D) with Bloom's Taxonomy	y Level				
At the	end of	the course, the	students will be ab	le to,					
~~~		~			Bloom's	Bloom's			
CO		Co	Course Outcome Statement/s Taxonomy						
	Com	proband the loc	Level						
CO1	Understanding								
CON									
	Dicti	nguish between	backup and maay	millologies for data centre		Applying			
005	Disti	nguisii betweei	i backup and lecove	ery technologies	Iv	Anarysing			
Madu	la		Madu	la Contonta		Houng			
Moau						Hours			
	1) 1.	ntroduction to	information stora	ge and Data center	nitactura Data				
T		enter Infrastru	cture Key Challens	pes in Managing Information	1 Information	6			
-	L	ifecycle, Stora	ge System Enviror	ment: Components of a St	orage System				
	E	nvironment.		L L	0				
		Oata Protection	n: RAID, Intelligen	nt Storage System					
П	S	torage compon	ents ,Data organiz	ation: File vs. Block, Objec	ct; Data store;	7			
		earchable mod	els ,Storage Device	s (including fixed content sto	bing devices)				
		lirect. Attached	d Storage SCSI S	AN NAS	liilig				
Ш	F	ibre Channel.	IP-based Storage (il	SCSI. FCIP. etc.).Examples		6			
	N	AS,NFS,CIFS	, DAFS						
	N	letwork compo	onents						
IV	C	Connectivity: sv	vitches, directors, hi	ighly available systems		6			
	F	ibre Channel,1	GE/10GE, Metro-E	thernet, Aggregation, Infinite	iband				
		Business Conti	nuity Backup and	<b>Recovery</b>	Carola Esilara				
V		normation Ava	alladility, BC Term	BC Technology Solutions	Cycle, Failure				
v		Rackup Metho	ds Backup Archit	ecture Backup and Restor	e Operations	7			
	B	ackup Topolog	gies, Backup in NAS	S Environments, Backup Ta	rgets,				
	L	arge Storage	Systems	,	<u> </u>				
VI	C	Boogle FS/BigT	Table, Cloud/Web-b	based systems (Amazon S3)		7			
	FS+DB convergence "Programming models: Hadoop,								

	Text Books							
1	Somasundaram Gnanasundaram, Alok Shrivastava, "Information Storage and Management", EMC Education Services (Wiley India), 2 <sup>nd</sup> Edition, 2012.							
2	Ulf Troppen, Rainer Erkens, Wolfgang Müller,, "Storage Networks Explained", (Wiley India ).							
2	2nd Edition, 2016.							
	References							
1	Robert Spalding, "Storage Networks: The complete Reference", McGraw Hill Education Indian edition 2017.							
2	Tom Clark, "Designing Storage Area Networks, A Practical Reference for Implementing Fibre							
	Chanel and IP SANs", AddisonWesley Professional; 2nd edition 2010.							
	Useful Links							
1	Modules II,III,IV and VI							
1	https://nptel.ac.in/courses/106/108/106108058/							

CO-PO Mapping															
		Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	2		1												
CO2					3							2			
CO3	2										1	2			
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High															
Each CO	Each CO of the course must map to at least one PO.														

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of

assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

	Walchand College of Engineering, Sangli					
	(Government Aided Autonomous Institute)					
AY 2022-23						
Course Information						
ProgrammeB.Tech. (Information Technology)						
Class, Semester Final Year B. Tech., Sem VIII						
Course Code	5IT432					
Course Name Professional Elective-4:Parallel Algorithm						
Desired Requisites: Operating System						

Teachin	g Scheme	<b>Examination Scheme (Marks)</b>							
Lecture	3 Hrs/week	MSE	ISE	ESE	Total				
Tutorial	-	30	20	50	100				
	-	Credits: 3							

	Course Objectives								
1	To introduce the current trends in parallel computer architectures and programming model.								
2	To acquaint with parallel program design methodologies.								
3	To devise various parallel algorithms for matrices and graphs								

### Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

1

СО	<b>Course Outcome Statement/s</b>	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Explain different parallel architectures and design methodologies	II	Understanding
CO2	Select appropriate Strategy to optimize real world problem	IV	Analysing
CO3	Study the parallel algorithms for matrices, graphs, sorting algorithm etc	IV	Analysing

Module	Module Contents	Hours			
Ι	<b>Basic Parallel Algorithm</b> Introduction to Parallel Computing, Parallelism on the JVM, Running Computations in Parallel, Monte Carlo Method to Estimate Pi, First-Class Tasks	7			
Π	<b>Basic Task in Parallel Algorithms</b> Parallel Sorting, Data Operations and Parallel Mapping, Parallel Fold (Reduce) Operation Associativity, Parallel Scan (Prefix Sum) Operation	6			
III	<b>Data-Parallelism</b> Data-Parallel Programming, Data-Parallel Operations, Scala Parallel Collections Splitters and Combiners	7			
IV	<b>Data Structures for Parallel Computing</b> Implementing Combiners, Parallel Two-phase Construction, Conc-tree Data Structure, Amortized, Constant-time Append Operation, Conc-Tree Combiners	7			
V	Sorting Issues, sorting network, Bubble sort	6			
VI	Graph Algorithms MST, SSSP, APSP	6			
Text Books					

Anath Grama, Ansul Gupta, George Karypis, Vipin Kumar, "Introduction to parallel computing,

	Second Edition", Pearson Education, 2003						
	References						
1	Horrowitz, SahniRajasekaran, "Computer Algorithms", Computer Science, W. H. Freeman and						
1	company Press, New York, 1997						
	Useful Links						
	Module I, II, III, IV						
	https://www.coursera.org/learn/parprog1?ranMID=40328&ranEAID=*GqSdLGGurk&ranSiteID						
1	=.GqSdLGGurk-ntwHfWI_xX32aIgZXdr9Ug&siteID=.GqSdLGGurk-						
	ntwHfWI_xX32aIgZXdr9Ug&utm_content=10&utm_medium=partners&utm_source=linkshare						
	&utm_campaign=*GqSdLGGurk#syllabus						

CO-PO Mapping														
	Programme Outcomes (PO)									PSO				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1					3							1		
CO2		1			2								1	
CO3	1	2												2

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.

#### Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of

assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

Walchand College of Engineering, Sangli					
(Government Aided Autonomous Institute)					
AY 2022-23					
Course Information					
Programme B.Tech. (Information Technology)					
Class, Semester	Final Year B. Tech., Sem VIII				
Course Code 5IT433					
Course Name	Professional Elective - 4: Software Defined Network				
<b>Desired Requisites:</b>	Computer Networks, Cloud Computing				

Teaching	g Scheme	Examination Scheme (Marks)						
Lecture	3 Hrs/week	MSE	ISE	ESE	Total			
Tutorial	-	30	20	50	100			
	-	Credits: 3						

	Course Objectives							
1	To provide fundamental knowledge of Software Defined Network.							
2	To acquaint SDN operation in Data center							
3	To appraise the network administration through virtualization	and open flow						
	Course Outcomes (CO) with Bloom's Taxonomy Level							
At the end of the course, the students will be able to,								
СО	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description					
CO1	Comprehend the concept of abstracting and centralizing the control plane in SDN	II	Understanding					
CO2	Analyze the implications of shifting from traditional network architectures to SDN	IV	Analysing					
CO3	Evaluate the network virtualization functions	V	Evaluating					

Module	Module Contents	Hours				
Ι	<b>Introduction to SDN:</b> Basic Packet Switching Terminology, The Modern Data Center, Architecture of SDN, SDN Switch, Central Control, Active Networks, The Road to SDN	7				
П	<b>Control and Data Plane:</b> Control/Data Separation, Opportunities in Various Domains, Challenges in Separating the Data and Control Planes, Routing Control Platform, The 4D Network Architecture	7				
III	<b>Open Flow Protocol and SDN</b> OpenFlow: Flow Table structure, Flowtable Actions, Flow messages, Legacy Mechanisms Evolve Toward SDN, SDN Applications, Alternate SDN Methods.	7				
IV	<b>SDN in Data Centre</b> SDN Use Cases in the Data Centre, Open SDN versus Overlays in the Data Centre	7				
V	Virtualization in Data Centre Network Functions Virtualization, Micro service based deployment, Virtualization techniques in Data Centre, micro services and orchestration of applications	7				
VI	Application of SDN SDN for Campus network, Data centre based applications, SDN in Public, Private and Hybrid Cloud	4				
Toxt Poolz						
С	huk Black Timothy Culver "Software Defined Networks: 4 Comprehensive	Annroach" 2nd				
$\begin{vmatrix} 1 \end{vmatrix} \begin{bmatrix} C \\ E \end{bmatrix}$	dition Wiley publication 2016					

2	Thomas Erl, Zaigham Mahmood and Ricardo Puttini, "Cloud Computing: Concepts, Technology & Architecture", Pearson, 1st Edition, 2010							
	References							
1	<ul> <li>Thomas D. Nadeau, "Software Defined Networks, An Authoritative Review of Network</li> <li>Programmability Technologies", Ken Gray Publisher, August 2013, ISBN: 978-1-4493-4230-</li> <li>2.</li> </ul>							
	Useful Links							
1	Module I, II, III, V, VI							
1	https://www.coursera.org/learn/sdn#about							
2	https://aws.amazon.com/							

CO-PO Mapping															
	Programme Outcomes (PO) PSG								PSO						
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1		2										2		
CO2			3												
CO3	2													3	
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High															

Each CO of the course must map to at least one PO.

#### Assessment

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MSE shall be typically on modules 1 to 3.

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assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

Walchand College of Engineering, Sangli					
(Government Aided Autonomous Institute)					
AY 2022-23					
Course Information					
Programme B.Tech. (Information Technology)					
Class, Semester	Final Year B. Tech., Sem VII (seven)				
Course Code	5IT434				
Course Name Professional Elective 4: Adavanved Deep Learning					
Desired Requisites:	Machine Learning				
Programme Class, Semester Course Code Course Name Desired Requisites:	AY 2022-23 Course Information B.Tech. (Information Technology) Final Year B. Tech., Sem VII (seven) 5IT434 Professional Elective 4:Adavanved Deep Learning Machine Learning				

Teaching	g Scheme	Examination Scheme (Marks)							
Lecture	3 Hrs/week	MSE	ISE	ESE	Total				
Tutorial	-	30	20	50	100				
	-	Credits: 3							

	Course Objectives						
1	To Introduce major deep learning algorithms						
2	to solve real world problems using deep learning						
3	3 To explain the advanced algorithms for Natural Language Processing and Computer Vision						
	Course Outcomes (CO) with Bloom's Taxor	omy Level					
At the	end of the course, the students will be able to,		1				
СО	<b>Course Outcome Statement/s</b>	Bloom's Taxonomy Level	Bloom's Taxonomy Description				
CO1	Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.	Π	Understanding				
CO2	Utilize appropriate learning algorithm for Encoder Decoder model.	III	Applying				
CO3	Implement deep learning algorithms and solve real-world problems.	IV	Analysing				
			1				
Modu	le Module Contents		Hours				
Ι	access Stories, ns, Perceptron Representation forward Neural etworks	6					
П	II FeedForward Neural Networks FeedForward Neural Networks, BackpropagationGradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, AdaGrad, RMSProp, Adam.						
III	Autoencoders Autoencoders and relation to PCA, Regularization in Denoising autoencoders, Sparse autoencoders, Contractive Greedy Layerwise Pre-training, Better activation functions initialization methods, Batch Normalization	7					
IV	Regularization in Training of DL Regularization: Bias Variance Tradeoff, L2 regularization, Dataset augmentation, Parameter sharing and tying, Injo input, Ensemble methods, Dropout	6					

V	<ul> <li>Convolutional Neural Networks</li> <li>Convolutional Neural Networks, LeNet, AlexNet, ZF-Net, VGGNet,</li> <li>GoogLeNet, ResNet, Visualizing Convolutional Neural Networks, Guided</li> <li>Backpropagation, Deep Dream, Deep Art, Fooling Convolutional Neural Networks</li> <li>Deep Learning for Computer Vision:</li> </ul>								
VI	VIDeep Learning for Computer Vision: Recap of Convolutional Neural Networks. Object Localization, Object Detection using Convolutional Implementation of Sliding Windows, Bounding Box Predictions, Intersection Over Union, Non-max Suppression, Anchor Boxes, YOLO Algorithm, and Region Proposal Networks.								
	Text Books								
1	Ian Goodfellow, Yoshua Bengio and Aoron Courville " <i>Deep Learning</i> " Cambridge, Massachusetts London, England, 2017, ISBN: 9780262035613	', The MIT Press							
	References								
1	Module I II III IV Prof.Mitesh M. Khapra, "Deep Learning", course on NPTEL, July 2019								
2	Andrew Ng, "Deep Learning Specialization", Coursera online course								
	Useful Links								
1	https://www.deeplearningbook.org/								
2	https://onlinecourses.nptel.ac.in/noc19_cs85/								

	CO-PO Mapping														
	Programme Outcomes (PO) PSO														
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3		1										2		
CO2		2													
CO3	2		1											1	
The stren	oth of	mannir	na is to	he wr	itten a	$1 \cdot I_{0}$	$x 2 \cdot \mathbf{N}$	ledium	3. H	ah					

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.

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Walchand College of Engineering, Sangli (Government Aided Autonomous Institute) AY 2022-23											
	Course Information										
Progr	amme		B.Tech. (Information Tech	nnology)							
Class,	, Seme	ster	Final Year B. Tech., Sem	VIII							
Cours	se Cod	e	5IT435								
Course Name Professional Elective 4: Augumented Reality and Virtual Reality											
Desired Requisites: Machine Learning											
Teaching Scheme         Examination Scheme (Marks)											
Lectu	re	3 Hrs/week	MSE	ISE	ESE	,	Т	otal			
Tutor	ial	-	30	20	50		1	00			
		_		Credit	s: 3						
		1									
			Course Ob	jectives							
1	To I	ntroduce geome	etric modelling and Virtual e	environment							
2	To s	olve real world	problems in AR VR								
3	Toe	xplain various	types of Hardware and software	vare in virtual F	Reality system	18					
At the	and o	the course the	ourse Outcomes (CO) with	Bloom's Taxo	nomy Level						
At the		i the course, the			Bloon	n's		Bloom's			
CO		Co	urse Outcome Statement/s		Taxon	omy	Т	axonomy			
					Leve	el 🌷	D	escription			
	Und	erstand fundam	ental computer vision, comp	II		Unc	lerstanding				
CO1	and										
	hum	an-computer in	teraction techniques related	to VR/AR			•	1 •			
CO2	Kela	te and different	hate VR/AR technology	ong			Ana	lysing			
0.05	mpi		Augmented Reality applicat	IOIIS	111		Ар	nying			
Modu	ıle		Module Co	ntents				Hours			
	Ι	ntroduction to	Virtual Reality:								
	V	virtual Reality a	and Virtual Environment: In	troduction, Cor	nputer graphi	cs, Real					
I	ti	me computer g	raphics, Flight Simulation,	Virtual				5			
	e	nvironment req	uirement, benefits of virtual	reality, Histor	ical						
	0	evelopment of	vR, Scientific Landmark.	a dallin ar							
		omputer Gr	appines And Geometric w	iodening:			1				
	1	ntroduction, 1	ne virtual world space, j	ositioning the	e virtual obs	erver, t	ne				
	p	erspective pro	bjection, human vision, st	ereo perspecti	ve projectio	n, Colo	our				
П	t	heory, Conve	ersion From 2D to 3D,	3D space c	urves, 3D	bounda	ıry	6			
	r	epresentation,	Simple 3D modelling,	3D clipping,	Illumination	n mode	els,	Ũ			
	F	Reflection mo	odels, Shading algorithm	ns. Geometri	cal Transfo	rmatio	ns:				
	I	Introduction, Frames of reference, Modelling transformations, Instances,									
	F	icking, Flying	g, Scaling the VE, Collisio	on detection.							
	V	virtual Enviro	nment:								
	I	nput: Tracker, S	Sensor, Digital Gloves, Mov	ement Capture	, Video-based	l Input, i	3D				
	N	Aenus & 3D Sc	anner etc.					_			
III		Dutput: V1sual /	Auditory / Haptic Devices.	vinonmont Cor	anutan anuina	nmont V	<b>ZD</b>	7			
	t i	echnology Mo	del of interaction VR System	vironinent, Cor ms	uputer enviro	mnent, '	vк				
	A	nimating the V	Virtual Environmen								

IV	Augmented Reality: Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.	7					
V       Development Tools and Frameworks: Human factors: Introduction, the eye, the ear, the somatic senses. Software: Introduction, Modelling virtual world, Physical simulation, VR toolkits, Introduction to VRML         AB (VD Amplifications)							
VI	VI AR / VR Applications: Introduction, Engineering, Entertainment, Science, Training.						
	Text Books						
1	Grigore C. Burdea, Philippe Coiffet, Virtual Reality Technology, Wiley 2016						
2	Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan 2013.	i Kaufmann,					
	References						
1	Alan Craig, William Sherman and Jeffrey Will, Developing Virtual Reality Applications, Foundations of Effective Design, Morgan Kaufmann, 2009.						
2	John Vince, "Virtual Reality Systems", Pearson Education Asia, 2007.						
	Useful Links						
1	https://nptel.ac.in/courses/106106138						
2	https://gamedevacademy.org/category/vr-ar-tutorials/						

CO-PO Mapping															
	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1									2				1		
CO2			2		1										
CO3			2												3
The stron	ath of	monni	ag is to	haum	itton of	1. I. I. o		Indian	<u>, 2. Ц</u>	ah					

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.

#### Assessment

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Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)										
AY 2022-23										
Course Information										
Programme		B.Tech. (Informat	ion Technology)							
Class, Seme	ster	Final Year, B. Teo	ch., Sem-VIII							
Course Cod	e	5IT436	5IT436							
Course Nan	ne	Professional Elective -5: Geographical Information System								
Desired Rec	uisites:	-								
Teachin	g Scheme		Examination S	Scheme (Marks)						
Lecture	3 Hrs/week	MSE	ISE	ESE	Total					
Tutorial	-	30	20	50	100					
	- Credits: 3									
		Cor	urse Objectives							

	Course Objectives
1	To make students able to describe, GIS.
2	To introduce GIS data structures, data capture, storage, analysis and the use.
3	To impart typical uses of GIS in business government and resource management

# Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

СО	<b>Course Outcome Statement/s</b>	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Distinguish spatial and non-spatial characteristics of GIS data	Π	Understanding
CO2	Examine the data quality issues and performance for GIS data	III	Applying
CO3	Design a GIS application for real time system	VI	Creating

Module	Module Contents	Hours
Ι	<b>Module 1: Introduction to GIS</b> Introduction to GIS, components of GIS, Real World to Digital World through GIS, GIS data and structures, representing the Real World.	7
II	Module 2: Georeferencing and Map Projections Georeferencing, Relative and Discrete Referencing, levation models, Coordinate Systems, Maps and Numbering, Map Projections.	6
ш	<b>Module 3: Data Quality and Measures</b> Positional Accuracy and Source of Errors, Classification Accuracy and Pixel Errors, Spatial Data Editing and Transformations, data model and comparisons.	б
IV	Module 4: Remote Sensing and GPS and Database systems: Introduction to Remote Sensing, RS-working, satellites, and GPS, GPS: Working and Signals, GPS errors Introduction to database, Database Management System - Introduction, DBMS models, Normalization forms, Creating and Maintaining a database, Spatial Database systems.	7
V	Module 5: Spatial Query and analysis Spatial Query - Introduction, Spatial analysis, Raster and vector data analysis, Overlay operations, Basic spatial analysis, advanced spatial analysis.	6
VI	Module 6: GIS Data Standard and Infrastructure Open Source GIS Softwares- Introduction, PROS & CONS of open source, GIS Data Standards, Open Geospatial Consortium (OGC), National Spatial Data Infrastructure (NSDI), Introduction to Web GIS and Geoserver.	7

**Text Books** 

1	Ian HeyWood, Sarah Cornelius and Steve Carver, "An Introduction to Geographical Information Systems", Pearson Education, 2 <sup>nd</sup> Edition, 2006								
2	Kang-tsung Chang, "Introduction to Geographic Information Systems", Tata McGrawHill, 4 <sup>th</sup> Edition, 2007								
References									
1	Peter A. Burrough, Rachael A. McDonnell and Christopher D. Lloyd "Principles of Geographical Information System", Oxford University Press, 2016								
2	Keith C. Clarke, Bradley O. Parks, and Michael P. Crane, "Geographical Information Systems and Environmental Modeling", Prentice-Hall India, 2001								
3	Michael N. Demers, "Fundamentals of Geographic Information Systems", 4 <sup>th</sup> Edition, Wiley Publication 2008,								
4	Chor Pang Lo, "Concepts and Techniques of Geographic Information Systems", Pearson Prentice Hall, 2007								
	Useful Links								
1	https://nptel.ac.in/courses/107/105/107105088/								
2	https://nptel.ac.in/courses/105/107/105107206/								
3	https://nptel.ac.in/courses/105/107/105107155/								
4									

CO-PO Mapping															
	Programme Outcomes (PO)											PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3							1					2		
CO2		1													
CO3	2		2											1	
The stren	gth of 1	mappir	ng is to	be wri	itten as	s 1: Lo	w, 2: N	ledium	n, 3: Hi	igh					1

Each CO of the course must map to at least one PO.

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	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute) AY 2022-23										
	Course Information										
Progra	amme		B.Tech. (Informat	tion Technology)							
Class,	Semes	ster	Final Year B. Tec	h., Sem VIII							
Cours	e Code	e	5IT437								
Cours	e Nam	e	Professional Elect	tive -5: Decision Supp	ort System						
Desire											
Te	aching	g Scheme		<b>Examination Sch</b>	eme (Marks)						
Lectur	re	3 Hrs/week	MSE	ISE	ESE	Total					
Tutor	ial	-	30	20	50	100					
		-		Credit	s: 3						
			9								
1	Tode	agariba tha dag	Cou	rse Objectives							
1	To in	troduce veries	ision making proce	ss							
2		nounce variou	is use cases in decis	logicion surres et est							
3	To pi	covide prototy	pe development in c	lecision support system	n 						
At the	end of	the course th	e students will be a	ble to	nomy Level						
At the		the course, th			Bloom's	Bloom's					
СО		Cou	rse Outcome State	ment/s	Taxonomy	Taxonomy					
			Description								
CO1	Ident	ify decision su	pport tools that can	aid decision making	II	Understanding					
CO2	Applying										
02											
CO3	Analysing										
	_			~							
Modu		two duration D	Modul	e Contents		Hours					
T	II In	troduction to	decision support sy	stems Components of	a decision	6					
1	SI SI	inport systems	Models in decision	n support systems	a decision	0					
	N	Iodels in Deci	sion Support Syste	ems:							
п	S	tructured, Sen	ni - Structured and	Unstructured problem	s, Purpose of	7					
11	cl	classification of models, Solution Techniques - Optimization : Linear									
		rogramming, I	Decision Support Sy	stems for Forecasting							
	<b>ע</b>   <b>ש</b>	ecision Makin	i <b>lg:</b> ng for Warehouse I	ocation Centre of	oravity · Ardalan						
III	b h	ouristic and tra	neportation cost mo	dels Estimation of spa	ce requirement in	6					
	2	warehouse and	d economic order a	1 antity ( FOO )	ce requirement in						
		ecision Maki	ng for Warehouse								
	S	pace calculation	on in a warehouse :	Space calculation for	racks, Order						
IV	P	icking ; Mater	ial handling equipm	ent's, Material Safety	and Safety						
	E	quipment's, Au	utomated storage &	replenishment system	s ( AS / RS )						
	D	ecision Suppo	ort Systems for Ma	rketing:	D						
V		ecision Suppo	ort Systems for Pro	oduct Pricing Model	Pricing : Model	7					
	3 	arket Rick A	$ralysis$ with $\cdot$	, Taxanon and the DIS	Induion network						
	T	ransshipment.	Flexibility and Six	Sigma, Flexibility and	Total Cost of the						
VI	N	etwork, Risk	Analysis for the I	Distribution Network,	Echelons in the	6					
	N	etwork									
				I EXT BOOKS							

1	
T	

1

Efraim Turban, Jay E. Aronson, Ting-Peng Liang, & Ramesh Sharda, "Decision Support Systems and Intelligent Systems", 8th Edition, Prentice Hall, 2006; ISBN 0-13-198660-0

#### References

1 Alex Tapscott, "Blockchain Revolution", Microsoft Publication, 1st Edition, 2016

#### **Useful Links**

# Module I, II, III, IV, V, VI

https://nptel.ac.in/courses/110/105/110105147/

	CO-PO Mapping														
	Programme Outcomes (PO)									PSO					
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3		1										2		
CO2		2													
CO3	2		1											1	
The stren	The strength of mapping is to be written as 1: Low, 2: Medium, 3: High														
E 1 00	C (1				. 1	· •									

Each CO of the course must map to at least one PO.

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	Walchand College of Engineering, Sangli									
(Government Aided Autonomous Institute)										
	AY 2022-23									
Ducan			Cours	se Information						
Progra		4.0.20	B. Iech. (Informat	Tech Sem VIII						
Class, Schlester Fillar Fear D. febli, Selli VIII										
Cours	e Cod	e	511438							
Cours	e Nam	e	Professional Elect	tive 5 Information and	Network Security					
Desired Requisites:										
Te		3 Ling/run alv	MCE	Examination Sche	me (Marks)	Tetel				
Tutor		5 HIS/ Week		15E 20	<b>ESE</b>	100				
Tutor	lai	-		20	30	100				
		-		Creatts:	3					
			Сош	rse Objectives						
1	To u	nderstand the c	ligital forensics tecl	hniques for forensic ex	amination					
2	To ir	troduce the ac	quisition, identifica	tion and analysis of da	ta.					
2	Tom	rovide incideto	in computer foren	vic and crimes						
3	10 p		an computer forens	with Pleam's Taxon	amy Laval					
At the	end of	the course th	e students will be a	) with bloom's Taxon ble to	omy Level					
		the course, th			Bloom's	Bloom's				
СО		Cou	rse Outcome State	ement/s	Taxonomy	Taxonomy				
					Level	Description				
COI	Appl	y forensic ana	lysis tools to recov	er important evidence	III	Applying				
COI	to ide	entify compute	er crime							
CO2	Anal	yze various cri	mes in hardware ar	nd software systems	IV	Analysing				
CO3	Inves	stigate the next	-generation comput	ter crimes	VI	Evaluating				
						1				
Modu	le		Modul	e Contents		Hours				
		ntroduction D	igital Forensic	Nothodo of staming date	Understanding					
I	II fi	la system Def	Digital Folensics, r	f computer crimes. Dis	tinction between	6				
		omputor orimo	and conventional	crimes						
п	B	asic Concepts	of Network securi	ty Encryption and dec	votion methods	7				
	E	ncryption Alg	orithm	ty, Eneryption and dee	yption methods,	,				
	C	computer Cri	nes:							
	Т	ypes of comp	uter crimes, Compu	ater virus, and comput	er worm, Trojan					
Ш	h	orse, trap do	or, super zapping,	logic bombs, Social	media crimes,	6				
	ir	ntellectual prop	perty crimes, cyber	r pornography & cybe	r terrorism, hate					
	sp	beech and cybe	er security							
	C	computer For	ensic and Tools:							
IV	S	eizure of suspe	ected computer, Pre	paration required prior	to seizure, Legal	7				
		nd privacy issu	les in computer for	ensics, Open and Proj	prietary tools for					
		isk Forensics	~o							
		)igital Forence	ics-Memory & N	etwork forensics Co	mputer forensic					
V	ir	vestigation R	estoration of dele	eted files Password	cracking Fmail	7				
	11   tr	acking			eraening, Email	,				
	N	Iohile nhone l	Forensics							
VI		igital Forens	ics and Mobile pho	one. Relevant law to c	ombat computer	_				
		rime –Informat	tion Technology Ac	ct, New challenges of c	omputer forensic	6				

	Text Books						
1	Warren G. Kruse II and Jay G. Heiser, "Computer Forensics: Incident Response Essentials",						
1	Addison Wesley, 2002						
r	Nelson, B, Phillips, A, Enfinger, F, Stuart, C., "Guide to Computer Forensics and						
Δ	Investigations", 2nd ed., Thomson Course Technology, 2006, ISBN: 0-619-21706-5						
References							
1	Vacca, J, "Computer Forensics, Computer Crime Scene Investigation", 2nd Ed, Charles River						
1	Media, 2005, ISBN: 1-58450-389						
	Useful Links						
1	Module I, II, III, IV, V, VI						
1	https://onlinecourses.swayam2.ac.in/cec20_lb06/preview						

	CO-PO Mapping														
	Programme Outcomes (PO)										PSO				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3		1										2		
CO2		2													
CO3	2		1											1	
The stren	gth of	mappii	ng is to	be wr	itten a	s 1: Lo	w. 2: N	/ledium	1. 3: H	igh					

Each CO of the course must map to at least one PO.

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Walchand College of Engineering, Sangli						
	(Government Aided Autonomous Institute)					
AY 2022-23						
Course Information						
Programme	B.Tech. (Information Technology)					
Class, Semester	Final Year, B. Tech., Sem VIII					
Course Code	5IT439					
Course Name	Professional Elective -5: Social Network Analytics					
Desired Requisites:	Data Structures					
Course Code Course Name Desired Requisites:	5IT439Professional Elective -5: Social Network AnalyticsData Structures					

Teachin	g Scheme	Examination Scheme (Marks)								
Lecture	3 Hrs/week	MSE	ISE	ESE	Total					
Tutorial	-	30	20	50	100					
	-		Cred	its: 3						

	Course Objectives								
1	1 To introduce the concept of semantic web and applications								
2	To explain human behaviour in social web and related communiti	les							
3	To express visualization of social networks								
	Course Outcomes (CO) with Bloom's Taxonomy Level								
At the	At the end of the course, the students will be able to,								
со	Course Outcome Statement/s	Bloom's Taxonomy	Bloom's Taxonomy						
		Level	Description						
<b>CO1</b>	Analyse human behaviour in social web and related communities	IV	Analysing						
CO2	Evaluate relationships between social networks	V	Evaluating						
<b>CO3</b>	Examine semantic web related applications	V	Evaluating						

Module	Module Contents	Hours
Ι	<b>Introduction :</b> Introduction to Semantic Web: Limitations of current Web Development of Semantic Web, Emergence of the Social Web, Social Network analysis: Development of Social Network Analysis, Key concepts and measures in network analysis.	6
П	Web Data Semantics and Knowledge Representation Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities, Web-based networks, Applications of Social Network Analysis. Ontology and their role in the Semantic Web: Ontology-based knowledge Representation, Ontology languages for the Semantic Web: Resource Description Framework, Web Ontology Language	7
III	Modeling And Aggregating State-of-the-art in network data representation, Ontological representation of social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data.	6
IV	<b>Issues Extraction And Mining Communities</b> Extracting evolution of Web Community from a Series of Web Archive. Detecting communities in social networks. Definition of community. Evaluating communities. Methods for community detection and mining.	6
V	<b>Predicting Human Behavior And Privacy Issues</b> Understanding and predicting human behavior for social communities, User data management, Inference and Distribution, Enabling new human experiences, Reality mining, Context, Awareness, Privacy in online social networks, Trust in online environment.	7

	Visualization And Applications Of Social Networks								
371	Graph theory, Centrality, Clustering, Node-Edge Diagrams, Matrix	7							
VI	representation, Visualizing online social networks, Visualizing social networks	1							
	with matrix-based representations, Matrix and Node-Link Diagrams								
	Text Books								
1	1 Peter Mika, "Social Networks and the Semantic Web", First Edition, Springer 2007.								
Borko Furht, "Handbook of Social Network Technologies and Applications", 1st Edition									
<sup>2</sup> 2010.									
	References								
	Guandong Xu, Yanchun Zhang and Lin Li, "Web Mining and Social Networking -	Techniques							
1	and applications", First Edition Springer, 2011.								
2	2 Charu C. Aggarwal, "Social Network Data Analytics", Springer; 2011								
	Useful Links								
1	https://nptel.ac.in/courses/106/106/106106169/								
2	https://blog.hootsuite.com/social-media-analytics/								
2									

3 https://towardsdatascience.com/how-to-get-started-with-social-network-analysis-6d527685d374

	CO-PO Mapping													
Programme Outcomes (PO)									PSO					
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		2											2	
CO2					2	1							2	
CO3					2							3		
The streng	The strength of mapping is to be written as 1: Low, 2: Medium, 3: High													

Each CO of the course must map to at least one PO.

#### Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of

assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

Walchand College of Engineering, Sangli						
	(Government Aided Autonomous Institute)					
	AY 2022-23					
Course Information						
Programme B.Tech. (Information Technology)						
Class, Semester	Final Year B. Tech., Sem VIII					
Course Code	5IT440					
Course Name	Professional Elective - 5: Computer Graphics and Multimedia Techniques					
<b>Desired Requisites:</b>	Data Structures, Computer Programming					

Teaching	g Scheme		Examination S	cheme (Marks)	
Lecture	3 Hrs/week	MSE	ISE	ESE	Total
Tutorial	-	30	20	50	100
	-		Cred	its: 3	

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	Course Objectives					
1	To introduce basics of computer graphics					
2	To describe object transformation algorithms and its modelling					
3	3 To impart key concepts of digital multimedia handling and storage devices					
	Course Outcomes (CO) with Bloom's Taxon	omy Level				
At the	end of the course, the students will be able to,					
СО	<b>Course Outcome Statement/s</b>	Bloom's Taxonomy Level	Bloom's Taxonomy Description			
CO1	CO1 Expain context of the computer graphics towards object II representation					
CO2	Implement geometric transformations and object modelling	III	Applying			
CO3	Evaluate digital multimedia handling techniques and its storages	V	Evaluating			
Modu	le Module Contents		Hours			
Ι	Graphics i/p & o/p Devices, Display Adapters, Vector Displays Scan Conversion Techniques- Real Time, RLE, Frame Buf Visualization of Basic Mathematical Objects- Point, Line, Bresenham's Techniques	& Raster Scan fers Circle – DDA &	6			
П	Dreseman is recentiques         Geometric Transformations:         Object Representations & Transformations- 2D & 3D         II       Affine Transformations- Translation, Scaling, Rotation, Reflection, 8         Shearing; Multiple Transformations         Plane Geometric Projections- Parallel and Perspective Viewing					
Ш	esentations ag and Seed Fill Ordered Dither	6				
	Clipping and Hidden line Elimination: Window & Viewport Transformation					

v	Plan Cur Cur	ne & S ve Rep ves, In	pace ( present terpola	Curves ation ation,	s: & Vis Cubic	sualiza Splir	ntion- ne, Par	Non-P abolic	arame Blene	tric an ded Cu	d Para urves,	ametric Bezier		7
	Cur	ves and	l B-Spl	ine Ci	irves									
VI	Multimedia Elements: Multimedia Components, Types of Media Files, Compression Techniques, Media Editing & Recording Software, Portable Storage Devices6Principles of Animation, Animation Software CASE study6							6						
						]	Fext B	ooks						
1	David I Edition	F. Roge , Reprin	ers, J A nt 2015	alan, A 5	dams,	"Mat	hemati	cal El	ements	for Co	ompute	er Graf	ohics", T	MGH, 2 <sup>nd</sup>
2	Tay Va	Tay Vaughan, "Multimedia Making it Work", TMGH, 8th Edition, 2010												
References														
1	Steve N 2016	Iarschn	er, Pet	er Shi	rley, "	Funda	imenta	ls of C	omput	er Graj	phics"	CRC	Press, 5 <sup>th</sup>	Edition,
2	Zhigang Edition	g Xiang , Reprin	g, <i>''Sch</i> nt 2020	aum's )	Outlin	e of C	ompute	er Gra	phics'	', McC	Braw-H	lill Edu	cation, 2	nd
						U	seful I	Links						
1	https://i	ptel.ac	.in/cou	urses/1	06/106	5/1061	06090	/						
2	https://v	www.tu	torials	point.	com/co	mpute	er_grap	hics/ii	ndex.h	tm				
3	https://v	www.ja	vatpoi	nt.com	ı/comp	uter-g	raphics	s-tutor	ial					
	CO-PO Mapping													
		Programme Outcomes (PO) PSO												
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2		1											
CO2			3	2									1	
CO3		2										1		3
The str	ength of	mappii	ng is to	be wr	ritten a	s 1: Lo	ow, 2: I	Mediu	m, 3: F	ligh				
Each C	CO of the	course	must 1	nap to	at leas	st one	PO.							

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

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	Walchand College of Engineering, Sangli					
	(Government Aided Autonomous Institute)					
	AY 2022-23					
	Course Information					
Programme	B.Tech. (Information Technology)					
Class, Semester	Final Year B. Tech., Sem VIII					
Course Code	5IT441					
Course Name	Professional Elective - 6: Advanced Distributed Computing					
<b>Desired Requisites:</b>	Data Mining					

Teaching	g Scheme	Examination Scheme (Marks)							
Lecture	3 Hrs/week	MSE	ISE	ESE	Total				
Tutorial	-	30	20	50	100				
	-		Crec	lits: 3					

	Course Objectives
1	To impart the fundamental concepts of Distributed Computing
2	To introduce Data flow Synchronization and Pipelining
3	To explain Client-Server Programming

## Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	<b>Course Outcome Statement/s</b>	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Realize the Advancement in Distributed Computing	II	Understanding
CO2	Study the various approach to implement distributed	IV	Analysing
	environment for computation		
CO3	Evaluate the reliability and performance various algorithms	V	Evaluating
COJ	of distributed system		

Module	Module Contents	Hours
Ι	Introduction to Distributed Systems: Task Creation and Termination (Async, Finish), Tasks in Java's Fork/Join Framework, Computation Graphs, Work, Span, Multiprocessor Scheduling	6
П	<b>Distributed System with Parallelism:</b> Parallel Speedup, Amdahl's Law,Reciprocal ArraySum using Async- Finish, ReciprocalArraySum using RecursiveAction's in Java's Fork/Join Framework	7
III	<b>Functional Parallelism:</b> Futures: Tasks with Return Value, Futures in Java's Fork/Join Framework, Memoization, Java Streams, Data Races and Determinism	6
IV	<b>Data flow Synchronization and Pipelining:</b> Split-phase Barriers with Java Phasers, Point-to-Point Sychronization with Phasers, One-Dimensional Iterative Averaging with Phasers, Pipeline Parallelism, Data Flow Parallelism	7
V	<b>Distributed Map Reduce:</b> Introduction to Map-Reduce, Hadoop Framework, Spark Framework, TF-IDF Example, Page Rank Example, Demonstration: Page Rank Algorithm in Spark	7
VI	<b>Client-Server Programming:</b> Introduction to Sockets, Serialization/Deserialization, Remote Method Invocation, Multicast Sockets, Publish-Subscribe Mode, Demonstration: File Server using Sockets	6

	Text Books
1	Prajapati Vignesh, "Big Data Analytics with R and Hadoop", Packt Publishing, 1st Edition,
1	2013
2	Minelli Michael, Chambers Michehe, "Big Data, Big Analytics: Emerging Business Intelligence
2	and Analytic Trends for Today's Business", Ambiga Dhiraj, Wiely CIO Series, 1st Edition, 2013
	References
1	Franks Bill, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams
1	with Advanced Analytics", Wiley and SAS Business Series, 1st Edition, 2012
	Useful Links
1	Module I, II, III, IV, V, VI
1	https://nptel.ac.in/courses/106/104/106104189/

CO-PO Mapping															
		Programme Outcomes (PO) PSO													
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1			2									2		
CO2		1													
CO3	2	2 1 3													
The stren	ngth of	mapp	ing is	to be v	written	n as 1:	Low, 2	2: Mec	lium, 3	3: Higł	ı				
Each CC	of the	e cours	e mus	t map	to at le	east on	e PO.			_					

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of

assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

	Walchand College of Engineering, Sangli
	(Government Aided Autonomous Institute)
	AY 2022-23
	Course Information
Programme	B.Tech. (Information Technology)
Class, Semester	Final Year B. Tech., Sem VIII
Course Code	5IT442
Course Name	Professional Elective 6: Advanced Database Engineering
<b>Desired Requisites:</b>	Database Engineering

Teachi	ng Scheme	Examination Scheme (Marks)						
Lecture	3 Hrs/week	MSE	ISE	ESE	Total			
Tutorial	-	30	20	50	100			
	-	Credits: 3						

	Course Objectives									
1	To introduce parallel and distributed databases architectures.									
2	To deliver application oriented appropriate database system.									
3	To develop design and implementation skills for database systems									
	Course Outcomes (CO) with Bloom's Taxonomy Level									
At the	end of the course, the students will be able to,									
		Bloom's	Bloom's							
CO	Comme Orden and Statemental	<b>T</b>	-							
	Course Outcome Statement/s	Taxonomy	Taxonomy							
co	Course Outcome Statement/s	Taxonomy Level	Taxonomy Description							
CO1	Differentiate parallel and distributed database architectures.	Level	Taxonomy Description Understanding							
CO1 CO2	Differentiate parallel and distributed database architectures.         Selection of appropriate database system for an application.	Taxonomy     Level     II     III	TaxonomyDescriptionUnderstandingApplying							
CO1 CO2 CO3	Differentiate parallel and distributed database architectures.         Selection of appropriate database system for an application.         Build a database for an application	Taxonomy     Level     II     III     VI	Taxonomy DescriptionUnderstandingApplyingCreating							

Module	Module Contents	Hours
Ι	Parallel and Distributed Databases: Architectures for parallel database, Parallel query Evaluation, Parallelizing individual operation, Parallel Query Optimization, Distributed DBMS, Architecture, Storing data in distributed DBMS, Distributed Catalog Management, Distributed query processing, Updating distributed data, Distributed concurrence control, Distributed recovery.	8
П	<ul><li>Data Warehousing and Data Mining: Introduction to decision support, OLAP, Implementation Techniques for OLAP, Data Warehousing, Views and decision support, view materialization.</li><li>Data Mining: Introduction, Counting Co-occurrences, Mining for rules, Tree structured rules, Clustering, Similarity search over sequences.</li></ul>	7
III	Object Database Systems: Structured data types, Operations, inheritance, Objects, OID and Reference types, design for ORDBMS, Comparing RDBMS with OODBMS and ORDBMS.	5
IV	Web Databases: Database, information retrieval. Indexing for text search. Web search engines, web search architecture, Inverted indexes the IR way, Inverted indexes for web search engines, web crawling, web search statistics. Data model for XML. XML Quires	7
v	Spatial Database: Types of Spatial Data, Spatial Queries, Application, spatial Indexes, space filling Curves, Grid files, R trees.	6

VI	Deductive Database: Recursive Queries, datalog programs, least model semantics, fixpoint operator, Recursive Queries with Negation, stratification, evaluation of Recursive Queries.	6							
	Text Books								
1	Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", 3 <sup>rd</sup> E Hill Higher Education, 2014	dition, McGraw-							
	References								
1	Carlos Coronel, Steven Morris, "Database Systems: Design, Implementation, & 13 <sup>th</sup> Edition, Cengage Learning, 2018.	& Management",							
2	Shio Kumar Singh, "Database Systems: Concepts, Design and Applications", 2 <sup>nd</sup> Edition, Pearson Education India, 2011								
	Useful Links								
1	https://nptel.ac.in/courses/106/104/106104021/								
2	https://nptel.ac.in/courses/106/106/106106093/								

CO-PO Mapping														
	Programme Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1			1											
CO2	2				2									
CO3														2
The stren	The strength of mapping is to be written as 1: Low, 2: Medium, 3: High													
Each CO	of the	course	must 1	nap to	at leas	t one P	Ю.							

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	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)											
			(Oovernment Al	<b>AY 2022-23</b>	<i>ie)</i>							
			Cour	se Information								
Progr	amme		B.Tech. (Information	tion Technology)								
Class,	Seme	ster	Final Year B. Tec	ch., Sem VIII								
Cours	e Cod	e	5IT443									
Cours	Course Name Professional Elective 6: Transacting Blockchain											
Desire	Desired Requisites: Cryptography and Network Security											
Te	eaching	g Scheme										
Lectu	re	3 Hrs/week	MSE	ISE	ESE	Total						
Tutor	ial	-	30	20	50	100						
		-		Credits:	3							
			Сон	rse Objectives								
1	To d	iscuss basics o	f cryptography									
2	To ir	troduce block	chain and transaction	ons								
3	To p	rovide insights	in algorithms of m	ining and hashing in blo	ockchain techno	logies						
		Cou	rse Outcomes (CO	) with Bloom's Taxon	omy Level							
At the	end of	f the course, th	e students will be a	ble to,								
CO		C			Bloom's	Bloom's						
CO		Cor	urse Outcome Stat	ement/s	I axonomy	Taxonomy Description						
CO1	CO1 Comprehend cryptographic algorithms on data block II											
CO2	CO2 Illustrate different hashing and mining algorithms III											
CO3	Analysing											
		•		<b>·</b>								
Modu	ıle		Modul	e Contents		Hours						
т	I I	ntroduction B	lockchain Technol	logy	Desis Counts	C						
1	P	rimitives	BIOCKCHAIN AFCHILE	cture, Conceptualization	i, Basic Crypto	0						
	C	Crypto System	s:									
II	H	lashing, public	key cryptosystems	, private vs public block	chain and use	7						
	c	ases, Hash Puz	zles									
		Sitcoin:	and corints. Us	a agent of Ditagin Dlag	zahain garinting							
111		nguaga in mic	ran and scripts, Us	ata Downside of Bitco	in mining	6						
		oins in Block	chain.	etc, Downside of Biteo	III – IIIIIIIg							
IV	A	Iternative coir	ns – Bitcoin Blockel	hain Ethereum and Sma	rt contracts.	7						
	Т	The real need for	or mining – consens	sus – Byzantine General	s Problem							
	B	lockchain and	l Distributed Netw	vork:								
V		Distributed coo	rdination problem,	permissioned blockcha	in, Introduction	7						
	B	lockchain use	case:									
1.11	P	ermissioned 1	Blockchain use ca	uses – Hyperledger, C	Corda, Uses of							
VI	В	lockchain in	E-Governance, La	nd Registration, Medi	cal Information	6						
	S	ystems, and ot	hers									
			,	Fort Books								
1	Dani	el Drescher. "I	Blockchain Basics ".	Apress Publications".	st Edition.2017							
2	Mela	nie Swa, "Blo	ckchain ",O'ReillyI	Publications, 1st Edition	, 2015							
			<b>`</b>									
		<b>m</b>		References								
1	Alex	Tapscott, "Bl	ockchain Revolution	n", Microsoft Publicatio	on, 1st Edition, 2	2016						

Course Contents for BTech Programme, Department of Information Technology, AY2022-23

Useful Links

Module I, II, III, IV, V, VI

1

https://onlinecourses.nptel.ac.in/noc20\_cs01/preview

CO-PO Mapping															
	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3		1										2		
CO2		2													
CO3	2		1											1	
The sture	ath of			1		. 1. T	<b>) )</b>	π. 1.	2.11	. 1.					

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.

#### Assessment

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Walchand College of Engineering, Sangli								
(Government Aided Autonomous Institute)								
AY 2022-23								
Course Information								
Programme	B.Tech. (Information Technology)							
Class, Semester	Final Year B. Tech., Sem VIII							
Course Code	5IT444							
Course Name	Professional Elective - 6: Big Data Analytics							
<b>Desired Requisites:</b>	Data Mining							

	heme (Marks)	Teaching Scheme			
Total	ESE	ISE	MSE	3 Hrs/week	Lecture
100	50	20	30	-	Tutorial
I	ts: 3	-			
	50 ts: 3	20 Cred	30	-	Tutorial

	Course Objectives		
1	To elaborate the fundamental concepts of big data analytics		
2	To analyze the big data using various techniques		
3	To represent big data using visualization tools		
	Course Outcomes (CO) with Bloom's Taxonomy	v Level	
At the	end of the course, the students will be able to,		
со	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Elaborate the fundamentals of various big data analytics techniques	III	Applying
CO1 CO2	Elaborate the fundamentals of various big data analytics techniques Study the various approach to implement distributed environment	III IV	Applying Analysing
CO1 CO2 CO3	Elaborate the fundamentals of various big data analytics techniques Study the various approach to implement distributed environment Evaluate the performance of algorithms on advanced distributed system	III IV V	Applying         Analysing         Evaluating

Module	Module Contents	Hours						
	Introduction to Big Data:							
Ι	Big Data and its Importance, Four V's of Big Data, Drivers for Big Data -	6						
	Introduction to Big Data Analytics, Big Data Analytics applications.							
	Hadoop's Parallel World, Data discovery, Open source technology for Big Data							
II	Analytics, Cloud and Big Data, Predictive Analytics, Mobile Business	7						
	Intelligence and Big Data, Crowd Sourcing Analytics, Inter- and Trans-Firewall Analytics							
	Processing Big Data:							
	Detecting Patterns in Complex Data with Clustering and Link Analysis,							
ш	Identifying previously unknown groupings within a data set, Segmenting the							
111	customer market with the K-Means algorithm, Defining similarity with							
	appropriate distance measures, Constructing tree-like clusters with hierarchical							
	clustering, Clustering text documents and tweets to aid understanding							
IV	Hadoop Mapreduce:	7						
	Introduction to Map-Reduce, Hadoop Framework, Spark Framework	•						
	Distributed Map Reduce:							
V	TF-IDF Example, Page Rank Example, Demonstration: Page Rank Algorithm in	7						
	Spark	-						
X / X	Analytic Tools:							
VI	PIG overview, SQL vs. PIG, PIG Latin, User Defined Functions, Data Processing	6						
	Operators, Overview of Hive, Hive QL, Tables, Querying Data	-						
Text Books								
1 P1	ajapati Vignesh, "Big Data Analytics with R and Hadoop", Packt Publishing, 1 <sup>st</sup> E	dition, 2013						

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2	Minelli Michael, Chambers Michehe, "Big Data, Big Analytics: Emerging Business Intelligence and
4	Analytic Trends for Today's Business", Ambiga Dhiraj, Wiely CIO Series, 1st Edition, 2013
	References
1	Franks Bill, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with
1	Advanced Analytics", Wiley and SAS Business Series, 1st Edition, 2012
	Useful Links
1	Module I, II, III, IV, V, VI
1	https://nptel.ac.in/courses/106/104/106104189/

CO-PO Mapping															
	Programme Outcomes (PO)											PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3		1										2		
CO2		2													
CO3	2		1											1	
The stree	The strength of mapping is to be written as 1: Low, 2: Medium, 3: High														
Each CO	of the	e cours	e mus	t map	to at l	east on	e PO.								

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Walchand College of Engineering, Sangli						
(Government Aided Autonomous Institute)						
AY 2022-23						
Course Information						
Programme	B.Tech. (Information Technology)					
Class, Semester	Final Year B. Tech., Sem VIII					
Course Code	5IT445					
Course Name	Professional Elective – 6: Software Reliability and Fault Detection					
Desired Requisites:	Software Engineering					

Teachi	ng Scheme	Examination Scheme (Marks)								
Lecture	3 Hrs/week	MSE	ISE	ESE	<b>Total</b> 100					
Tutorial	-	30	20	50						
	-		Credits: 3							
	_	Cicuits. 5								

	Course Objectives									
1	To introduce fundamentals of virtualization									
2	To impart various types of virtualization									
3	<b>3</b> To acquaint the significance of virtualization in data center									
Course Outcomes (CO) with Bloom's Taxonomy Level										
At the	end of the course, the students will be able to,									
со	Course Outcome Statement/s	Bloom's Taxonomy Description								
CO1	Grasp scientific concepts of Software Reliability	II	Understanding							
CO2	Apply Software Reliability Growth Models in Software Development	III	Applying							
CO3	Resolve the Software system fault tolerance	IV	Analysing							
Modu	le Module Contents		Hours							
Ι	Basic of Software Testing: Software Testing, Testing type           Cyclomatic complexity, Graph Matrices, Debugging & Test C	es, Flow graph, ase Strategies	7							
II	Software Quality: Software Quality Assurance, Software Reuse, Documentation Standards, Software Configuration Management, Version Con	7								
III	Software Reliability: Software Reliability, Software Reliability Issues, Statistical Te Software Quality Management, ISO 9000, Case Tools, Charac Case Tools	7								
IV	User Interface and Design: Concept of user Interface and Design, Types of user Interface, Based GUI Development	7								
v	Software Fault Detection: Basic terminology of Fault tolerant, Fault detection using fault tolerant in SRE, Techniques for Fault tolerant: Recovery bloc programming	5								
VI	Software Fault Analysis: Fault tree modeling, Fault tree analysis, Analysis of fault toler system, Quantitative analysis of fault tolerant system	6								
Text Books										
1	1Jalote Pankaj, "An Integrated Approach to Software Engineering", Narosa Publication, 3rd Edition, 2010.									
2	2 Sommerville, "Software Engineering", Pearson Education India, New Delhi,2nd Edition, 2006									
References										
1	1 Musa John D., "Software Reliability Engineering", Tata McGraw Hill, 2nd Edition, 1999									

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2	Lyu, "S	.yu, "Software Reliability Engineering", IEEE Computer Society Press, 1st Edition, 1996													
Useful Links															
1	1 Module I, II, III, IV, V https://onlinecourses.nptel.ac.in/noc21_cs15/preview														
1															
CO-PO Mapping															
	Programme Outcomes (PO)										PSO				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	1	3											2		
CO2			1												
CO3	2				2									1	
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High															
Each CO of the course must map to at least one PO.															

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MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of

assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.