## Syllabus of M. Tech. in Computer Science (Internet of Things)

Course Number	Subject	L	Т	Р	Credits
PGCS(IoT)10 1	Program Core I- Mathematical foundations of Computer Science	3	0	0	3
PGCS(IoT)10 2	Program Core II- Advanced Data Structures	3	0	0	3
PGCS(IoT)10 3 PGCS(IoT)10 3B/PGCS(Io T)103C	<ul> <li>Program Elective I-</li> <li>A. Data Science/</li> <li>B. Wireless Access Technologies/</li> <li>C. Mobile Applications and Services</li> </ul>	3	0	0	3
PGCS(IoT)10 4 PGCS(IoT)10 4 PGCS(IoT)10 4C	<ul> <li>Program Elective II-</li> <li>A. Machine Learning/</li> <li>B. Smart Sensors and Internet of Things/</li> <li>C. Logic and Functional Programming</li> </ul>	3	0	0	3
PGCS(IoT)10 5	Research Methodology and IPR	2	0	0	2
PGCS(IoT)106A/B/ C/D/E/F	Audit Course	2	0	0	0
PGCS(IoT)19 2	Laboratory 1 (Advanced Data Structures)	0	0	4	2
PGCS(IoT)193A/B/ C	Laboratory 2 (Based on Elective I)	0	0	4	2
PGCS(IoT)194A/B/ C	Laboratory 3 (Based on Elective II)	0	0	4	2
	Total Cred(	CSs: 20			

#### Semester I

### Semester II

Course Number	Subject	L	Т	Р	
PGCS(IoT)20 1	Program Core III – Advanced Computer Architecture	3	0	0	3
PGCS(IoT)20 2	ProgramCore IV – Wireless and Sensor Networks	3	0	0	3
PGCS(IoT)203A/ B/C	<ul> <li>Program Elective III –</li> <li>A. Sensor Networks and Internet of Things</li> <li>B. Data Visualization</li> <li>C. IoT Application and Communication Protocol</li> </ul>	3	0	0	3
PGCS(IoT)204 A/B/C	<ul> <li>Program Elective IV –</li> <li>A. Big Data Analytics</li> <li>B. Network Security</li> <li>C. Advanced Machine Learning</li> </ul>	3	0	0	3

PGCS(IoT)205A /B/C/D	AudCS Course	2	0	0	0
PGCS(IoT)291	Advanced Computer Architecture Lab	0	0	4	2
PGCS(IoT)292	Wireless and Sensor Networks Lab	0	0	4	2
PGCS(IoT)293A /B/C	Lab based on Elective III	0	0	4	2
PGCS(IoT)294	Term Paper with Seminar				
		0	0	4	2
	Total	Credits: 20			

#### Semester III

Course Number	Subject	L	Т	Р	Credits
PGCS(IoT)301A/B/ C	<ul> <li>Program Elective V –</li> <li>A. Cloud Computing</li> <li>B. Real Time Operating Systems</li> <li>C. Emulation and Simulation Methodologies</li> </ul>	3	0	0	03
PGCS(IoT)302A/       Open Elective         PGCS(IoT)302B/       A.Business Analytics         PGCS(IoT)302C/       B. Industrial Safety         PGCS(IoT)302D/       PGCS(IoT)302E/         PGCS(IoT)302E/       D.Cost Management of Engineering         PGCS(IoT)302F       E. Composite Materials         F. Waste to Energy       F. Waste to Energy		3	0	0	03
PGCS(IoT)391	Dissertation-I /Industrial Project	0	0	20	10
	Total Credi	ts: 16			

#### Semester IV

Course Number		L	Т	Р	Credits
	Subject				
PGCS(IoT)491	Dissertation II	0	0	32	16
	Total Credits: 16				

# <u>Semester I</u>

	Mathematical Foundation	Semester:1st					
	ode: PGCS(IoT)101						
	: 48 Hours	Maximum Marks: 100					
Teaching	-	Examination Scheme					
Theory: 3		End Semester Exam: 70					
Tutorial: Practical:							
Credit: 3	NA		avaluation	- N A			
credit: 3	edit: 3 Practical Sessional internal continuous evaluation: NA Practical Sessional external examination: NA						
Aim:		Plactical Sessional external examination	I: NA				
Sl. No.							
<u>1.</u>	To understand the basi	c notions of discrete and continuous pr	ohahility				
2.		hods of statistical inference, and the ro					
۷.	play in those methods.	ious of statistical finerence, and the ro	ie tilat sai	inpling distributions			
3.		orrect and meaningful statistical analy	ses of sim	ple to moderate			
	complexity.	······································					
Objective	 2:						
Sl. No.							
1.	To understand the math	hematical fundamentals that are prere	quisites fo	or a variety of courses			
	like Data mining, Netwo	ork protocols, analysis of Web traffic, C	omputer s	security, Software			
		architecture, operating systems, distri	buted sys	tems, Bioinformatics,			
	Machine learning.						
2.	-	anding of the mathematical and logical		-			
	techniques in informati and concurrency.	on technology like machine learning, p	orogramm	ing language design,			
3.	To study various sample	ing and classification problems.					
Pre-Requ	iisite:						
Sl. No.							
1.	Discrete Mathematics						
2.							
Contonto			Ura /	oolt			
Contents			Hrs./w				
Chapter 01	Name of the Topic	ter and annualating distribution	Hours	Marks			
01		ty, and cumulative distribution amilies of distributions, Expected	7	10			
		onal expectation, Applications of the					
		riate Central Limit Theorem,					
	Probabilistic inequalitie	•					
0.2		ling distributions of estimators,	7	12			
UZ			-				
02	Methods of Moments an	Methods of Moments and Maximum Likelihood					
			8	12			
3	Statistical inference, Int	troduction to multivariate statistical classification problems, principal	8	12			

4       Graph Theory: Isomorphism, Planar graphs, graph colouring. Hamilton circuits and Ruler cycles. Permutations and Combinations with and without repetition. Specialized techniques to solve combinatorial enumeration problems       11       16         5       Information Technology Applications, Data mining, Network protocls, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning.       10       15         6       Recent Trends in various distribution functions in the mathematical field of computer science for varying fields like bioinformatics, soft computing, and computer vision.       40       70         1       Internal Assessment Examination & Preparation of Semester Examination Total:       1000       70         2       Internal Assessment Examination & Preparation of Semester Examination       5       5         1       John Vince, Foundation Mathematics for Computer Science, 2.       Title of the Book       Edition/ISSN/ISBN       Name of the Publisher         1.       John Vince, Statistics with Reliability, Queuing, and Computer Science Applications.       Wiley       5         3.M.Mitzenmacher and Computer Science Applications.       Wiley       -       -         3.M.Mitzenmacher Algorithms and Probability and Computing: Randomized Algorithms and Probabilistic Combinatorics       Wiley       -       -         1.       John Vince, Reference Books:       Applied Combinat		model asse	ssment.			
Permutations and Combinations with and without repetition. Specialized techniques to solve combinatorial enumeration problems       Image: Computer architecture, operating systems, distributed systems, foinformatics, Machine learning.       10       15         6       Recent Trends in various distribution functions in the mathematical field of computer science for varying fields like bioinformatics, soft computer architecture, operating systems, distribution science for varying fields like bioinformatics, soft computer vision.       40       70         1       Internal Assessment Examination & Preparation of Semester Examination       30       30         Practical:       Skills to be developed:       100       100         2       Total:       100       100         Practical: Sl. No. 1& 2 compulsory & at least three from the rest)         Assignments:         List of Practical: Sl. No. 1& 2 compulsory & at least three from the rest)         Assignments:         List of Books         Tethe Book       Edition/ISSN/ISBN       Name of the Publisher         1.       John Vince, Matematics for Computer Science,       Springer.       Springer.         2.       K. Trivedi.       Probability and Science Applications.       Wiley.         3.M.Mitzenmacher and E. Upfal.       Applied Computing: Radomized	4			ng, 11	16	
problems     normation Technology Applications, Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning.     10     15       6     Recent Trends in various distribution functions in the mathematical field of computer science for varying fields like bioinformatics, soft computer science for varying fields like bioinformatics, soft computer science for varying fields like bioinformatics, soft computer vision.     40     70       1     Internal Assessment Examination & Preparation of Semester Examination     40     70       1     Internal Assessment Examination & Preparation of Semester Examination     30     30       1     Total:     100     100       Practical:     Skills to be developed:     100     100       List of Practical: Sl. No. 1& 2 compulsory & at least three from the rest)     Assignments:       List of Books     Title of the Book     Edition/ISSN/ISBN     Name of the Publisher       1.     John Vince,     Foundation Mathematics for Computer Science,     Springer.       2.     K. Trivedi.     Probability and Statistics with Reliability, Queuing, and Computer Science Applications.     Wiley.       3.M.Mitzenmacher and E. Upfal.     Probability and Computers     Wiley       Reference Books:     Internal Assis.     Internal Assis.       4.     Alan Tucker     Applied Combinatorics <td< td=""><td></td><td></td><td></td><td>on.</td><td></td></td<>				on.		
5       Information Technology Applications, Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning.       10       15         6       Recent Trends in various distribution functions in the mathematical field of computer science for varying fields like bioinformatics, soft computing, and computer vision.       5       5         8       Sub Total:       40       70         9       Internal Assessment Examination & Preparation of Semester science, and the examination       30         100       Total:       100         9       Practical:       100         9       Practical:       100         9       Statistics with analysis.       100         9       Practical: SL No. 1& 2 compulsory & at least three from the rest)       30         Assignments:       List of Practical: SL No. 1& 2 compulsory & at least three from the rest)       Assignments:         1.       John Vince, Foundation Mathematics for Computer Science, Computer Science, Computer Science, Science Applications.       Springer.         2.       K. Trivedi.       Probability and Statistics with Reliability, Queuing, and Computer Science Applications.       Wiley.         3.M.Mitzenmacher Adaptistic Adaptistic Adaptistic Adaptistic Adaptistic Adaptistic Adaptistic Adaptistic Adaptistic Adaptistis.       Wiley		Specialized				
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Software engineering. Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning. <ul> <li>Recent Trends in various distribution functions in the bioinformatics, soft computer science for varying fields like bioinformatics, soft computing, and computer vision.</li> <li>Sub Total:</li> <li>Sub Total:</li> <li>Total:</li> </ul> 40 <ul> <li>70</li> </ul> Internal Assessment Examination & Preparation of Semester Examination <li>Total:</li> <ul> <li>Total:</li> <li>Total:</li> </ul> 100 <ul> <li>Practical:</li> <li>Skills to be developed:</li> </ul> List of Practical:         Signments: <ul> <li>Station</li> <li>Spinger.</li> </ul> Assignments: <ul> <li>List of Books</li> <li>Title of the Book</li> <li>Edition/ISSN/ISBN</li> <li>Name of the Publisher</li> </ul> 1.         John Vince,         Foundation <li>Mathematics for Computer Science, and Computer Science Applications.</li> <ul> <li>John Vince, Foundation</li> <li>Reliability, Queuing, and Computer Science, and Computer Science Applications.</li> <li> <ul> <li>Statistics with Reliability, Queuing, and Computer Science Applications.<!--</td--><td></td><td></td><td></td><td>_</td><td></td><td></td></li></ul></li></ul>				_		
learning.     Image: Constraint of the second		Software ei	ngineering, Computer ar	chitecture, operating		
6       Recent Trends in various distribution functions in the mathematical field of computer science for varying fields like bioinformatics, soft computing, and computer vision.       5       5         Sub Total:       40       70         Internal Assessment Examination & Preparation of Semester Examination       30         Total:       100         Total:       100         Practical:       Skills to be developed:         List of Practical: SI. No. 1& 2 compulsory & at least three from the rest)       Assignments:         List of Books       Title of the Book       Edition/ISSN/ISBN       Name of the Publisher         1.       John Vince, Poundation Mathematics for Computer Science, Computing: Randomized Algorithms and Probabilistic Analysis.		-	stributed systems, Bioin	formatics, Machine		
mathematical field of computer science for varying fields like bioinformatics, soft computing, and computer vision.       40       70         Sub Total:       40       70         Internal Assessment Examination & Preparation of Semester Examination       30         Total:       100         Practical:       Skills to be developed:         List of Practical: SI. No. 1& 2 compulsory & at least three from the rest)       100         Assignments:       Skills to be developed:         List of Books       Title of the Book       Edition/ISSN/ISBN       Name of the Publisher         1.       John Vince, Poundation Mathematics for Computer Science,       Springer.       Springer.         2.       K. Trivedi.       Probability and Statistics with Reliability, Queuing, and Computer Science Applications.       Wiley.       Statistics with Probabilistic Analysis.         3.M.Mitzenmacher and E. Upfal.       Computer Computer Science, Algorithms and Probabilistic Analysis.       Wiley       Statistics with Randomized Algorithms and Probabilistic Analysis.       Wiley         4.       Alan Tucker       Applied Combinatorics       Miley       Statistics         5.       Internal Algorithms and Probabilistic       Internal Algorithms and Probabilistic       Internal Probabilistic Analysis.         4.       Alan Tucker       Applied Combinatorics       Internal Probabilistic		0				
bioinformatics, soft computing, and computer vision.         40         70           Sub Total:         40         70           Internal Assessment Examination & Preparation of Semester         30           Total:         100           Practical:         Skills to be developed:         100           Skills to be developed:         Skills to be developed:         100           Assignments:         Skills to be developed:         Skills to be developed:         Skills to be developed:           List of Practical:         SI.N.O. 1& 2 compulsory & at least three from the rest)         Assignments:         Skills to be developed:           List of Books         Foundation         Mathematics for Computer Science, 2000         Springer.           2.         K. Trivedi.         Probability and Statistics with Reliability, Queuing, and Computer Science, 2000         Wiley.           3.M.Mitzenmacher and E. Upfal.         Probability and Computer Science, 2000         Wiley         Science Applications.           4.         Alan Tucker         Applied Combinatorics         Wiley         Science Applications.           8.         Analysis.         Analysis.         Science Applications.         Science Applications.           3.4.         Alan Tucker         Applied Combinatorics         Wiley         Science Applications.  <	6				-	5
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Examination         100           Practical:         300           Skills to be developed:         List of Practical: Sl. No. 1& 2 compulsory & at least three from the rest)         Assignments:           List of Practical: Sl. No. 1& 2 compulsory & at least three from the rest)         Assignments:         Skills to be developed:           List of Books         Fact Books:         Springer.         Springer.           Name of Author         Title of the Book         Edition/ISSN/ISBN         Name of the Publisher           1.         John Vince,         Foundation         Springer.         Springer.           2.         K. Trivedi.         Probability and Reliability, Queuing, and Computer Science, 2         Wiley.         Science Applications.           3.M.Mitzenmacher         Probability and Computing:         Kandomized Algorithms and Probabilistic         Wiley           4.         Alan Tucker         Applied Combinatorics         Wiley         Science Applied Combinatorics         Science Applied           5.         Science Applied Combinatorics         Science Applied Combinatorics         Science Applied Combinatorics         Science Applied Combinatorics           4.         Alan Tucker         Applied Combinatorics         Science Applied Combinatorics         Science Applied Combinatorics         Science Applied Combinatorics			essment Examination & Pro	enaration of Semester	40	
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Skills to be developed: List of Practical: Sl. No. 1& 2 compulsory & at least three from the rest) Assignments: List of Books Text Books: Text Books: Text Books: Text Books: Text Books: 1. John Vince, Foundation Mathematics for Computer Science, Computer		Total:				100
List of Practical: SI. No. 1& 2 compulsory & at least three from the rest) Assignments: List of Books Text Books: Name of Author Title of the Book Edition/ISSN/ISBN Name of the Publisher Name of Author Foundation Mathematics for Computer Science, Since Computer Science, Since Computer Science, Since Computer Science, Since Computer Science, Science Applications. 3.M.Mitzenmacher Probability and Since Applications. 3.M.Mitzenmacher Probability and Computer Science Applications. 3.M.Mitzenmacher Algorithms and Probabilistic Analysis. 4. Alan Tucker Applied Combinatorics Wiley Wiley. Reference Books: Reference Books: List of equipment/apparatus for laboratory experiments:	Practical	:				
Assignments:          List of Books         Text Books:         Name of Author       Title of the Book       Edition/ISSN/ISBN       Name of the Publisher         1.       John Vince,       Foundation       Springer.         2.       K. Trivedi.       Probability and       Wiley.         Statistics with       Reliability, Queuing, and Computer       Wiley.         Science Applications.       Algorithms and       Probabilistic         And E. Upfal.       Probabilistic       Algorithms and         Probabilistic       Analysis.       Wiley         4.       Alan Tucker       Applied         Combinatorics       Combinatorics       Wiley         List of equipment/apparatus for laboratory experiments:	Skills to l	be developed	1:			
Assignments:          List of Books         Text Books:         Name of Author       Title of the Book       Edition/ISSN/ISBN       Name of the Publisher         1.       John Vince,       Foundation       Springer.         2.       K. Trivedi.       Probability and       Wiley.         Statistics with       Reliability, Queuing, and Computer       Wiley.         Science Applications.       Algorithms and       Probabilistic         And E. Upfal.       Probabilistic       Algorithms and         Probabilistic       Analysis.       Wiley         4.       Alan Tucker       Applied         Combinatorics       Combinatorics       Wiley         List of equipment/apparatus for laboratory experiments:	List of Pr	actical: Sl. No	o. 1& 2 compulsory & at ]	least three from the res	t)	
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Text Books:         Name of Author       Title of the Book       Edition/ISSN/ISBN       Name of the Publisher         1.       John Vince,       Foundation       Springer.         Mathematics for       Computer Science,       Springer.         2.       K. Trivedi.       Probability and       Wiley.         Statistics with       Reliability, Queuing, and Computer       Mathematics for       Science Applications.         3.M.Mitzenmacher       Probability and       Computing:       Randomized         Algorithms and       Probabilistic       Analysis.       Miley         4.       Alan Tucker       Applied       Wiley       Wiley         Reference Books:         Image: Science Applied       Science Applied         Image: Science Applied         Image: Science Applied       Wiley       Science Applied         Image: Science Applied       Wiley       Science Applied       Science Applied         Image: Science Books:       Image: Science S	Assignme	ents:				
Text Books:         Name of Author       Title of the Book       Edition/ISSN/ISBN       Name of the Publisher         1.       John Vince,       Foundation       Springer.         Mathematics for       Computer Science,       Springer.         2.       K. Trivedi.       Probability and       Wiley.         Statistics with       Reliability, Queuing, and Computer       Mathematics for       Science Applications.         3.M.Mitzenmacher       Probability and       Computing:       Randomized         Algorithms and       Probabilistic       Analysis.       Miley         4.       Alan Tucker       Applied       Wiley       Wiley         Reference Books:         Image: Science Applied       Science Applied         Image: Science Applied         Image: Science Applied       Wiley       Science Applied         Image: Science Applied       Wiley       Science Applied       Science Applied         Image: Science Books:       Image: Science S						
Name of Author       Title of the Book       Edition/ISSN/ISBN       Name of the Publisher         1.       John Vince,       Foundation       Springer.       Springer.         2.       K. Trivedi.       Probability and Statistics with Reliability, Queuing, and Computer Science Applications.       Wiley.       Wiley.         3.M.Mitzenmacher and E. Upfal.       Probability and Computing: Randomized Algorithms and Probabilistic Analysis.       Wiley       Wiley         4.       Alan Tucker       Applied Combinatorics       Wiley       Wiley         List of equipment/apparatus for laboratory experiments:						
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2.							
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5.							
End Semes	ster Examin	ation Schen	ne. Max	kimum Mar	rks-70.	Time all	otted-3hrs.
Group	Unit	Objective	Questions		Subj	jective Ques	stions
		(MCQ only v					
		correct ans					
		No of	Total	No of	To answer	Marks per	Total Marks
		question	Marks	question		question	
		to be set		to be set			
Α	1,2,3	12		5	3		
			20			10	70
В	4,5	8		4	2		
Onl	y multiple cho	oice type ques	tion (MCQ) wi	th one corre	ct answer are to	be set in the	objective part.
• Spe	cific instructio	on to the stud	ents to mainta	in the order	in answering ob	jective questi	ions should be given on top
oft	he question pa	aper.			-		
Examinati	on Scheme	for end sem	ester exami	nation:			
Group		Chapter	Marks o	of each	Question to b	oe Quest	tion to be answered
		•	questio	n 🛛	set		
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Internal E	xamination	:					40
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	V	/iva voce					

Name of the Course: M.Tech. in I Subject:Advanced Data Structur	6						
Course Code:PGCS(IoT)102, PGCS(IoT)192Semester: 1st							
Duration: 48 Hrs.	Maximum Marks: 200						
Teaching Scheme	Examination Scheme						
Theory: 3	End Semester Exam: 70						
Tutorial: 0	Attendance : 5						
Practical: 4	Continuous Assessment: 25						
<b>Credit:</b> 3 + 2	Practical Sessional internal continuous evaluation:						
	40						

	Practical Sessional external examin	nation: 6	50									
Aim:												
Sl. No.												
1.	Understand the implementation of symbol table using hashing	g technia	ues.									
2.	Develop and analyze algorithms for red-black trees, B-trees and Splay trees.											
3.	Develop algorithms for text processing applications.											
<u>4.</u>	Identify suitable data structures and develop algorithms for computational											
11	geometry problems.	omputut	Ionai									
<b>Objective</b> :												
Sl. No.	The student should be able to choose appropriate data structu	iros und	orstand									
51. 110.	the ADT/libraries, and use it to design algorithms for a specific problem.											
1.	Students should be able to understand the necessary mathematical abstraction											
1.	to solve problems.		Straction									
2.	To familiarize students with advanced paradigms and data str	ucturo u	icod to									
4.	solve algorithmic problems.	ucture u	iseu io									
3.	Student should be able to come up with analysis of efficiency a	nd proc	fs of									
J.	correctness.	inu p100	13 01									
Pre-Requi	site											
Sl. No.												
<u>31. NO.</u> 3.	UG level course in Data Structures											
<u> </u>	od level course in Data Structures											
4.												
Contents		Hrs./w	eek									
Chapter	Name of the Topic	Hours	Marks									
01	Dictionaries: Definition, Dictionary Abstract Data Type,	7	10									
01	Implementation of Dictionaries.	/	10									
	Hashing: Review of Hashing, Hash Function, Collision											
	Resolution Techniques in											
	Hashing, Separate Chaining, Open Addressing, Linear											
	Probing, Quadratic Probing, Double Hashing, Rehashing,											
	Extendible Hashing.											
02		5	12									
02			14									
	Skip Lists: Need for Randomizing Data Structures and											
	Algorithms, Search and Update Operations on Skip Lists,											
	Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists		12									
	Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3	9	12									
03	Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees 9	9										
03	Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees 9 Text Processing: Sting Operations, Brute-Force Pattern		12 16									
03	Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees 9 Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer- Moore Algorithm, The Knuth-Morris-	9										
03 04	Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees 9 Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer- Moore Algorithm, The Knuth-Morris- Pratt Algorithm, Standard Tries, Compressed Tries, Suffix	9										
03	Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees 9 Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer- Moore Algorithm, The Knuth-Morris- Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common	9										
03	Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees 9 Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer- Moore Algorithm, The Knuth-Morris- Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic	9										
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03 04	Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees 9 Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer- Moore Algorithm, The Knuth-Morris- Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem. Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search	9 12	16									
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03 04	Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees 9 Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer- Moore Algorithm, The Knuth-Morris- Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem. Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quadtrees, k-D Trees.	9 12	16									
03 04 05	<ul> <li>Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists</li> <li>Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees 9</li> <li>Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer- Moore Algorithm, The Knuth-Morris- Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem.</li> <li>Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quadtrees, k-D Trees.</li> <li>Recent Trands in Hashing, Trees, and various computational geometry methods for effeciently solving the new evolving</li> </ul>	9 12 10	16 15									
03 04 05	Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees 9 Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer- Moore Algorithm, The Knuth-Morris- Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem. Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quadtrees, k-D Trees.	9 12 10	16 15									

	Examinatio	on								
Total:     100       Practical: Based on Theory     100										
Skills to be	Based on T e developed ctical: Sl. No nts: ks s:	l:	-		e from the res ISSN/ISBN	Nar	ne of th Disher			
Reference		1								
1. Mai Weiss	rk Allen	Data Struct Algorithm C++		2nd Edit	ion	Pea	rson, 2	004		
2. M T Goodrich, I Tamassia		Algorithm	Design			Joh	n Wiley	<b>7, 2002</b> .		
List of equ	ipment/ap	paratus for l	aboratory e	xperimen	ts:					
Sl. No.				•						
6.										
7.										
<u> </u>										
10.										
End Semes	ster Examin	ation Schem	ie. Max	imum Ma	rks-70.	Т	ime all	otted-		
3hrs.				1						
Group	Unit	Objective (MCQ only v correct ansv	vith the		Subjective	Que	stions			
		No of question	Total Marks	No of question	To answer		ks per stion	Total Marks		
A	ALL	to be set	10	to be set						
В	ALL			5	3	5		70		
С	ALL			5	3	15				
		oice type quest	tion (MCQ) wit	-	ect answer are to		t in the c	objective		
	cific instructi	on to the stude of the question		in the order	in answering of	ojectiv	e questi	ons should		
Examinati		for end sem	ester exami							
Group		Chapter	Marks o question		Question to l set	be	Quest answe	ion to be ered		

Α	ALL		1		10		10			
В	ALL		5		5		3			
С	ALL		15		5		3			
<b>Examination Scheme</b>	Examination Scheme for Practical Sessional examination:									
Practical Internal Ses	Practical Internal Sessional Continuous Evaluation									
Internal Examination								40		
Five No of										
Experiments										
<b>External Examination:</b> E	Examiner-							60		
Signed Lab Note Book(for	five					10				
experiments)										
On Spot Experiment(one					40					
group consisting 5 studen	its)									
	/iva voce					10				

PGCS(IoT)193 Duration: 48 H Teaching Sche Theory: 3 Tutorial: 0 Practical: 4 Credit: 3 + 2 Aim: Sl. No. 1. Expla 2. Unde appl 3. Impl Objective: Sl. No. 1. Prov scier 2. Dem are v 3. Prod 4. Critis	GCS(IoT)103A,					
Duration: 48 H Teaching Sche Theory: 3 Tutorial: 0 Practical: 4 Credit: 3 + 2 Aim: Sl. No. 1. Expla 2. Unde appl: 3. Impl Objective: Sl. No. 1. Prov scier 2. Dem are v 3. Prod 4. Critic com Pre-Requisite: Sl. No. 5. Stationed Scientific Scien	Α	Semester: 1st				
Theory: 3 Tutorial: 0 Practical: 4 Credit: 3 + 2 Aim: Sl. No. 1. Expla 2. Unde appl 3. Impl Objective: Sl. No. 1. Prov scier 2. Dem are v 3. Prod 4. Critic com Pre-Requisite: Sl. No. 5. S		Maximum Marks: 200				
Tutorial: 0 Practical: 4 Credit: 3 + 2 Aim: Sl. No. 1. Expla 2. Unde appl 3. Impl Objective: Sl. No. 1. Prov scier 2. Dem are v 3. Prod 4. Critic com Pre-Requisite: Sl. No. 5. Stationer (Complete)	eme	Examination Scheme				
Tutorial: 0 Practical: 4 Credit: 3 + 2 Aim: Sl. No. 1. Expla 2. Unde appl 3. Impl Objective: Sl. No. 1. Prov scier 2. Dem are v 3. Prod 4. Critic com Pre-Requisite: Sl. No. 5. Stationer (Complete)		End Semester Exam: 70				
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Aim: Sl. No. 1. Expla 2. Unde appl 3. Impl Objective: Sl. No. 1. Prov scier 2. Dem are v 3. Prod 4. Critic com Pre-Requisite: Sl. No. 5. S.		Continuous Assessment: 25				
Sl. No.Explay1.Explay2.Under apple3.ImpleObjective:ImpleSl. No.Imple1.Prov scier2.Dem are v3.Prod4.Critic comPre-Requisite:Sl. No.5.		<b>Practical Sessional internal continu</b> 40	ious eva	luation:		
Sl. No.Explay1.Explay2.Under apple3.ImpleObjective:ImpleSl. No.Imple1.Prov scier2.Dem are v3.Prod4.Critic comPre-Requisite:Sl. No.5.		Practical Sessional external examin	nation: 6	0		
1.Explay2.Under applition3.Implition3.ImplitionObjective:SimplitionSl. No.Implition1.Provision2.Dem are volto3.Prod4.CriticionPre-Requisite:Si. No.5.5.						
2. Unde appl 3. Impl 3. Impl 3. Simpl 0bjective: Sl. No. 1. Prov scier 2. Dem are v 3. Prod 4. Critic com Pre-Requisite: Sl. No. 5. States						
appl 3. Impl Objectiv Sl. No. 1. Prov Scier 2. Dem are v 3. Prod 4. Critic com Pre-Requisite: Sl. No. 5. State St	Explain how data is collected, managed and stored for data science;					
Objective: Sl. No. 1. Prov scier 2. Dem are v 3. Prod 4. Critic com Pre-Requisite: Sl. No. 5. State Sta		icepts in data science, including their rea olkit used by data scientists;	il-world			
Sl. No.1.Prov scier2.Dem are v3.Prod4.Critic commPre-Requisite:Sl. No.5.	lement data collect	ion and management scripts using Mong	joDB			
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scier           2.         Dem           are v         are v           3.         Prod           4.         Critic           pre-Requisite:         site:           Sl. No.         5.						
are v       3.     Prod       4.     Critic       comm       Pre-Requisite:       Sl. No.       5.		nowledge and expertise to become a pro	ficient da	ita		
4.         Critic           comm           Pre-Requisite:           Sl. No.           5.	ionstrate an unders vital for data scienc	standing of statistics and machine learni :e;	ng conce	pts that		
comm           Pre-Requisite:           Sl. No.           5.	luce Python code to	statistically analyze a dataset;				
Pre-Requisite:Sl. No.5.	Critically evaluate data visualizations based on their design and use for communicating stories from data;					
<b>Sl. No.</b> 5.	<u>v</u>	,				
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6						
Contents			Hrs./w	eek		
	e of the Topic		Hours	Marks		

01	Unit 1:			6	10
-		on to core concepts and	technologies: Introductio		
		gy, data science process imple applications	s, data science toolkit, Typ	pes	
02			Introduction, Sources of	7	12
			loring and fixing data, Da		
		d management, Using m			
03		sis: Introduction, Termi		10	12
		on to statistics, Central t			
		ns, Variance, Distributio			
			achine learning algorithm	1S,	
04		ession, SVM, Naive Bay	es. Types of data visualisatior	n, 11	16
04			Data encodings, Retinal	1, 11	10
		<b>.</b> .	codings, Visual encoding	S.	
05			nologies for visualisation		15
	Bokeh (Pyt	hon)			
06		nds in various data colle		7	5
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		nt methods of used in d	ata science.	40	=
	Sub Total:	essment Examination & P	ronaration of Comostor	48	70 30
	Examination		reparation of Semester		30
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14.							
15.							
End Sem 3hrs.	ester Exam	ination Scher	ne. Max	kimum Mar	ks-70.	Time all	otted-
Group	Unit	Objective (MCQ only correct ans			Subjective	e Questions	
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
А	ALL	10	10				
В	ALL			5	3	5	70
С	ALL			5	3	15	
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be Examina Group A B C Examina Practical Internal Five No o Experime Signed Lat experimen On Spot Ex	tion Schem tion Schem Internal Se Examination f ents Examination o Note Book(f	o of the question e for end sem Chapter ALL ALL ALL e for Practica essional Cont on: Examiner- for five	n paper. nester exami Marks o questio 1 5 15 15 15 15	nation: of each n	Question to l set 10 5 5 n:	be Quest answ 10 3	tion to be ered 40

Name of the Course: M.Tech. in Internet of Things Subject:Wireless Access Technologies					
Course Code:PGCS(IoT)103B,	Semester: 1st				
PGCS(IoT)193B					
Duration: 48 Hrs.	Maximum Marks: 200				
Teaching Scheme	Examination Scheme				
Theory: 3	End Semester Exam: 70				
Tutorial: 0	Attendance : 5				
Practical: 4	Continuous Assessment: 25				
<b>Credit:</b> 3 + 2	Practical Sessional internal continuous evaluation:				
	40				
	<b>Practical Sessional external examination:</b> 60				
Aim:					
Sl. No.					
<b>1.</b> Interpret basic terms a	nd characteristics of wireless access networks				

2.	Compare various wireless access technologies					
3.	Analyze measurements of wireless access network parameter					
4.	Assess security issues in wireless networks					
5.	Choose modulation technique for wireless transmission					
Objective						
Sl. No.						
1.	Overview of wireless access technologies, Fixed wireless access Terminal mobility issues regarding wireless access to Internet	networl	KS.			
2.	Introduction to various Network topologies, hotspot networks,		nication			
3.	links: point-to-point, point-to-multipoint, multipoint-to-multipoint. To provide an overview of Standards for most frequently used wireless access networks: WPAN, UWB, WLAN, WMAN, WWAN. Network services. Wireless access networks planning, design and installation.					
4.	To get and insight of Wireless networking security issues, Wirel network exploitation and management, software requirements control.					
Pre-Requ	iisite:					
Sl. No.						
1.	Wireless Networks					
2.						
Contents		Hrs./w	eek			
Chapter	Name of the Topic	Hours	Marks			
01	Necessity for wireless terminals connectivity and networking.	8	10			
	Wireless networking advantages and disadvantages,					
	Overview of wireless access technologies. Narrowband and					
ļ	8		1			
1	broadband networks, fixed and nomadic					
	broadband networks, fixed and nomadic networks. Wireless local loop (WLL), Public Switched					
	networks. Wireless local loop (WLL), Public Switched					
	networks. Wireless local loop (WLL), Public Switched Telephone Network					
02	networks. Wireless local loop (WLL), Public Switched Telephone Network (PSTN) interfaces.	8	12			
02	networks. Wireless local loop (WLL), Public Switched Telephone Network (PSTN) interfaces. Fixed wireless access (FWA) networks, frequency bands for different networks. Criterions for frequency bands allocation, Network topologies, hotspot networks. Communication links:	8	12			
02	networks. Wireless local loop (WLL), Public Switched Telephone Network (PSTN) interfaces. Fixed wireless access (FWA) networks, frequency bands for different networks. Criterions for frequency bands allocation, Network topologies, hotspot networks. Communication links: point-to-point (PTP), point-	8	12			
	networks. Wireless local loop (WLL), Public Switched Telephone Network (PSTN) interfaces. Fixed wireless access (FWA) networks, frequency bands for different networks. Criterions for frequency bands allocation, Network topologies, hotspot networks. Communication links: point-to-point (PTP), point- to-multipoint (PMP), multipoint-to-multipoint (MTM).					
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	networks. Wireless local loop (WLL), Public Switched Telephone Network (PSTN) interfaces. Fixed wireless access (FWA) networks, frequency bands for different networks. Criterions for frequency bands allocation, Network topologies, hotspot networks. Communication links: point-to-point (PTP), point- to-multipoint (PMP), multipoint-to-multipoint (MTM). Standards for most frequently used wireless access networks: WPAN (802.15, Bluetooth, DECT, IrDA), UWB (Ultra- Wideband), WLAN (802.11, Wi-Fi, HIPERLAN, IrDA), WMAN (802.16, WiMAX, HIPERMAN, HIPERACCESS), WWAN (802.20), Other technologies for broadband wireless access, Local Multipoint Distribution					
	networks. Wireless local loop (WLL), Public Switched Telephone Network (PSTN) interfaces. Fixed wireless access (FWA) networks, frequency bands for different networks. Criterions for frequency bands allocation, Network topologies, hotspot networks. Communication links: point-to-point (PTP), point- to-multipoint (PMP), multipoint-to-multipoint (MTM). Standards for most frequently used wireless access networks: WPAN (802.15, Bluetooth, DECT, IrDA), UWB (Ultra- Wideband), WLAN (802.11, Wi-Fi, HIPERLAN, IrDA), WMAN (802.16, WiMAX, HIPERMAN, HIPERACCESS), WWAN (802.20), Other technologies for broadband wireless access, Local Multipoint Distribution Service (LMDS), Multichannel Multipoint Distribution					
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	point alloca Terminal n	interference ratio (C/I). I ation. Base station and a nobility issues regarding	ccess point equipment. wireless access to		
05	Internet. W Example of environme Wireless ac software re Business m research an application		15		
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06	Recent tren mechanism	5	5		
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	Total:				100
Assignn List of B					
		Title of the Book	Edition/ISSN/ISBN	Name Publis	
Name o	oks: f Author	Title of the Book	Edition/ISSN/ISBN		
Name o	oks:	Wireless Access Networks: Fixed Wireless Access and WLL networks	Edition/ISSN/ISBN	Publis	her Viley & Sons,
Referen 1. I	oks: f Author nce Books:	Wireless Access Networks: Fixed Wireless Access and WLL networks Design and Operation Fixed Broadband Wireless Communications: Principles and	Edition/ISSN/ISBN	John W Chiche	her Viley & Sons, ester ce Hall, Upper
Name o Referen 1. 1 2. 1	oks: f Author nce Books: M. P. Clark	Wireless Access Networks: Fixed Wireless Access and WLL networks Design and Operation Fixed Broadband Wireless Communications:	Edition/ISSN/ISBN	Publis       John W       Chiche       Prenti	her Viley & Sons, ester ce Hall, Upper River ress,
Name o Referen 1. 1 2. 1	oks: f Author nce Books: M. P. Clark D. H. Morais	Wireless Access Networks: Fixed Wireless Access and WLL networks Design and Operation Fixed Broadband Wireless Communications: Principles and Practical Applications Introduction to WLLs: Application and Deployment for Fixed and Broadband	Edition/ISSN/ISBN	Publis	her Viley & Sons, ester ce Hall, Upper River ress,
Name o     Referen     1.     2.     3.	nce Books: M. P. Clark D. H. Morais R. Pandya	Wireless Access Networks: Fixed Wireless Access and WLL networks Design and Operation Fixed Broadband Wireless Communications: Principles and Practical Applications Introduction to WLLs: Application and Deployment for Fixed and Broadband		Publis	her Viley & Sons, ester ce Hall, Upper River ress,

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<u>18.</u> 19.									
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		correct ar							
		No of	To	otal	No of	To answer	Mar	ks per	Total
		question	M	arks	question		ques	stion	Marks
		to be set			to be set		<b>`</b>		
Α	ALL	10	1(	0					
В	ALL				5	3	5		70
С	ALL				5	3	15		
Only	y multiple cho	oice type qu	estion	(MCQ) wit	h one corre	ect answer are to	be se	t in the o	objective
part									
• Spe	cific instructi	on to the stu	idents	to maintai	n the order	in answering ol	ojectiv	e questi	ons should
be g	iven on top o	f the question	on pap	er.					
Examinati	on Scheme	for end se	meste	er examir	nation:				
Group		Chapter		Marks of	f each	Question to	be	Quest	ion to be
				questior	ı	set		answe	ered
Α		ALL		1		10		10	
В		ALL		5	5			3	
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Examinati	on Scheme	for Practic	cal Se	ssional ex	xaminatio	on:			
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Experiments									
External Examination: Examiner									60
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	eriment(one					40			
group consis	sting 5 studer	e				10			
Viva voce						10			

Name of the Course: M.Tech. in Internet of Things					
Subject: Mobile Applications and Services					
Course Code:PGCS(IoT)103C,	Semester:1st				
PGCS(IoT)193C					
Duration: 48 Hrs.	Maximum Marks: 200				
Teaching Scheme	Examination Scheme				
Theory: 3	End Semester Exam: 70				
Tutorial: 0	Attendance : 5				
Practical: 4	Continuous Assessment: 25				
<b>Credit:</b> 3 + 2	Practical Sessional internal continuous evaluation:				
	40				
	Practical Sessional external examination: 60				

Aim:						
Sl. No.						
1.	Identify the target platform and users and be able to define and sketch a mobile application					
2.	Understand the fundamentals, frameworks, and development lifecycle of mobile application platforms including iOS, Android, and PhoneGap					
3.	Design and develop a mobile application prototype in one of the platform (challenge project)					
Objective						
Sl. No.						
1.	This course presents the three main mobile platforms and their namely Android, iOS, and PhoneGap/WebOS.	r ecosyst	ems,			
2.	It explores emerging technologies and tools used to design and	impleme	ent			
	feature-rich mobile applications for smartphones and tablets					
3.	It also takes into account both the technical constraints relative	e to stora	ge			
	capacity, processing capacity, display screen, communication in user interface, context and profile	nterfaces	, and the			
4.						
Pre-Requ	iisite:					
Sl. No.						
1.	Wireless Communication and Mobile Computing					
2.						
Contents		Hrs./w	eek			
Chapter	Name of the Topic	Hours	Marks			
01	Unit 1:Introduction:Introduction to Mobile Computing,	8	10			
01	Introduction to Android Development Environment, Factors	8				
01	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile	8				
01	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI	8				
	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User		10			
01	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech	8 8 8				
	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques,		10			
	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, .		10			
	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication		10			
	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and		10			
	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content		10			
02	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider	8	10 12			
	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider Communications via Network and the Web: State Machine,		10			
02	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider Communications via Network and the Web: State Machine, Correct Communications Model, Android Networking and	8	10 12			
02	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider Communications via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web, Telephony Deciding Scope of an App, Wireless	8	10 12			
02	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider Communications via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web, Telephony Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony	8	10 12			
02	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider Communications via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web, Telephony Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony Notifications and Alarms: Performance, Performance and	8	10 12			
02	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider Communications via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web, Telephony Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony Notifications and Alarms: Performance, Performance and Memory Management, Android Notifications and Alarms,	8	10 12			
02	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider Communications via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web, Telephony Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony Notifications and Alarms: Performance, Performance and	8	10 12			
02	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider Communications via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web, Telephony Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony Notifications and Alarms: Performance, Performance and Memory Management, Android Notifications and Alarms, Graphics, Performance and Multithreading,	8	10 12			
02	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider Communications via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web, Telephony Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony Notifications and Alarms: Performance, Performance and Memory Management, Android Notifications and Alarms, Graphics, Performance and Multithreading, Graphics and UI Performance, Android Graphics	8	10 12 12			
02	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider Communications via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web, Telephony Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony Notifications and Alarms: Performance, Performance and Memory Management, Android Notifications and Alarms, Graphics, Performance and Multithreading, Graphics and UI Performance, Android Graphics Putting It All Together : Packaging and Deploying,	8	10 12 12			
02	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider Communications via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web, Telephony Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony Notifications and Alarms: Performance, Performance and Memory Management, Android Notifications and Alarms, Graphics, Performance and Multithreading, Graphics and UI Performance, Android Graphics Putting It All Together : Packaging and Deploying, Performance Best Practices, Android Field Service App, Location Mobility and Location Based Services Android Multimedia: Mobile Agents and Peer-to-Peer Architecture,	8	10 12 12			
02	Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider Communications via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web, Telephony Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony Notifications and Alarms: Performance, Performance and Memory Management, Android Notifications and Alarms, Graphics, Performance and Multithreading, Graphics and UI Performance, Android Graphics Putting It All Together : Packaging and Deploying, Performance Best Practices, Android Field Service App, Location Mobility and Location Based Services Android	8	10 12 12			

	Architecture, Design, Technology Selection, Mobile App Development Hurdles, Testing, Security and Hacking , Active Transactions, More on Security, Hacking Android						
06	mobile	ends in Comn ng techniques	-			5 15	5
	Sub Total					48	70
		ssessment Exa	mination & Pr	eparation of	Semester		30
	Examinati	on		-			
D	Total: l: Based on	<b>T</b> ]					100
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Group	Unit	(MCQ only correct ans	wer)		Subjective	e Questions	5
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
P						_	
В	ALL			5	3	5	70

С	ALL			5	3		15		
• Onl	ly multiple cho	ice type ques	tion (MCQ) wit	th one cor	rect answe	r are to b	e set in the	obiective	
par		lee type quee				1 410 00 0	e see in the	objective	
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	given on top of					, ing obje	cuve quest	ons should	
	· ·		ester exami	nation					
	ion scheme i		Marks o		Ouerti	on to ho	01100	tion to he	
Group		Chapter			•	on to be	-	Question to be answered	
			question	<u>n</u>	set			erea	
Α		ALL	1		10		10		
В		ALL	5		5		3		
С		ALL	15		5		3		
Examinati	ion Scheme f	for Practica	l Sessional e	xaminati	ion:		·		
Practical I	Internal Sess	sional Cont	inuous Evalu	ation					
Internal E	xamination:							40	
Five No of									
Experimen	nts								
<b>F</b>									
External Ex	xamination: E	xaminer-						60	
Signed Lab Note Book(for five		five				10			
experiment									
A	periment(one f	or each				40			
	sting 5 studen								
<u> </u>		viva voce				10			
	•					10			

Nama of th	he Course: M.Tech. in Internet of Things				
	chine learning	ernet of Things			
	le:PGCS(IoT)104A,	Semester: 1st			
PGCS(IoT)1		Semester. 1st			
Duration: 4		Maximum Marks: 200			
		Examination Scheme			
Teaching S	cheme				
Theory: 3		End Semester Exam: 70			
Tutorial: 0		Attendance : 5			
Practical: 4		Continuous Assessment: 25			
<b>Credit:</b> 3 + 2	2	Practical Sessional internal continuous evaluation:			
		40			
		Practical Sessional external examination: 60			
Aim:					
Sl. No.					
1.		an be used for a particular machine learning approach in			
	various IOT application	ns.			
-	m 1 .				
2.		ast pros and cons of various machine learning techniques			
	and to get an insight of	f when to apply a particular machine learning approach.			
3.	To mathematically ana	lyse various machine learning approaches and			
5.	paradigms.	nyse various maenne rearning approaches and			
	<u>r</u>				
<b>Objective:</b>					
Sl. No.					
1.	To learn the concept of	f how to learn patterns and concepts from data without			
	being explicitly progra	mmed in various IOT nodes.			

2.	To design and analyse various machine learning algorithms and with a modern outlook focusing on recent advances.	nd techn	iques					
3.	Explore supervised and unsupervised learning paradigms of machine learning.							
4.	To explore Deep learning technique and various feature extra							
Pre-Requi								
Sl. No.								
1.	Algorithm and Data Structure							
2.								
<i>2</i> .								
Contents		Hrs./w	eek					
Chapter	Name of the Topic	Hours	Marks					
01	Unit 1:	10	10					
01	Supervised Learning (Regression/Classification)	10	10					
	<ul> <li>Basic methods: Distance-based methods, Nearest-</li> </ul>							
	Neighbours, Decision Trees, Nave Bayes							
	• Linear models: Linear Regression, Logistic Regression,							
	Generalized Linear Models							
	<ul> <li>Support Vector Machines, Nonlinearity and Kernel</li> </ul>							
	Methods							
	Beyond Binary Classification: Multi-class/Structured							
	Outputs, Ranking							
02	Unsupervised Learning	7	12					
	Clustering: K-means/Kernel K-means							
	Dimensionality Reduction: PCA and kernel PCA							
	Matrix Factorization and Matrix Completion							
	-							
	Generative Models (mixture models and latent factor							
	models)							
03	Evaluating Machine Learning algorithms and Model	6	12					
00	Selection, Introduction to							
	Statistical Learning Theory, Ensemble Methods (Boosting,							
	Bagging, Random Forests)							
04	Sparse Modeling and Estimation, Modeling Sequence/Time-	10	16					
	Series Data, Deep							
	Learning and Feature Representation Learning							
05	Scalable Machine Learning (Online and Distributed	10	15					
	Learning)							
	A selection from some other advanced topics, e.g., Semi-							
	supervised Learning,							
	Active Learning, Reinforcement Learning, Inference in							
	Graphical Models, Introduction to Bayesian Learning and							
	Inference							
06	Recent trends classification applications.in various methods	5	5					
	for learning techniques IoT applications of machine learning							
	Various models for and IoT							
	Sub Total:	48	70					

	Internal A Examinat	ssessment Ex	amination & I	Preparation	of Semester		30	
	Total:						100	
Practical	: Based on '	Гheory				I		
Skills to l	oe develope	d:						
List of Pr	actical: Sl. N	lo. 1& 2 comj	pulsory & at	least three	from the res	it)		
Assignmo	ents:							
List of Bo Text Boo								
Name of .	Author	Title of t	he Book	Edition/I	SSN/ISBN	Name of the Publisher	he	
Referenc			I			MIT D	2042	
1. K	evin Murph	A Probab				MIT Press	, 2012	
2. T	revor Hastie		Perspective The Elements of			Springer 2	2009	
Robert T	ibshirani, riedman,	·	Statistical Learning,			(freely available online)		
3.Christo	pher Bishoj	and Mac	Pattern Recognition and Machine Learning,			Springer,	2007.	
	uipment/ap	oparatus for	laboratory e	xperiments	S:			
Sl. No. 26.								
20.								
27.								
29.								
30.								
	ester Exami	nation Scher	ne. Max	kimum Mar	ks-70.	Time all	lotted-	
Group	Unit	Objective (MCQ only correct ans		Subjective		e Questions		
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks	
A	ALL	10	10					
В	ALL			5	3	5	70	
С	ALL			5	3	15		
• 01	nly multiple cl	noice type ques	tion (MCQ) wi	_	-		objective	
pa	irt.							
• Sp	ecific instruct	tion to the stud	ents to mainta	in the order i	n answering ol	bjective quest	ions shoul	

be given on top of	the questi	on paper.			
<b>Examination Scheme f</b>	or end se	emester exami	nation:		
Group	Chapte	er Marks o question		Question to be set	Question to be answered
Α	ALL	1		10	10
В	ALL	5		5	3
С	ALL	15		5	3
<b>Examination Scheme f</b>	or Practi	cal Sessional e	xaminat	ion:	
Practical Internal Sess	ional Cor	ntinuous Evalu	ation		
<b>Internal Examination:</b>					40
Five No of					
Experiments					
<b>External Examination: Ex</b>	kaminer-			1	60
Signed Lab Note Book(for	five			10	
experiments)					
On Spot Experiment(one f				40	
group consisting 5 student	:s)				
V	iva voce			10	

	of the Course: M.Tech. in I	
,	:Smart Sensors and Inter	
	Code:PGCS(IoT)104B,	Semester: 1st
<b>`</b>	oT)194B	
	on: 48 Hrs.	Maximum Marks: 200
	ng Scheme	Examination Scheme
Theory		End Semester Exam: 70
Tutoria		Attendance : 5
Practic		Continuous Assessment: 25
Credit:	3 + 2	Practical Sessional internal continuous evaluation:
		40
		Practical Sessional external examination: 60
Aim:		
Sl. No.		
1.	Understand the vision	of IoT from a global context.
2.	Determine the Market	perspective of IoT.
3.	Use of Devices, Gatewa	ays and Data Management in IoT.
4.	Application of IoT in In World Design Constra	ndustrial and Commercial Building Automation and Real- ints.
5.	Building state of the an	rt architecture in IoT.
Objecti	ve:	
Sl. No.		
1.	Able to understand the	e application areas of IoT
2.	Able to realize the rev Networks	olution of Internet in Mobile Devices, Cloud & Sensor

	Able to understand building blocks of Internet of Things and ch	aracteri	stics
Pre-Requ	lisite:		
Sl. No.			
1.	Wireless Networks		
2.			
C + + -		<b>TT</b>	1-
Contents		Hrs./w	1
Chapter 01	Name of the Topic Unit 1: Environmental Parameters Measurement and	Hours 7	Marks
01	Monitoring: Why measurement and monitoring are	/	10
	important, effects of adverse parameters for the living being		
	for IOT		
02	Sensors: Working Principles: Different types; Selection of	8	12
	Sensors for Practical Applications		
	Introduction of Different Types of Sensors such as Capacitive,		
	Resistive, Surface		
	Acoustic Wave for Temperature, Pressure, Humidity, Toxic		
	Gas etc		10
03	Important Characteristics of Sensors: Determination of the	11	12
	Characteristics Fractional order element: Constant Phase Impedance for		
	sensing applications such as humidity, water quality, milk		
	quality		
	Impedance Spectroscopy: Equivalent circuit of Sensors and		
	Modelling of Sensors		
	Importance and Adoption of Smart Sensors		
04	Architecture of Smart Sensors: Important components, their	10	16
	features Fabrication of Sensor and Smart Sensor: Electrode		
	fabrication: Screen printing, Photolithography, Electroplating		
	Sensing film deposition: Physical and chemical		
~ -	Vapor, Anodization, Sol-gel	_	
05	Interface Electronic Circuit for Smart Sensors and Challenges	7	15
	for Interfering the Smort Concern Headylness of Silison Technology		
	Interfacing the Smart Sensor, Usefulness of Silicon Technology in Smart Sensor And Future scope of research in smart sensor		
06	Recent trends in smart sensor for day to day life, evolving	5	5
00	sensors and	5	5
	their architecture.		
	Sub Total:	48	70
	Internal Assessment Examination & Preparation of Semester		30
	Examination		
	Total:		100

						Publi	sher	
Referen	ce Books:							
	/asuura, H., CM., Liu, Y., ''	Smart Sen IoT Fronti	sors at the er,			Sprin Inter Publi	natio	-
2. Kyung, CM., Yasuura, H., Liu, Y., Lin, YL		Smart Sen Systems,	sors and			Sprin Inter Publi	natio	
List of e	quipment/aj	pparatus for	laboratory e	experiment	s:			
Sl. No.								
31.								
32.								
33.								
34.								
35.				•				
End Sen 3hrs.	nester Exami	nation Scher	ne. Max	kimum Mar	'ks-70.	Tin	ne all	otted-
Group	Unit	<b>Objective Questions</b> (MCQ only with the correct answer)		Subjective Ques			ions	
		No of question to be set	Total Marks	No of question to be set	To answer	Marks questi		Total Marks
A	ALL	10	10					
В	ALL			5	3	5		70
С	ALL			5	3	15		
• (		hoice type ques	stion (MCQ) wi		ct answer are to		n the o	objective
b	e given on top	of the question	n paper.		in answering ob	jective	questi	ons should
	ation Scheme	e for end sem Chapter	Marks o		Question to b		Quest	ion to be
Group		Chapter	questio		set		answe	
A		ALL	1		10		10	
B		ALL	5		5		3	
C		ALL	15		5		3	
	ation Scheme	e for Practica		xaminatio	n:			
Practica	l Internal Se	ssional Cont	inuous Evalu	ation			_	
Internal	l Examinatio	n:						40
Five No o								
Experim	ents							
External	Examination:	Examiner-						60
	b Note Book(fe	or fivo			10			

On Spot Experiment(one for each group consisting 5 students)	40	
Viva voce	10	

	ogic And Functional Pro	<u> </u>					
Course Co PGCS(IoT	ode:PGCS(IoT)104C, )194C	Semester: 1st					
Duration:	: 48 Hrs.	Maximum Marks: 200	Maximum Marks: 200				
Гeaching	Scheme	Examination Scheme					
Theory: 3		End Semester Exam: 70					
<b>Sutorial</b> :	0	Attendance : 5					
Practical:	4	Continuous Assessment: 25					
<b>Credit:</b> 3 + 2		<b>Practical Sessional internal continu</b> 40	uous eva	aluation			
		Practical Sessional external examin	nation: (	50			
Aim:							
Sl. No.							
1.	Understanding of the theory and practice of functional and logic programming For IoT.						
2.	The ability to write functional and logic programs for nodes in IoT.						
3.	The ability to solve p	roblems in and using functional and logic	c progran	nming.			
Objective	•						
Sl. No.							
<u>31. NO.</u> 1.		of the art on the theoretical and practical ve programming tools in logic programm	-				
	developing declarativ analysis	ve programming tools in logic programm of functional programming and constrain	ing for I				
1.       2.	developing declarative analysis To introduce basics of programming for not Introduction into for	ve programming tools in logic programm of functional programming and constrain	ing for I( t logic				
1.       2.       3.	developing declarativ analysis To introduce basics of programming for noo Introduction into for paradigms, basic know	ve programming tools in logic programm of functional programming and constrain des in IoT. mal concepts used as a theoretical basis f	ing for I( t logic				
1. 2. 3. Pre-Requ	developing declarativ analysis To introduce basics of programming for noo Introduction into for paradigms, basic know	ve programming tools in logic programm of functional programming and constrain des in IoT. mal concepts used as a theoretical basis f	ing for I( t logic				
1.       2.       3.	developing declarative analysis To introduce basics of programming for not Introduction into for paradigms, basic know isite:	ve programming tools in logic programm of functional programming and constrain des in IoT. mal concepts used as a theoretical basis f	ing for I( t logic				
1. 2. 3. Pre-Requ Sl. No.	developing declarative analysis To introduce basics of programming for not Introduction into for paradigms, basic know isite:	ve programming tools in logic programm of functional programming and constrain des in IoT. mal concepts used as a theoretical basis f owledge and practical experience.	ing for I( t logic				
1. 2. 3. Pre-Requ Sl. No. 1. 2.	developing declarative analysis To introduce basics of programming for not Introduction into for paradigms, basic know isite:	ve programming tools in logic programm of functional programming and constrain des in IoT. mal concepts used as a theoretical basis f owledge and practical experience.	ing for I( t logic	OT data			
1. 2. 3. Pre-Requ Sl. No. 1. 2. Contents	developing declarative analysis To introduce basics of programming for not Introduction into for paradigms, basic know isite:	ve programming tools in logic programm of functional programming and constrain des in IoT. mal concepts used as a theoretical basis f owledge and practical experience.	t logic for both	OT data			
1. 2. 3. <u>Pre-Requ</u> <u>Sl. No.</u> 1.	developing declarative analysis To introduce basics of programming for not Introduction into for paradigms, basic know isite: Computer Programm Name of the Topic Unit 1: Proposition Le Functional Paradigm	ve programming tools in logic programm of functional programming and constrain des in IoT. mal concepts used as a theoretical basis f owledge and practical experience. ning, Mathematical Logic	t logic for both Hrs./w	OT data			

	Propertie	s of AL, Resolution, Res	olving Arguments			
03	Introduct	ion to Predicate Logic O	bjects, Predicates and		9	12
	Quantifier	rs, Functions, First Orde	er Language, Quantifiers	5,		
	Scopeand	Binding, Substitution, A	An Axiomatic System for	•		
	-	er Predicate Logic, Soun	-			
		ness, Axiomatic Semant				
04	_	Tableaux & Resolution			13	16
01		Tableaux, Instantiation		r in	10	10
		Logic, Normal forms, H				
		ation, Resolution, Unific				
	-	g Tool, Nondeterminist	-			
	- ·	te Data Structure,	ie i i ogi anning,			
	-	rder Programming in Pr	olog Logic Grammars			
		lause Grammar, A Gran	0			
05		Eager Evaluation strate	<b>–</b>	ioc	9	15
05		uation: Evaluation Orde			9	15
		ning with lazy evaluation				
		Delay of unnecessary Co				
		, Eager Evaluation and F		ld		
06		ends in logical and function			5	5
	predicate		tionai programming,		5	5
	-	us evaluation strategies				
	Sub Total		9		48	70
		ssessment Examination &	Proparation of Somester		40	30
	Examinatio		r reparation of Semester			30
	Total:					100
Dractical	Based on T	hoom				100
List of Pra Assignmen List of Boo Text Book	nts: oks s:	o. 1& 2 compulsory & at		-		
Name of A	uthor	Title of the Book	Edition/ISSN/ISBN	-	me of the blisher	2
Reference	Books					
	n Kelly,	"The Essence of		Pre	entice-Ha	ll India
		Logic",				in muia.
2. Sar	oj	"Logic and Prolog			w Age	
Kaushik,		Programming",		Int	ernation	al ltd
				_		
	ipment/ap	paratus for laboratory o	experiments:			
Sl. No.						
36.						
37.						
End Semes	ster Examin	nation Scheme. Ma	ximum Marks-70.	Т	'ime allo	tted-
•						

3hrs.								
Group	Unit	<b>Objective Questions</b> (MCQ only with the correct answer)		Subjective Questions				
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	· Total Marks	
A	ALL	10 be set	10	to be set				
В	ALL			5	3	5	70	
С	ALL			5	3	15		
be	given on top	of the question			in answering ob	jective que	stions should	
Group	uon scheme	Chapter	Marks of		Question to b	e Que	stion to be	
ar oup		on a pro-	questio		set	-	wered	
Α		ALL	1		10	10		
В		ALL	5		5	3		
С		ALL	15		5	3		
			al Sessional e		n:			
			inuous Evalu	lation				
	Examinatior	1:		1		1	40	
Five No of								
Experime	nts							
External F	Examination:	Examiner-					60	
	Note Book(fo				10			
experimen	ts)							
	periment(one				40			
group cons	sisting 5 stude				4.0			
		Viva voce			10			

	e Course:M.Tech. in In	8	
Subject:Re	esearch Methodology a	nd IPR	
Course Co	de: PGCS(IoT)105	Semester: 1st	
<b>Duration</b> :	36 hours	Maximum Marks:100	
<b>Teaching</b>	Scheme	Examination Scheme	
Theory:2		End Semester Exam:70	
Tutorial:0		End Semester Exam:70	
Practical:0		Attendance : 5	
Credit: 2		Continuous Assessment: 25	
Aim:			
Sl. No.			
1.	Understand research problem formulation.		
2.	Analyze research related information		
3.	Follow research ethic	CS	

Objective	· · · · · · · · · · · · · · · · · · ·					
Sl. No.						
1.	Understand research problem formulation.					
2.	Analyze research related information					
3.	Follow research ethics					
4.	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.					
5.	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasise the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.					
6.	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.					
Pre-Requ	isite:					
Sl. No.						
7.						
8.						
Contents		Hrs./w	eek			
Chapter	Name of the Topic	Hours	Marks			
01	Meaning of research problem, Sources of research problem,	6	14			
	Criteria Characteristics of a good research problem, Errors					
	in selecting a research problem, Scope and objectives of					
	research problem. Approaches of investigation of solutions					
	for research problem, data collection, analysis,					
00	interpretation, Necessary instrumentations.		10			
02	Effective literature studies approaches, analysis Plagiarism, Research ethics	6	10			
03	Effective technical writing, how to write report, Paper	6	14			
03	Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.	0	17			
04	Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.	6	14			
05	Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.	6	14			
06	New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems,	6	4			

	b Total				36	70
		ssessment Examination & F	Preparation of Semester		4	30
	aminatio otal:	on			40	100
Practical:	Jial:				40	100
Skills to be de	al: Sl. No	o. 1& 2 compulsory & at 1	least three from the re	st)		
List of Books						
Text Books:		Ι	I			
Name of Autho	or	Title of the Book	Edition/ISSN/ISBN		ne of th olisher	e
Reference Boo	oks:	((D				
1. StuartMelville ayneGoddard,		"Researchmethodolo gy: an introduction for science & engineering students'"				
WayneGoddai StuartMelville	2,	"ResearchMethodolo gy: An Introduction"				
Ranjit Kumar,	,	"Research Methodology: A Step by Step Guide for beginners"	2nd Edition,			
T. Ramappa, S Chand,	5.	"Intellectual Property Rights Under WTO",	2008			
Robert P. Mer Peter S. Mene Mark A. Lemle	IÌ,	" Intellectual Property in New Technological Age",	2016.			
Asimov,		"Introduction to Design", Prentice Hall,	1962.			
Mayall,		"Industrial Design",				ill, 1992.
Halbert,		"Resisting Intellectual Property",			/lor & F ,2007.	rancis
Niebel,		"Product Design",		Mc	Graw H	ill, 1974.
A	ient/ap	paratus for laboratory e	xperiments:			
Sl. No.						
<u>1</u> 2						
<u> </u>						
J						
End Semester 3hrs.	Examin	ation Scheme. Max	imum Marks-70.	Т	'ime all	otted-

Group	Unit	Objective (MCQ only correct ans		h the				
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks	
Α	All	10	10	5	3	15	70	
В	All			5	3	45		
С	All			5		10		
be	given on top	of the question	n paper.		in answering ol			
Group		Chapter	Marks o questio		Question to set	be Ques answ	tion to be rered	
Α		ALL	1		10	10		
В		ALL	5		5	3		
С		ALL	15		5	3		
		<b>M.Tech. in In</b> esearch paper		ings				
•	ode:PGCS(I		Semester	1st				
Duration	: 24 hours		Maximum	Maximum Marks:100				

Course Code:PGCS(IoT)106A	Semester: 1st
Duration: 24 hours	Maximum Marks:100
Teaching Scheme	Examination Scheme
Theory:02	End Semester Exam:70
Tutorial:	End Semester Exam:70
Practical:	Attendance : 5
Credit:02	Continuous Assessment: 25
Aim:	·

Understand that how to improve your writing skills and level of readability
Learn about what to write in each section
Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission
Understand that how to improve your writing skills and level of readability
Learn about what to write in each section
Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission
site:
Basic Knowledge of English

Contents					Hrs./w	eek	
Chapter	Name of	the Topic			Hours	Marks	
01	Planning sentence	and Preparation, Word ( s, Structuring Paragraph and Removing Redundan	s and Sentences, Being		4	14	
02	Hedging	g Who Did What, Highligl and Criticising, Paraphra of a Paper, Abstracts.Inti	sing and Plagiarism,		4	14	
03		f the Literature, Methods ons, TheFinal Check.	s, Results, Discussion,		4	10	
04	needed w when wr	key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction,skills needed when writing a Review of the Literature,					
05	skills are when wr Discussic	4	14				
06	-	rases, how to ensure pap bethe first- time submiss	4	14			
	Sub Tota	l:			24	70	
		ssessment Examination & I	Preparation of Semester		4	30	
	Examinati	ion			28	100	
List of Boo <u>Text Book</u> Name of A	s:	Title of the Book	Edition/ISSN/ISBN		ne of the blisher	2	
Reference				¥7 ¥			
1. Goldbort R		(2006) Writing for Science,		Pre Goo	Yale University Press (available o Google Books)		
2. Day R		(2006) How to Write and Publish a Scientific Paper,		Cambridge University Press		Press	
	ghman N	(1998), Handbook of Writing for the Mathematical Sciences,		Hig	IAM. ighman'sbook.		
4. Ad Wa	rian Illwork,	English for Writing Research Papers,		Doi	inger Ne rdrecht delberg		

						201	1.	
	ster Examin	ation Schem	e. Max	imum Ma	rks-70.	Ti	me all	otted-
3hrs. Group	Unit	<b>Objective (</b> (MCQ only w correct answ	rith the		Subjective	Ques	tions	
		No of question to be set	Total Marks	No of question to be set	To answer	Mark quest	-	Total Marks
А	ALL	10	10					
В	ALL			5	3	5		70
С	ALL			5	3	15		
par • Spe be ۽	t. cific instructio given on top o	on to the stude f the question p	nts to maintai	in the order	ect answer are to in answering ob			·
	on Scheme	for end seme			Ougstion to k		0	ion to ho
Group		Chapter	Marks o question		Question to be set		Question to be answered	
Α		ALL	1		10		10	
В		ALL	5		5		3	
С		ALL	15		5		3	

	ne Course: M.Tech. in Int	ernet of Things		
	saster management			
Course Co	de:PGCS(IoT)106B	Semester: 1st		
Duration:2	24 hrs	Maximum Marks:100		
Teaching S	Scheme	Examination Scheme		
Theory:02		End Semester Exam:70		
Tutorial:0		End Semester Exam:70		
Practical:0		Attendance : 5		
Credit: 02		Continuous Assessment: 25		
Aim:				
Sl. No.				
1.	learn to demonstrate a	a critical understanding of key concepts in disaster risk		
	reduction and humani	tarian response.		
2.		he strengths and weaknesses of disaster management		
		and programming in different countries, particularly		
	their home country or	thecountries they work in		
3.				
<b>Objective:</b>	Γ			
Sl. No.				
1.		a critical understanding of key concepts in disaster risk		
	reduction and humanitarian response.			
2.		he strengths and weaknesses of disaster management		
		and programming in different countries, particularly		
		thecountries they work in		
3.		ster risk reduction and humanitarian response policy		
	and practice from mul	tiple perspectives.		

4.	develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
Pre-Req	
Sl. No.	
1.	
2.	
-	

Contents		Hrs./w	eek
Chapter	Name of the Topic	Hours	Marks
01	Introduction Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude. 4 Repercussions Of Disasters And Hazards: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.	5	15
02	Disaster Prone Areas In India Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics	5	15
03	Disaster Preparedness And Management Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk:ApplicationOf Remote Sensing, Data FromMeteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.	5	15
04	Risk Assessment Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.	5	10
)5	Disaster Mitigation Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.	4	15
	Sub Total:	24	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	28	100

List of Bo Text Boo							
Name of Author		Title of the	e Book	Edition/	, ,		of the her
Referenc	e Books:						
1. R Singh AK	Nishith, ,	"Disaster Manageme Perspectiv and strate	•			New R Compa	oyal book any.
Pardeep (Eds.),		" Disaster Experienc	" Disaster Mitigation Experiences and Reflections"				ce Hall of New Delhi.
3. G			Disaster Administration and Management Text and Case Studies",			Deep & Public New D	ation Pvt. Ltd.
End Sem 3hrs.	ester Exan	ination Scher	ne. Max	kimum Ma	rks-70.	Tim	e allotted-
Group	Unit	<b>Objective Questions</b> (MCQ only with the correct answer)		Subjective Questions			ons
		No of question to be set	Total Marks	No of question to be set	To answer	Marks p questio	
A	ALL	10	10				
В	ALL			5	3	5	70
С	ALL			5	3	15	
pa • Sp	nrt. Decific instru	choice type ques ction to the stud p of the questior	ents to mainta				
		ne for end sem		nation:			
Group		Chapter	Marks o questio		Question to set		uestion to be nswered
Α		ALL	1		10	1	
B C		ALL	5 15		5 5	3	
						1.7	

Name of the Course: M.Tech. in Internet of Things				
Subject:Sanskrit for technical know	wledge			
Course Code:PGCS(IoT)106C				
Duration: 24 hours	Semester: 1st			
Teaching Scheme	Maximum Marks:100			
Theory:02	Examination Scheme			
Tutorial:0	End Semester Exam:70			
Practical:0	End Semester Exam:70			

Credit: 02	2	Attendar	nce : 5 ous Assessment: 25		
Aim:			143 A33C33111CIIL, 4J		
Sl. No.					
<u>1.</u>	Understand	ling basic Sanskrit lan	01120P		
<u>1.</u> 2.			science & technology car	n he underste	od
2. 3.			to develop logic in stude		vu
Objective	<u>م</u> .				
Sl. No.					
1.	To get a wo world	rking knowledge in ill	ustrious Sanskrit, the sci	entific langua	ige in the
2.		f Sanskrit to improve b	orain functioning		
3.			he logic in mathematics, s	science & othe	er
	subjects		0 · ··································		
4.		the memory power			
5.			ed with Sanskrit will be a	ble to explore	e the
6.	huge know	<u> </u>		<b>F</b>	
Pre-Requ					
Sl. No.					
1.					
2.					
Contents	5			Hrs./w	reek
Chapter	Name of the	e Topic		Hours	Marks
01		nabets in Sanskrit,	nnskrit,		
	-	/Present/Future Tens	se.		25
			,.,		
	• Sim	ple Sentences			
02	• Ord	8	25		
	• Intr	oduction of roots			
	-		out Sanskrit Literature		
			in Sanski it Litel atul C		
03	Tecl	nnical concepts of Eng	ineering-Electrical,	8	20
		hanical, Architecture,			
	Sub Total:			24	70
		essment Examination &	Preparation of Semester	4	30
	Examination		· · · · · · · · · · · · · · · · · · ·		
	Total:			28	100
Assignm List of Bo	Examination Total: ents: Based o boks	L	Preparation of Semester		
m		Title of the D l-	Edition /ICON /ICDN	Norra - 6 H	
Text Boo		Title of the Book	Edition/ISSN/ISBN	Name of the	
Text Boo Name of	Author			D 1. 1	
	Author			Publisher	
	Author			Publisher	
	Author			Publisher	

Reference Books: 1. Dr.Vishwas, Samskrita- Sansthanam, New Delhi Publication 2. PrathamaDe eksha-		"Abhyaspustakam" – "Teach Yourself Sanskrit"				Bharti Put New Delhi	•
						VempatiKutumbshas tri, Rashtriya Sanskrit	
3. \$	Suresh Soni,	"India's Gle Scientific T				Ocean books (P) Ltd. New Delhi.	
					70	II	attad
End Sen 3hrs.	nester Examir	nation Schen	ne. Max	timum Mar	KS-70.	Time all	ottea-
	unit		<b>Questions</b> with the			e Questions	otteu-
3hrs.		Objective (MCQ only	<b>Questions</b> with the	No of question to be set			Total Marks
3hrs.		Objective (MCQ only correct ans No of question	Questions with the wer) Total	No of question	Subjective	e Questions	Total
3hrs. Group	Unit	Objective (MCQ only correct ans No of question to be set	Questions with the wer) Total Marks	No of question	Subjective	e Questions	Total

• Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:						
Group	Chapter	Marks of each question	Question to be set	Question to be answered		
		question	301	allsweieu		
Α	ALL	1	10	10		
В	ALL	5	5	3		
С	ALL	15	5	3		

Name of	the Course: M.Tech. in In	iternet of Things			
Subject:V	Value education				
Course Co	ode:PGCS(IoT)106D	Semester: 1st			
Duration	: 36 hours	Maximum Marks:100			
Teaching	Scheme	Examination Scheme			
Theory:02	2	End Semester Exam:70			
Tutorial:0	)	End Semester Exam:70			
Practical:	0	Attendance : 5			
Credit:02		Continuous Assessment: 25			
Aim:	-				
Sl. No.					
1.	Knowledge of self-development				
2.	Learn the importance of Human values				
3.	Developing the overall personality				
Objective	):				

Sl. No.								
1.	Understand value of education and self- development							
2.	Imbibe good values in students							
3.	Let the should know about the importance of character							
Pre-Requ	iisite:							
Sl. No.								
1.								
2.								
		1						
Contents		Hrs./w						
Chapter	Name of the Topic	Hours	Marks					
01	<ul> <li>Values and self-development -Social values and individual attitudes. Work ethics, Indian vision of humanism.</li> <li>Moral and non- moral valuation. Standards and principles.</li> <li>Value judgements</li> </ul>	6	10					
02	<ul> <li>Importance of cultivation of values.</li> <li>Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness.</li> <li>Honesty, Humanity. Power of faith, National Unity.</li> <li>Patriotism.Love for nature,Discipline</li> </ul>	6	20					
03	<ul> <li>Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline.</li> <li>Punctuality, Love and Kindness.</li> <li>Avoid fault Thinking.</li> <li>Free from anger, Dignity of labour.</li> <li>Universal brotherhood and religious tolerance.</li> <li>True friendship.</li> <li>Happiness Vs suffering, love for truth.</li> <li>Aware of self-destructive habits.</li> <li>Association and Cooperation.</li> <li>Doing best for saving nature</li> </ul>	6	20					
04	<ul> <li>Character and Competence –Holy books vs Blind faith.</li> <li>Self-management and Good health.</li> <li>Science of reincarnation.</li> <li>Equality, Nonviolence,Humility, Role of Women.</li> <li>All religions and same message.</li> <li>Mind your Mind, Self-control.</li> <li>Honesty, Studying effectively</li> </ul>	6	20					
	Sub Total:	24	70					

	Internal As Examination	sessment Exam on	nination & Pr	eparation o	of Semester	4	30
	Total:					28	100
0	ents: Based	on theory					
List of B							
Text Books: Name of Author		Title of the Book		Edition/ISSN/ISBN		Name of the Publisher	
Referen	ce Books:						
Chakroborty, S.K.		"Values and Ethics for organizations Theory and practice"				Oxford U Press, No	niversity ew Delhi
End Sem 3hrs.	nester Exami	ination Schen	ne. Max	imum Maı	rks-70.	Time a	llotted-
Group	Unit	Objective (MCQ only correct ans		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
А	ALL	10	10				
В	ALL			5	3	5	70
B C	ALL ALL			5 5	3	5 15	70
C • C • D • S b	ALL Only multiple c art. pecific instruc e given on top	tion to the stud	ents to maintai paper.	5 ch one corre		15 be set in th	e objective
C • C p • S b Examina	ALL Only multiple c art. pecific instruc e given on top	tion to the stud of the question <b>e for end sem</b>	ents to maintai paper. ester examin	5 th one corre- in the order nation:	3 ct answer are to in answering ol	be set in th	e objective stions should
C • C • D • S b	ALL Only multiple c art. pecific instruc e given on top	tion to the stud	ents to maintai paper. ester examin Marks o	5 ch one corre- in the order nation: f each	3 ct answer are to in answering of <b>Question to</b>	be set in th	e objective stions should stion to be
C • C p • S b Examina	ALL Only multiple c art. pecific instruc e given on top	tion to the stud of the question <b>e for end sem</b>	ents to maintai paper. ester examin	5 ch one corre- in the order nation: f each	3 ct answer are to in answering ol	be set in th	e objective stions should
C • C p • S b Examina Group	ALL Only multiple c art. pecific instruc e given on top	tion to the stud of the question e for end sem Chapter	ents to maintai paper. ester examin Marks o question	5 ch one corre- in the order nation: f each	3 ct answer are to in answering of Question to set	be set in th ojective ques be Que ans	e objective stions should stion to be

### <u>Semester II</u>

	of the Course: M.Tech. in Int ct:Advanced Computer Archi				
Course Code: PGCS(IoT)201, PGCS(IoT)291		Semester: 2 <sup>nd</sup>			
Duration: 48 Hrs.		Maximum Marks: 200			
Teaching Scheme		Examination Scheme			
Theor		End Semester Exam: 70			
Tutori		Attendance : 5			
Practi	cal: 4	<b>Continuous Assessment:</b> 25			
Credit	: 3 + 2	<b>Practical Sessional internal continu</b> 40	ious eva	luation:	
		Practical Sessional external examin	nation: 6	0	
Aim:					
Sl.					
No.					
1.	Evaluate performance of d	ifferent architectures with respect to va	rious pa	rameters	
2.	Analyze performance of dif				
3.	Identify cache and memory	y related issues in multi-processors			
Objec	tive:				
Sl.					
No.					
1.		nitectural design of processors			
2.	Learn about the various tee power savings in current p	chniques used to obtain performance in rocessors	nprovem	ent and	
3.					
Pre-R	equisite:				
Sl.					
No.					
1.	Computer Architecture				
2.	Distributed Computing				
Cast			Hrs./w	<b> </b> -	
	itents				
Chap	Name of the Topic		Hours	Marks	
<b>ter</b> 01	FUNDAMENTALS OF COMP	UTER DESIGN	14	15	
		d Organization-Review, Fundamentals	14	15	
	of Computer Design, Techn				
	Analysis (3L)				
	Parallel Processing Archite				
	SIMD, MIMD, PRAM models				
	Data and Resource Dependencies, Program Partitioning and				
	Scheduling, Control Flow v				

02		LEVEL PARALLELISM			14	20	
			ogies-Static, Dynamic, Types of Networks (3L) Iemory Hierarchy, Virtual Memory (4L)				
		pelining, Instruction Pi					
	-	thmetic pipelines. (4L)	penning, uynannc				
03		PARALLELISM I			10	20	
05		ors- Multistage Network	c Cacha Caharanca		10	20	
	-	on, Message- passing (4					
	Vector Proces						
	Algorithms (3	Chaining (4L) Array Pro	<i>Jeessons- ser acture,</i>				
04	<u> </u>	PARALLELISM II			10	15	
01		hitecture- Graphs. Petri	Nets. Static and Dynam		10	15	
		putations (4L)	rices, static and by nam				
		amming Models, Langu	ages, Compilers (4L)				
	Sub Total:				48	70	
		ment Examination & Prep	aration of Semester			30	
	Examination						
	Total:					100	
Practi	ical: Based on T	heory					
Assigr	nments:	1	least three from the re	-			
List of	f Books			-			
List of Text B	f Books 3ooks:			Nam	e of th	e	
List of Text B	f Books	Title of the Book	Edition/ISSN/ISBN		e of th	le	
List of <u>Text B</u> Name	f Books 3ooks:			Publ	isher	ie iufmann/	
List of <u>Text B</u> Name John L	f Books Books: of Author	Title of the Book	Edition/ISSN/ISBN	Publ	isher gan Ka		
List of Text B Name John L and D	f Books Books: of Author L Hennessey avid A	Title of the Book "Computer	Edition/ISSN/ISBN	Publ Mor	isher gan Ka		
List of <u>Text B</u> Name John L	f Books Books: of Author L Hennessey avid A	Title of the Book "Computer Architecture A	Edition/ISSN/ISBN	Publ Mor	isher gan Ka		
List of Text E Name John L and D Patter Kai Hy	f Books Books: of Author L Hennessey avid A rson, wang and A.	Title of the Book "Computer Architecture A Quantitative Approach", Computer	Edition/ISSN/ISBN Fifth Edition, 2012. International	Publ Morg Elsev	isher gan Ka	ufmann/	
List of Text E Name John L and D Patter Kai Hy	f Books Books: of Author L Hennessey avid A rson, wang and A.	Title of the Book "Computer Architecture A Quantitative Approach", Computer Architecture and	Edition/ISSN/ISBN Fifth Edition, 2012.	Publ Morg Elsev	lisher gan Ka vier,	ufmann/	
List of Text E Name John L and D Patter Kai Hy Briggg	f Books Books: of Author L Hennessey avid A rson, wang and A. gs	Title of the Book "Computer Architecture A Quantitative Approach", Computer Architecture and Parallel Processing-	Edition/ISSN/ISBN Fifth Edition, 2012. International	Publ Mor Else McG	isher gan Ka vier, raw H	ufmann/	
List of Text E Name John L and D Patter Kai Hy Briggg D. Sim	f Books Books: of Author L Hennessey avid A rson, wang and A. gs	Title of the Book "Computer Architecture A Quantitative Approach", Computer Architecture and Parallel Processing- Advanced Computer	Edition/ISSN/ISBN Fifth Edition, 2012. International	Publ Morg Elsev	isher gan Ka vier, raw H	ufmann/	
List of Text E Name John L and D Patter Kai Hy Briggg D. Sim P. Kac	f Books Books: of Author - Hennessey avid A rson, wang and A. gs na, T. fountain, csuk,	Title of the Book "Computer Architecture A Quantitative Approach", Computer Architecture and Parallel Processing- Advanced Computer Architecture:	Edition/ISSN/ISBN Fifth Edition, 2012. International	Publ Morg Elsev McG Pear	isher gan Ka vier, raw H	ufmann/	
List of Text E Name John L and D Patter Kai Hy Briggg D. Sim P. Kac D. Cull	f Books Books: of Author L Hennessey avid A rson, wang and A. gs na, T. fountain, csuk, ler, J.P.Singh,	Title of the Book "Computer Architecture A Quantitative Approach", Computer Architecture and Parallel Processing- Advanced Computer Architecture: Parallel Computer	Edition/ISSN/ISBN Fifth Edition, 2012. International	Publ Mor Else McG	isher gan Ka vier, raw H	ufmann/	
List of Text E Name John L and D Patter Kai Hy Briggg D. Sim P. Kac D. Cull A.Gup	f Books Books: of Author L Hennessey avid A rson, wang and A. gs na, T. fountain, csuk, ler, J.P.Singh, ota,	Title of the Book "Computer Architecture A Quantitative Approach", Computer Architecture and Parallel Processing- Advanced Computer Architecture:	Edition/ISSN/ISBN Fifth Edition, 2012. International	Publ Morg Elsev McG Pear	isher gan Ka vier, raw H	ufmann/	
List of Text E Name John L and D Patter Kai Hy Briggg D. Sim P. Kac D. Cull A.Gup	f Books Books: of Author L Hennessey avid A rson, wang and A. gs na, T. fountain, csuk, ler, J.P.Singh,	Title of the Book "Computer Architecture A Quantitative Approach", Computer Architecture and Parallel Processing- Advanced Computer Architecture: Parallel Computer	Edition/ISSN/ISBN Fifth Edition, 2012. International	Publ Morg Elsev McG Pear	isher gan Ka vier, raw H	ufmann/	
List of Text E Name John L and D Patter Kai Hy Briggg D. Sim P. Kac D. Cull A.Gup	f Books Books: of Author L Hennessey avid A rson, wang and A. gs na, T. fountain, csuk, ler, J.P.Singh, ota,	Title of the Book "Computer Architecture A Quantitative Approach", Computer Architecture and Parallel Processing- Advanced Computer Architecture: Parallel Computer	Edition/ISSN/ISBN Fifth Edition, 2012. International	Publ Morg Elsev McG Pear	isher gan Ka vier, raw H	ufmann/	
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List of Text E Name John L and D Patter Kai Hy Briggg D. Sim P. Kac D. Cull A.Gup	f Books Books: of Author L Hennessey avid A rson, wang and A. gs na, T. fountain, csuk, ler, J.P.Singh, ota,	Title of the Book "Computer Architecture A Quantitative Approach", Computer Architecture and Parallel Processing- Advanced Computer Architecture: Parallel Computer	Edition/ISSN/ISBN Fifth Edition, 2012. International	Publ Morg Elsev McG Pear	isher gan Ka vier, raw H	ufmann/	
List of Text E Name John L and D Patter Kai Hy Briggg D. Sim P. Kac D. Cull A.Gup Refere	f Books Books: of Author L Hennessey avid A rson, wang and A. gs na, T. fountain, csuk, ler, J.P.Singh, ota, ence Books:	Title of the Book "Computer Architecture A Quantitative Approach", Computer Architecture and Parallel Processing- Advanced Computer Architecture: Parallel Computer	Edition/ISSN/ISBN Fifth Edition, 2012. International Edition,	Publ Morg Elsev McG Pear	isher gan Ka vier, raw H	ufmann/	
List of Text E Name John L and D Patter Kai Hy Briggg D. Sim P. Kac D. Cull A.Gup Refere	f Books Books: of Author L Hennessey avid A rson, wang and A. gs na, T. fountain, csuk, ler, J.P.Singh, ota, ence Books:	Title of the Book "Computer Architecture A Quantitative Approach", Computer Architecture and Parallel Processing- Advanced Computer Architecture: Parallel Computer Architecture	Edition/ISSN/ISBN Fifth Edition, 2012. International Edition,	Publ Morg Elsev McG Pear	isher gan Ka vier, raw H	ufmann/	
List of Text E Name John I and D Patter Kai Hy Briggg D. Sim P. Kac D. Cull A.Gup Refere Sl. No. 38	f Books Books: of Author Hennessey avid A rson, wang and A. gs na, T. fountain, csuk, ler, J.P.Singh, ota, ence Books: f equipment/ap 3.	Title of the Book "Computer Architecture A Quantitative Approach", Computer Architecture and Parallel Processing- Advanced Computer Architecture: Parallel Computer Architecture	Edition/ISSN/ISBN Fifth Edition, 2012. International Edition,	Publ Morg Elsev McG Pear	isher gan Ka vier, raw H	ufmann/	
List of Text E Name John L and D Patter Kai Hy Briggg D. Sim P. Kac D. Cull A.Gup Refered List of Sl. No. 38 39	f Books Books: of Author Hennessey avid A rson, wang and A. gs na, T. fountain, csuk, ler, J.P.Singh, ota, ence Books: f equipment/ap 3.	Title of the Book "Computer Architecture A Quantitative Approach", Computer Architecture and Parallel Processing- Advanced Computer Architecture: Parallel Computer Architecture paratus for laboratory e	Edition/ISSN/ISBN Fifth Edition, 2012. International Edition,	Publ Morg Elsev McG Pear Elsev	isher gan Ka vier, raw H son vier	ufmann/	

Grou	Unit	Objective	ions						
р		(MCQ only				•			
•		correct ans	wer)						
		No of	Total	No of	To answer	Marks	per	Total	
		question	Marks	question		questi	on	Marks	
		to be set		to be set					
А	ALL	10	10						
В	ALL			5	3	5		70	
С	ALL			5	3	15			
٠	Only multiple cho	oice type ques	tion (MCQ) wit	h one corre	ct answer are to	be set i	n the c	bjective	
	part.								
•	Specific instruction			n the order	in answering ob	jective	questi	ons should	
	be given on top of								
	ination Scheme f								
Group	)	Chapter	Marks o		Question to b		-	ion to be	
			question	1	set	-	answe	ered	
Α		ALL	1		10		10		
B		ALL	5		5		3		
С		ALL	15		5			3	
Exami	ination Scheme f	for Practica	l Sessional e	xaminatio	n:				
Practi	ical Internal Sess	sional Conti	inuous Evalu	ation					
Intern	nal Examination:							40	
Five N	lo of								
Five N	o of iments								
Five N Experi	iments							60	
Five N Experi	iments nal Examination: E				10			60	
Five N Experi Extern Signed	iments nal Examination: E Lab Note Book(for				10			60	
Five N Experi Extern Signed experir	iments nal Examination: E Lab Note Book(for ments)	five						60	
Five N Experi Extern Signed experin On Spo	iments nal Examination: E Lab Note Book(for	five for each			10			60	

Name of t	the Course: M.Tech. in	Internet of Things					
Subject: V	Wireless and Sensor Netw	orks					
Course Co	ode: PGCS(IoT)202,	Semester: 2 <sup>nd</sup>					
PGCS(IoT)	292						
Duration	: 48 Hrs.	Maximum Marks: 200					
Teaching	Scheme	Examination Scheme					
Theory: 3		End Semester Exam: 70					
Tutorial: 0		Attendance : 5					
Practical	: 4	Continuous Assessment: 25					
Credit: 3	+ 2	Practical Sessional internal continuous evaluation:					
		40					
		Practical Sessional external examination: 60					
Aim:							
Sl. No.							
1.	To list various app	lications of wireless sensor networks, describe the concepts,					
	protocols, and diffe	erences underlying the design, implementation, and use of					
	wireless sensor net	tworks,					
2.	Propose, implemer	nt, and evaluate new ideas for solving wireless sensor					

	network design issues							
3.								
Objective:								
Sl. No.								
1.	Students should be able to list various applications of wireless sensor networks, describe the concepts, protocols, and differences underlying the design							
2.	Implementation, and use of wireless sensor networks. Also im evaluate new ideas for solving wireless sensor network design	•	and					
3.								
Dro Doqui	aita							
Pre-Requi Sl. No.								
<u>31. NO.</u> 1.	Computer Architecture							
	Computer Architecture							
2.	Networking							
Contents		Hrs./w	oolr					
Contents Chapter	Name of the Topic	Hrs./w Hours	еек Marks					
01	Sensor networks overview:	4	10					
01	Introduction, Applications of WSN, Range of Applications,	4	10					
	Designissues							
02	Basic Wireless Sensor Technology:	6	10					
02	Sensor node architecture, Hardware and Software, Sensor	U	10					
	Taxonomy, WSN Operating Environment, Trend							
03	Wireless Transmission Technology and Systems:	6	10					
00	Introduction, Radio Technology Primer, Propagation &	Ū	10					
	Propagation							
	Impairments, Available Wireless Technologies							
04	Fundamentals of MAC Protocols:	6	10					
	Performance Requirements, Common Protocols,		_					
	MAC Protocols for WSNs, Schedule-Based Protocols, Random							
	Access-Based Protocols, Sensor-MAC Case Study, Protocol							
	Overview, Periodic Listen and Sleep Operations, Schedule							
	Selection							
	and Coordination, Schedule Synchronization, Adaptive							
	Listening,							
	Access Control and Data Exchange.							
05	Routing Protocols for Wireless Sensor Networks:	6	10					
	Routing Challenges and Design Issues in Wireless, Sensor							
	Networks,							
	Network Scale and Time-Varying Characteristics, Resource							
	Constraints, Sensor Applications Data Models, Routing							
	Strategies in Wireless Sensor Networks, WSN Routing							
	Techniques							
	Flooding and its Variants, Sensor Protocols for Information							
	via Negotiation, LowEnergy Adaptive Clustering Hierarchy,							
	Power-Efficient Gathering in Sensor Information Systems, Directed Diffusion, Coographical Pouting							
06	Directed Diffusion, Geographical Routing.	6	5					
00	Transport Control Protocols for Wireless Sensor Networks: Transport Protocol Design Issues, Examples of Existing	O	5					
	Transport Protocol Design Issues, Examples of Existing TransportControl Protocols, CODA (Congestion Detection							
	and Avoidance),							
	ana monuanee j,	1	1					

	Quickly), GARUDA,	ATP (Ad Hoc Transpo	rt Protocol), Problems w	ith					
	Transpor	t Control Protocols, Pe							
	Control P	tocols, Congestion, Packet Loss Recovery.							
07	Middlewa	re for Wireless Senso	6	5					
	Introduct	ion, Network Manager	nent Requirements,						
	Tradition	al							
		Network Management Models, Simple Network Management							
		Telecom Operation Ma	ap, Network Managemen	t					
	Design	1 474							
			t Architecture: MANNA, O	ther					
		lated to Network Mana	agement, Naming,						
08	Localizati		omont.	4	5				
08		nce and Traffic Manag	ols, Routing Protocols,	4	5				
	-	Transport Protocols, Performance Modeling of WSNs, Performance Metrics, Basic Models, Network Models.							
09		g Systems for Wireless	•	4	5				
0,7			s, Examples of MANTIS,	-	5				
	SenOS, Ma		,,,,,,,,						
	Sub Total	0		48	70				
	Internal As		30						
	Examinati		•						
	Total:				100				
Skills to	al: Based on T be developed Practical: Sl. N	d:	at least three from the re	st)					
Skills to List of P Assignn	) be developed Practical: Sl. N nents:	d:	at least three from the re	st)					
Skills to List of P Assignn List of E	) be developed Practical: Sl. N nents: Books	d:	at least three from the re	st)					
Skills to List of P Assignn List of E Text Bo	) be developed Practical: Sl. N nents: Books oks:	d: o. 1& 2 compulsory & a			he				
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Skills to List of P Assignn List of E <u>Text Bo</u> Name o [1] Kaze Daniel I TaiebZr	o be developed Practical: Sl. No nents: Books oks: f Author em Sohraby, Minoli, nati.	d: o. 1& 2 compulsory & a Title of the Book Wireless Sensor Network		Name of t Publisher Wiley					
Skills to List of P Assignn List of E <u>Text Bo</u> Name o [1] Kaze Daniel I TaiebZr [2] Anam	o be developed Practical: Sl. No nents: Books oks: f Author em Sohraby, Minoli, nati.	d: o. 1& 2 compulsory & a Title of the Book Wireless Sensor Network Wireless Sensor		Name of t Publisher					
Skills to List of P Assignn List of E Text Bo Name o [1] Kaze Daniel I TaiebZr [2] Anan Swami,	o be developed Practical: Sl. No nents: Books oks: f Author em Sohraby, Minoli, nati. nthram Qing Zhao,	d: o. 1& 2 compulsory & a Title of the Book Wireless Sensor Network Wireless Sensor Networks Signal		Name of t Publisher Wiley					
Skills to List of P Assignn List of E <u>Text Bo</u> Name o [1] Kaze Daniel I TaiebZr [2] Anan Swami, YaoWin	o be developed Practical: Sl. No nents: Books oks: f Author em Sohraby, Minoli, nati. nthram Qing Zhao, i Hong, Lang	d: o. 1& 2 compulsory & a Title of the Book Wireless Sensor Network Wireless Sensor Networks Signal Processing and		Name of t Publisher Wiley					
Skills to List of P Assignn List of E <u>Text Bo</u> Name o [1] Kaze Daniel I TaiebZr [2] Anan Swami, YaoWin Tong Pu	o be developed Practical: Sl. No nents: Books oks: f Author em Sohraby, Minoli, nati. nthram Qing Zhao, i Hong, Lang ib	d: o. 1& 2 compulsory & a Title of the Book Wireless Sensor Network Wireless Sensor Networks Signal Processing and Communications		Name of t Publisher Wiley John Wile	y & Sons.				
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Skills to List of P Assignn List of E <u>Text Bo</u> Name o [1] Kaze Daniel I TaiebZr [2] Anan Swami, YaoWin Tong Pu	o be developed Practical: Sl. No nents: Books oks: f Author em Sohraby, Minoli, nati. nthram Qing Zhao, i Hong, Lang ib	d: o. 1& 2 compulsory & a Title of the Book Wireless Sensor Network Wireless Sensor Networks Signal Processing and Communications Ad Hoc Wireless		Name of t Publisher Wiley John Wile	y & Sons.				
Skills to List of P Assignn List of E <u>Text Bo</u> Name o [1] Kaze Daniel I TaiebZr [2] Anan Swami, YaoWin Tong Pu	o be developed Practical: Sl. No nents: Books oks: f Author em Sohraby, Minoli, nati. nthram Qing Zhao, i Hong, Lang ib	d: o. 1& 2 compulsory & a Title of the Book Wireless Sensor Network Wireless Sensor Networks Signal Processing and Communications Ad Hoc Wireless Networks:		Name of t Publisher Wiley John Wile	y & Sons.				
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Skills to List of P Assignm List of E <u>Text Bo</u> Name o [1] Kaze Daniel P TaiebZr [2] Anar Swami, YaoWin Tong Pu [3] Mur [4] Editt Raghav	be developed Practical: Sl. No nents: Books oks: f Author em Sohraby, Minoli, nati. nthram Qing Zhao, a Hong, Lang 1b thy Pub ed by C. S. endra Pub	d: o. 1& 2 compulsory & a Title of the Book Wireless Sensor Network Wireless Sensor Networks Signal Processing and Communications Ad Hoc Wireless Networks: Architectures and Protocols Wireless sensor networks		Name of t Publisher Wiley John Wile Pearson F	y & Sons.				
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aran, Vir V N. Balakris Chuka D. O	hnan,	Applicati Technolo		and						
Reference	Books:							1		
List of equi	ipment/ap	paratus fo	r lab	oratory ex	xperimen	ts:		1		
Sl. No.										
40.										
41.										
42.										
<u>43.</u> 44.										
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3hrs.		ation sen	me.	Max	iniuni Ma	1113	70.	1	inic an	otteu
Group	Unit	Objectiv	e Qu	estions			Subjective	Que	stions	
-		(MCQ onl					·	•		
		correct an		,	NL C		<b>m</b>			m · 1
		No of question		otal Iarks	No of question		To answer		ks per stion	Total Marks
		to be set	1.	iui K5	to be set			que		inter its
А	ALL	10	1	0						
В	ALL				5		3	5		70
С	ALL				5		3	15		
	/ multiple cho	jice type qu	estion	n (MCO) wit	-		-		t in the	objective
part	-			(-0)-						
-	cific instruction				n the order	r in a	answering ob	jectiv	e questi	ons should
	iven on top o									
Examination Group	on scheme	Chapter	nest	Marks of		01	uestion to b		Quest	tion to be
Group		Chapter		question		se		Je	answ	
Α		ALL		1	-	10			10	ci cu
В		ALL		5		5			3	
С		ALL		15		5			3	
Examination						on:				
Practical In			tinu	ous Evalu	ation					
Internal Ex	amination	1								40
Five No of Experiment	-c									
Experiment	10									
External Ex	amination: F	xaminer-								60
	lote Book(for						10			
On Spot Expe	eriment(one						40			
group consis	-	-					10			
		/iva voce					10			

	ensor Networks and Int de: PGCS(IoT)203A,	ernet of Things Semester: 2 <sup>nd</sup>						
PGCS(IoT)2								
Duration:		Maximum Marks: 200						
Гeaching								
Гheory: 3								
Futorial:	)	End Semester Exam: 70 Attendance : 5						
Practical:								
Credit: 3 +		Continuous Assessment: 25 Practical Sessional internal continuou	s evalua	tion: 40				
		Practical Sessional external examinati						
Aim:			0111 00					
Sl. No.								
1.	Identify requireme systems, protocols ar	nts from emerging WSN applications on WSN platfo ad middleware	rms, comn	nunication				
2.	• •	e and evaluate communication and network protoco	ls used in V	WSNs				
3.	-	mechanisms and algorithms for time synchronization						
4.	Understand and disc	Understand and discuss requirements for the design of security mechanisms and middleware systems to be used in WSNs						
Objective								
Sl. No.								
1.	The course gives an overview of various topics related to wireless sensor networks, which are expected to be the basis for the emerging internet-of-things.							
2.	The course covers topics with relation to various sub disciplines of computer science such as							
	hardware, operating	systems, distributed systems, networking, security a	and databa	ses.				
3.		vireless sensor network (WSN) specific issues such a topology control are addressed as well.						
Pre-Requ	isite:							
Sl. No.								
1.	Wireless Networks							
2.								
Contents			Hrs./w	eek				
Chapter	Name of the Topic		Hours	Marks				
01	cities, smart living learning. Example Self-Adaptive Syst Systems, Software	Applications: Smart transportation, smart g, smart energy, smart health, and smart es of research areas include for instance: tems, Cyber Physical Systems, Systems of e Architectures and Connectors, Software Big Data and Big Data Mining, Privacy and	8	10				
		hitecture- Introduction, Functional View,	9	12				
02	IoT Reference Arc Information View Relevant architec Real-World Desig Design constraint	, Deployment and Operational View, Other						

	integrated	d Web of Things, IMC-A	ESOP: from the Web of							
	0	the Cloud of Things, Co								
		on- Introduction, Case s	5							
		-	i today, Case study: phas	P						
		mercial building	rtouay, case study. phas							
		on in the future.								
0.4			Communitien Orientie	~	10	10				
04			Consumption, Operatin	g	10	16				
	-	ystems, Time Synchronization, Positioning and ocalization, Medium Access Control, Topology and								
		•		_						
		ge Control, Routing: Transport Protocols, Network								
		Middleware, Databases								
05			s: What is an IOT Device	·,	7	15				
	Exemplar									
	Device Bo	ard, Linux on Raspberr	ry, Interface and							
	Programm	ning & IOT Device								
06	Recent tre	ends in sensor network	and IOT architecture,		5	5				
	Automatio									
	Industrial	aspect of IOT								
	Sub Total				40	70				
			Preparation of Semester			30				
	Examinatio									
	Total:					100				
Practical:	Based on T	heory								
	20000001									
Skills to be	e developed	1.								
	e uevelopee									
List of Dro.	ctical SL N	19.2 compulsors 8 of		-1)						
List of Practical: Sl. No. 1& 2 compulsory & at least three from the rest)										
LISUOIPIA	cucai. Si. No	o. 1& 2 compulsory & a	t least three from the re	stj						
		5. 1& 2 computsory & a	t least three from the re	stj						
Assignmen		o. 1& 2 computsory & a	t least three from the re	stj						
Assignmer	nts:	o. 1& 2 computsory & a	t least three from the rea	stj						
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Assignmer List of Boo	nts: oks s:	Title of the Book	Edition/ISSN/ISBN	Nar	ne of th	e				
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Assignmer List of Boo Text Book	nts: oks s:			Nar		e				
Assignmer List of Boo Text Book	nts: oks s:			Nar		e				
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Assignmen List of Boo Text Book Name of A	nts: ks s: uthor Books:			Nar Put		e				
Assignmer List of Boo Text Book Name of A	nts: ks s: uthor Books: 3., Barja,	Title of the Book		Nar Put	olisher					
Assignmen List of Boo Text Book Name of A Reference Mandler, F J., Mitre Ca	nts: bks s: uthor Books: 3., Barja, umpista,	Title of the Book		Nar Put Spr Inte	inger	nal				
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Assignmen List of Boo Text Book Name of A Reference Mandler, E J., Mitre Ca M.E., Cagá Chaouchi, Zeadally, S	nts: bks s: uthor Books: B., Barja, umpista, ová, D., H., S., Badra,	Title of the Book		Nar Put Spr Inte	inger	nal				
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Assignmen List of Boo Text Book Name of A Name of A Reference Mandler, E J., Mitre Ca M.E., Cagá Chaouchi, Zeadally, S M., Giorda Fazio, M., S Vieriu, R1	nts: ks s: uthor Books: 3., Barja, umpista, ová, D., H., S., Badra, no, S., Somov, A., L.,	Title of the Book	Edition/ISSN/ISBN	Nar Put Spr Inte	inger	nal				
Assignmen List of Boo Text Book Name of A Reference Mandler, F J., Mitre Ca M.E., Cagá Chaouchi, Zeadally, S M., Giorda Fazio, M., S Vieriu, R1 List of equ Sl. No.	nts: ks s: uthor Books: 3., Barja, umpista, ová, D., H., S., Badra, no, S., Somov, A., L.,	Title of the Book Internet of Things. IoT Infrastructures,	Edition/ISSN/ISBN	Nar Put Spr Inte	inger	nal				
Assignmen List of Boo Text Book Name of A Name of A Reference Mandler, E J., Mitre Ca M.E., Cagá Chaouchi, Zeadally, S M., Giorda Fazio, M., S Vieriu, R1	nts: ks s: uthor Books: 3., Barja, umpista, ová, D., H., S., Badra, no, S., Somov, A., L.,	Title of the Book Internet of Things. IoT Infrastructures,	Edition/ISSN/ISBN	Nar Put Spr Inte	inger	nal				

47.									
	ester Examina	ation Scher	me. Max	kimum Ma	rks-70.	Tin	ne all	otted-	
3hrs.									
Group	Unit		Questions	Subjective Questions					
		(MCQ only							
		correct answer) No of Total		No of	Marks per		Total		
		question	Marks	question	To answer			•	
		to be set	Marks	to be set		question		Marks	
А	ALL	10	10						
В	ALL			5	3	5		70	
С	ALL			5	3	15			
• 01	nly multiple cho	ice type que	stion (MCQ) wi	th one corre	ect answer are to	be set i	in the	bjective	
	art.	51 1						,	
• Sp	pecific instruction	on to the stud	lents to mainta	in the order	in answering ob	jective	questi	ons should	
	e given on top of				-	-	-		
Examina	tion Scheme f	or end sen	nester exami	nation:					
Group		Chapter	Marks o	of each Question to b		e Question to be			
			questio	n	set		answered		
Α		ALL	1		10	-	10		
В		ALL	5		5		3		
С		ALL	15		5	1	3		
Examina	tion Scheme f	or Practica	al Sessional e	xaminatio	n:	·			
Practical	<b>Internal Sess</b>	ional Cont	inuous Evalu	ation					
Internal	Examination:							40	
Five No o	f								
Experime	ents								
*									
	Examination: E			1		1		60	
	Note Book(for	five			10				
experimen									
	periment(one f				40				
group cons	sisting 5 studen	-			10				
	V	iva voce			10				

Name of th	e Course: M.Tech. in	Internet of Things					
Subject: Da	ata visualization						
Course Co	de: PGCS(IoT)203B,	Semester: 2 <sup>nd</sup>					
PGCS(IoT)29	93B						
Duration: 48 Hrs. Maximum Max		Maximum Marks: 200					
Teaching Scheme Examination Scheme							
Theory: 3		End Semester Exam: 70					
Tutorial: 0		Attendance : 5					
Practical:	4	Continuous Assessment: 25					
Credit: 3 +	2	Practical Sessional internal continuous evaluation:					
		40					
		Practical Sessional external examination: 60					
Aim:							
Sl. No.							
1.	Familiar with the de	sign process to develop visualization methods and					
	visualization system	ns, and methods for their evaluation.					

2.	Preparation and processing of data, visual mapping and the visualization							
3.		nderstanding of large-s						
_		0 0 0						
<b>Objective:</b>								
Sl. No.								
1.	Familiari	ze students with the has	ic and advanced technic	11165 (	of inform	ation		
1.		ion and scientific visual		14050	/1 111101 11	ation		
2.		key techniques of the vis						
3.			on, the visualized data a	nd th	o actual			
5.		ion, interaction and dis		inu ti	ic actual			
	Visualizat	ion, meraction and dis	torting teeninques					
Pre-Requi	site:							
Sl. No.								
1.								
2.								
2.								
Contents					Hrs./w	aak		
Chapter	Name of t	ha Tonic			Hours	Marks		
01			, visual representation of	of	8	10		
01		alt principles, informat		<b>J</b> I	0	10		
02		visual representations,			8	12		
02	0	sual mapping, visual and			U	12		
		ion applications.	ily tres, Design of					
03		tion of visualization sys	tems. Interaction and		10	12		
05		-	ing, Visualization of one		10	12		
			text and text documents					
04			phs, clusters, networks,		11	16		
01		Metaphorical visualizat		,		10		
05		<b>.</b>	vector fields, processes	and	7	15		
			s, geographic informatio					
		ns, collaborative visual		- ,				
	visualizat	-						
06	Recent tro	ends in various percept	ion techniques, various		4	5		
		ion techniques,	•					
		ctures used in data visua	alization.					
	Sub Total	:			48	70		
	Internal As	ssessment Examination &	Preparation of Semester			30		
	Examination	on						
	Total:					100		
Practical:	Based on T	heory						
		_						
Skills to be	e developed	<b>d</b> :						
List of Pra	ctical: SI. No	o. 1& 2 compulsory & at	least three from the res	st)				
Assignme	nts:							
List of Boo								
Text Book				N				
Name of A	utnor	Title of the Book	Edition/ISSN/ISBN		ne of the			
				Pub	lisher			

Reference	Books:									
1. WA GRINSTEIN	RD,	Visualiz Foundat Technig	Interactive Data Visualization: Foundations, Techniques, and Applications.					Nati Ltd.		K Peters,
2. E. T	Applications. The Visual Display o Quantitative Information,						Gra	phics F	Press.	
List of oqui	inmont /an	paratus f	or lab	oratory o	vnorimon	ter				
List of equi Sl. No.	ipilient/ap	paratus i		Ji ator y e	xperimen	115:				
48.										
49.										
50.										
50.										
52.										
End Semes	ter Examin	ation Sch	eme.	Max	imum Ma	rks-'	70.	T	ime all	otted-
3hrs.										
Group	Unit	Objecti	ve Qu	estions		S	Subjective	Que	stions	
-		(MCQ on correct a					-	-		
		No of		otal	No of			Mar	ks per	Total
		question		arks	question			question		Marks
		to be set			to be set					
А	ALL	10	1	0						
В	ALL				5	3	3	5		70
С	ALL				5	3	3	15		
<ul> <li>Only part</li> <li>Spective</li> </ul>	v multiple cho cific instructi iven on top o	on to the st f the quest	tudents ion pap	to maintai ber.	th one corre	ect an	iswer are to	be se		
Examinatio	on scheme			Marks o		0	estion to b		0	ton to ho
Group		Chapter		question		set		le	answ	tion to be ered
A		ALL		1		10			10	
B		ALL		5		5			3	
C		ALL		15		5			3	
Examination Practical In						on:				
Internal Ex			mmu							40
Five No of	ammation	•								10
Experiment	s									
Lapermen	.0									
External Exa	amination: F				1					60
Signed Lab N							10			
experiments	)									
On Spot Expe			_	_	_		40		_	
group consis	ting 5 studer	its)								

Viva voce	10	

	the Course: M.Tech. in In oT Applications and Cor	0			
	ode: PGCS(IoT)203C, Semester: 2 <sup>nd</sup>				
Duration		Maximum Marks: 200			
Гeaching	g Scheme Examination Scheme				
Theory: 3	3	End Semester Exam: 70			
<b>Futorial</b> :	0	Attendance : 5			
Practical	:4	<b>Continuous Assessment:</b> 25			
C <b>redit:</b> 3	+ 2	<b>Practical Sessional internal continu</b> 40	ious eva	luation:	
		Practical Sessional external examin	nation: 6	0	
Aim:					
Sl. No.					
1.	To understand mergin implementation in hor	g technological options, platforms and ca ne & city automation	se studie	es of IoT	
2.	Determine the Market				
3.		· · · · · · · · · · · · · · · · · · ·			
Objective	) 2:				
Sl. No.					
1.		ll the elements of IoT-Mechanical, Electro l wireline protocols, Mobile to Electronics tegration			
2.	Open source/commere ArmMbedLPC	cial electronics platform for IoT-Raspber	ry Pi, Ard	luino,	
3.	Open source /commer Libellium, Axeda, Cisco	cial enterprise cloud platform for IoT-Ay o fog cloud	la, iO Brio	dge,	
Pre-Requ	isite:				
Sl. No.					
1.	Computer Networks				
2.					
Contents			Hrs./we	ek	
Chapter	Name of the Topic		Hours	Marks	

Contents		Hrs./w	eek
Chapter	Name of the Topic	Hours	Marks
01	Basic function and architecture of a sensor — sensor body, sensor mechanism, sensor calibration, sensor maintenance,	9	10
	cost and pricing structure, legacy and modern sensor network.		
	Development of sensor electronics — IoT vs legacy, and open source vs traditional PCB design style		
	Development of sensor communication protocols, Protocols:		
	Modbus, relay, Zigbee, Zwave, X10,Bluetooth, ANT, etc.		
	Business driver for sensor deployment — FDA/EPA		
	regulation, fraud/tempering detection, supervision, quality		
	control and process management		
	Different kind of calibration Techniques: manual, automation,		
	infield, primary and secondary calibration — and their		

	implication in Powering optic and PoE		tery, solar, Witricity, Mo	bile			
02	Zigbee and Zwa networking. Lo Zigbee chips. Bluetooth/BLE class of BLE. In review. Wireless prote	ion,	12				
	BLE and Zigbee LOS vs NLOS lin	e Other long-distan 1ks, Capacity and th ues in wireless pro	t and packet structure fo ce RF communication lin troughput calculation tocols:power consumpti	ık.			
03	PCB vs FPGA vs Prototyping el- certificate for 1 Basic introduc Electronics rel rate Environm Basic Open sou Beaglebone		12				
04	Introduction to Mobile app platform for IoT:       Protocol       8       16         stack of Mobileapp for IoT,       Mobile to server integration,       16         iBeacon in IoS,Window Azure, Linkify Mobile platform for IoT,       Axeda,Xively       16						
05	Database impl SQL vs NoSQL, M2M cloud pla Libellium, CISC &T M2M platfo	ble	15				
06	Recent trends optimization in home		n, IoT-locks, Energy	5	5		
	Sub Total:			48	70		
		nent Examination & F	Preparation of Semester		30		
	Total:				100		
Skills to	l: Based on Theo be developed: ractical: Sl. No. 10	-	t least three from the re	st)			
Assignm List of B	ooks						
Text Boo Name of		tle of the Book	Edition/ISSN/ISBN	Name of Publishe			

Referenc				1				
David Bo	Hersent, oswarthick, Elloumi,	Thin Applica	ternet of gs: Key tions and tocols			Wiley-Blackwell		ckwell.
List of ea	uipment/apj	paratus for	laboratory e	xnerimen	ts:			
Sl. No.	<u></u>		<u>1480140019</u> 0	p				
53.								
54.								
55.								
56.								
57.								
	ester Examin	ation Schei	ne. Max	kimum Ma	rks-70.	Ti	ime all	otted-
<u>3hrs.</u>			<u> </u>			0		
Group	Unit	(MCQ only	e Questions		Subjective	Que	stions	
		correct ans						
		No of	Total	No of	To answer	Marl	ks per	Total
		question	Marks	question		ques	tion	Marks
_		to be set		to be set				
A	ALL	10	10					
В	ALL			5	3	5		70
С	ALL			5	3	15		
		pice type que:	stion (MCO) wi	-	ect answer are to	-	t in the	obiective
ра								,
				in the order	r in answering ob	jectiv	e questi	ons should
	given on top o							
	tion Scheme				0		0	· · · · · · ·
Group		Chapter	Marks o questio		Question to b	be	Quest	tion to be
A		ALL	1	11	10		10	ereu
B		ALL	5		5		3	
C		ALL	15		5		3	
-	tion Scheme			xaminatio	-	I	U	
	Internal Ses							
Internal	Examination	1						40
Five No of	f							
Experime	nts							
External F	Examination: E	 Examiner-						60
	Note Book(for				10			
experimen	ts)							
	periment(one				40			
group cons	sisting 5 studen							
	I	/iva voce			10			

<b>Course C</b>	ode:PGCS(IoT)204A	Semester: 2 <sup>nd</sup>						
	a: 48 Hours	Maximum Marks: 100						
Teaching	g Scheme	Examination Scheme						
Theory: 3		End Semester Exam: 70						
Tutorial:		Attendance: 05						
Practical:	NA	Internal Assessment: 25						
Credit: 3		Practical Sessional internal continuous e	valuation	: NA				
		Practical Sessional external examination						
Aim:								
Sl. No.								
1.	Describe big data and u	ise cases from selected business domain	S					
2.	Install, configure, and r	run Hadoop and HDFS						
3.	Perform map-reduce a	nalytics using Hadoop						
4.	Use Hadoop related too analytics	ols such as HBase, Cassandra, Pig, and Hi	ve for big	g data				
5.	Explain NoSQL big data	management						
Objective	e:							
Sl. No.								
1.	0	r business intelligence. Learn business c and nosql big data management. Perform and related tools						
2.								
3.	-							
Pre-Requ	uisite:							
Sl. No.								
1.	Data Structure							
2.	Computer Architecture	and Organization						
		<u> </u>						
Contents	<u> </u>		Hrs./w	eek				
Chapter	Name of the Topic		Hours	Marks				
01		ig data, convergence of key trends,	8	10				
	unstructured data, ind	ustry examples of big data, web						
	analytics, big data and	marketing, fraud and big data, risk and						
	big data, credit risk ma	nagement, big data and algorithmic						
		ealthcare, big data in medicine,						
		a, big data technologies, introduction						
		e technologies, cloud and big data,						
	1 1 1 1 1 1 1 1 1 1	gence, Crowd sourcing analytics, inter						
	and trans firewall anal							
02	and trans firewall analy Introduction to NoSQL,	aggregate data models, aggregates,	8	12				
02	and trans firewall anal Introduction to NoSQL, key-value and docume	aggregate data models, aggregates, nt data models, relationships, graph	8	12				
02	and trans firewall analy Introduction to NoSQL, key-value and docume databases, schemaless	aggregate data models, aggregates, nt data models, relationships, graph databases, materialized views,	8	12				
02	and trans firewall analy Introduction to NoSQL, key-value and documen databases, schemaless distribution models, sh	aggregate data models, aggregates, nt data models, relationships, graph	8	12				

	relaxing co	nsistency, version stam	os, map-reduce,				
	partitionin	g and combining, compo	sing map-				
	reducecalc	ulations.					
03	Data format, analyzing data with Hadoop, scaling out, Hadoop streaming, Hadoop pipes, design of Hadoop distributed file system (HDFS), HDFS concepts, Java interface, data flow, Hadoop I/O, data integrity, compression, serialization, Avro, file-based data structures						
04	local tests, reduce, YAI scheduling	e workflows, unit tests w anatomy of MapReduce RN, failures in classic Ma , shuffle and sort, task ex ats, output formats	job run, classic Map- p-reduce and YARN, jo	b	10	16	
05	Hbase, data examples, j	n model and implementa praxis.Cassandra, Cassar Cassandra clients, Hadoo	ndra data model, Cassa		7	15	
06	Pig Latin so Hive, data t	pig data model, Pig Latir rripts. types and file formats, H a manipulation, HiveQL	iveQL data definition,	ıg	6	5	
	Sub Total:				48	70	
		essment Examination & Pr	eparation of Semester			30	
	Total:					100	
Skills to List of P	o be developed Practical: Sl. No	l: o. 1& 2 compulsory & at	least three from the rea	st)			
Skills to List of P Assignn List of B	o be developed Practical: Sl. No nents: Books		least three from the re	st)			
List of P Assignn List of P Text Bo	o be developed Practical: Sl. No nents: Books		least three from the re Edition/ISSN/ISBN	Nar	ne of th blisher	16	
Skills to List of F Assignn List of F Text Bo	o be developed Practical: Sl. No nents: Books poks:	o. 1& 2 compulsory & at		Nar		1e	
Skills to List of F Assignn List of E Text Bo Name o Referen	o be developed Practical: Sl. No nents: Books ooks: of Author f Author	o. 1& 2 compulsory & at		Nar		16	
Skills to List of P Assignn List of E Text Bo Name o Name o Referen 1. I Minelli, Chambe	o be developed Practical: Sl. No nents: Books boks: of Author f Author <u>nce Books:</u> Michael , Michelle ers, and	o. 1& 2 compulsory & at Title of the Book "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's		Nar Put			
Skills to List of P Assignm List of E <u>Text Bo</u> Name o Name o Referen 1. 1 Minelli, Chambe Ambiga 2. 1	o be developed Practical: Sl. No nents: Books ooks: of Author f Author nce Books: Michael , Michelle ers, and Dhiraj, P. J. Sadalage	o. 1& 2 compulsory & at Title of the Book "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends		Wil Add	ey, 201	.3.	
Skills to List of P Assignm List of E <u>Text Bo</u> Name o Name o Referen 1. 1 Minelli, Chambe Ambiga 2. 1 and M. 1	o be developed Practical: Sl. No nents: Books ooks: of Author f Author nce Books: Michael , Michelle ers, and Dhiraj, P. J. Sadalage	D. 1& 2 compulsory & at Title of the Book "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", "NoSQL Distilled: A Brief Guide to the Emerging World ofPolyglot		Nar Put Wil	ey, 201	.3. Vesley nal, 2012.	

Sammer,								
5. E. C D. Wample Ruthergle		"Program	ming Hive",		O'Reilley, 2012.		2012.	
	s George,	"HBase: T Definitive			O'Reilley, 2011.			2011.
7. Ebe	en Hewitt,	"Cassandr Definitive	a: The			O'Reilley, 2010.		
8. Ala	n Gates,	"Program				O'R	eilley,	2011.
	,	0	00/					
List of equ	ipment/ap	paratus for	laboratory e	xperimen	ts:			
Sl. No.								
58.								
59.								
60.								
61.								
62.				·				- 44 - 3
End Semes	ster Examin	ation Schei	ne. Max	imum Ma	rks-70.	I	ime all	ottea-
Group	Unit	Objective	Questions		Subjective		ctions	
Group	Unit	(MCQ only			Subjective	Que	500115	
		correct ans						
		No of	Total	No of	To answer	Mar	ks per	Total
		question	Marks	question		que	stion	Marks
		to be set		to be set				
A	ALL	10	10					
В	ALL			5	3	5		70
D	ALL			5	3	5		70
С	ALL			5	3	15		
		jice type que:	stion (MCO) wit	-	ect answer are to		t in the	biective
part	· •							
• Spe	cific instructi	on to the stud	lents to maintai	in the order	in answering ob	ojectiv	e questi	ons should
		f the question						
	on Scheme		nester examin			1		
Group		Chapter	Marks o		Question to l	be	-	ion to be
•			question	1	set		answ	erea
A B		ALL ALL	<u>1</u> 5		10 5		10 3	
С		ALL	15		5		3	
-	on Scheme		l Sessional e	vaminatio	-		3	
			inuous Evalu		/11.			
				ution				40
Five No of		-						
Experimen	ts							
-								
External Ex	amination: H	Examiner-		•				60
	Note Book(for	five						
experiments	s) eriment(one	for each						
· ·	eriment(one sting 5 studer							
- or oup consid	-	Viva voce						
L						1		

	etwork Security				
	de:PGCS(IoT)204B	Semester: 2 <sup>nd</sup>			
Duration:		Maximum Marks: 100			
Teaching	Scheme	Examination Scheme			
Theory: 3		End Semester Exam: 70			
Tutorial: 0		Attendance: 05			
Practical: I	NA	Internal Assessment: 25			
Credit: 3		Practical Sessional internal continuous e		: NA	
		Practical Sessional external examination	: NA		
Aim:					
Sl. No.					
1.		nding of basics of security and issues rela			
2.	today's world.	ometric techniques available and how the	ey are use	ed in	
3.	Security issues in we	eb and how to tackle them.			
4.	Learn mechanisms f	or transport and network security			
Objective					
Sl. No.					
1.	To learn the basics o	of security and various types of security is	sues.		
2.	To study different cryptography techniques available and various security attacks.				
3.	Explore network security and how they are implemented in real world.				
4.	-	various issues of Web security and biomet			
	authentication.				
Pre-Requi	isite:				
Sl. No.					
1.	Computer Networks	1			
2.	Web Programming	-			
Contents			Hrs./w	eek	
Chapter	Name of the Topic		Hours	Marks	
01	Data security: Review	w of cryptography. Examples RSA, DES,	6	10	
02	Authentication, non-	-repudiation and message integrity.	9	12	
	Digital signatures an	ld			
	certificates. Protoco	ls using cryptography (example			
	Kerberos). Attacks o	n protocols			
03	Network security: Fi	rewalls, Proxy-Servers, Network	9	12	
	intrusion detection.				
		Mechanisms of TLS, SSL, IPSec.			
04		njection, XSS, etc. Software security and	11	16	
		ware types and case studies. Access			
	· · · · · · · · · · · · · · · · · · ·	d host/network intrusion detection.			
05		tric authentication, Secure E-Commerce	8	15	
	(ex. SET), Smart				
		ireless Communication.			
06		' security, IDS and Biometric.	5	5	
	Sub Total:		48	70	
	Internal According to E	xamination & Preparation of Semester		30	

	Examinatio							
Due eti e e la	Total:							100
Practical: Skills to be	e developed	l:						
List of Pra	ctical: Sl. No	o. 1& 2 comp	ulsory & at	least thre	e from the res	t)		
Assignmer	nts:							
List of Boo Text Book								
Name of A	uthor	Title of the	Book	Edition/	'ISSN/ISBN		ne of th olisher	e
Reference	Books:							
1. W. Cheswick a Bellovin.		Firewalls a Internet Se	-			Add 199	lison W 94.	/esley,
	Stallings.	Cryptograp Network Se	•			Prentice Hall, 1999.		all, 1999.
3. B. S	Schneier.	Applied Cryptograp	bhy.			Wil	ey, 199	9.
List of equ	ipment/ap	paratus for l	aboratory e	experimen	ts:			
63.								
64.								
65.								
66.								
67.								
End Semes 3hrs.	ster Examin	ation Schem	ie. Max	ximum Ma	rks-70.	Т	ime all	otted-
Group	Unit	Objective (MCQ only w correct answ	vith the		Subjective	e Que	stions	
		No of	Total	No of	To answer		ks per	Total
		question	Marks	question		ques	stion	Marks
A	ALL	to be set	10	to be set				
В	ALL			5	3	5 70		70
С	ALL			5	3	15		
	-	oice type quest	tion (MCQ) wi	th one corre	ect answer are to	be se	t in the o	bjective
	cific instructi	on to the stude of the question		in the order	in answering ol	ojectiv	e questi	ons should
				nation:				
Group	coup Chapter Marks of each Question to be Question to be question to be answered							

Α	ALL	1		10	10	
В	ALL	5		5	3	
С	ALL	15		5	3	
<b>Examination Scheme</b>	for Practical S	essional e	xaminatio	on:		
Practical Internal Ses	sional Continu	ous Evalu	ation			
Internal Examination	:					40
Five No of						
Experiments						
<b>External Examination: E</b>	Examiner-					60
Signed Lab Note Book(for	five					
experiments)						
On Spot Experiment(one	On Spot Experiment(one for each					
group consisting 5 studen	its)					
l I	/iva voce					

	he Course: M.Tech. in Ir	0		
	dvanced Machine Learn de:PGCS(IoT)204C	Semester: 2 <sup>nd</sup>		
Duration:		Maximum Marks: 100		
Teaching		Examination Scheme		
Theory: 3				
Tutorial: 0		Attendance: 05		
Practical: N		Internal Assessment: 25		
Credit: 3		Practical Sessional internal continuous evaluation: NA		
di cuitti c		Practical Sessional external examination: NA		
Aim:				
Sl. No.				
1.	Key concepts, tools an sets	nd approaches for pattern recognition on complex data		
2.	Kernel methods for handling high dimensional and non-linear patterns State-of-the-art algorithms such as Support Vector Machines and Bayesian networks			
3.	Solve real-world mac	hine learning tasks: from data to inference		
4.		and the motivations behind different learning		
<b>Objective</b> :				
Sl. No.				
1.	5	cepts in pattern recognition and machine learning; orithms for classification, regression, clustering and ng.		
2.	0	of the general issues arising in the application of ng data, common terms used, and common errors made if		
3.		lbox of techniques that can be immediately applied to real sed as a basis for future research into the topic.		
Pre-Requi	site:			
Sl. No.				
1.	Machine Learning,			
2.	Probability Theory			

Contents					Hrs./w	eek	
Chapter	Name of t	he Topic			Hours	Marks	
01	Key conce functions Parametr Computat Ensemble		8	10			
02	Machines	Kernel Methods for non-linear data, Support Vector Machines, Kernel Ridge Regression, Structure Kernels, Kernel PCA, Latent Semantic Analysis					
03	Bayesian Bayesian models, P Expectati	Bayesian methods for using prior knowledge and data, Bayesian inference, Bayesian Belief Networks and Graphical models, Probabilistic Latent Semantic Analysis, The Expectation-Maximisation (EM) algorithm, Gaussian Processes					
04	Dimensio Variates -	10	16				
05	Low-Rank		aches - Embedded meth ender Systems.Applicat utific		9	15	
06	Recent tro algorithm	ends in supervised and <sup>1</sup> ,		n	5	5	
	Sub Total	40	70				
	Internal As Examination	Internal Assessment Examination & Preparation of Semester					
Skills to b	Total: e developed actical: Sl. No	1:	t least three from the rea	st)		100	
Skills to b List of Pra Assignme List of Boo Text Book	e developed actical: Sl. No nts: oks as:	1:	t least three from the read to be a constructed by the second secon	Nar	ne of the		
Skills to b List of Pra Assignmen List of Boo Text Book	e developed actical: Sl. No nts: oks as:	l: o. 1& 2 compulsory & at		Nar	ne of the plisher		
Skills to b List of Pra Assignme List of Boo Text Book	e developed actical: Sl. No nts: oks as:	l: o. 1& 2 compulsory & at		Nar			
Skills to b List of Pra Assignme List of Boo Text Book	e developed actical: Sl. No nts: oks as:	l: o. 1& 2 compulsory & at		Nar			
Skills to b List of Pra Assignmer List of Boo Text Book	e developed actical: Sl. No nts: oks as:	l: o. 1& 2 compulsory & at		Nar			
Skills to b List of Pra Assignmen List of Boo Text Book Name of A	e developed actical: Sl. No nts: oks cs: Author	l: o. 1& 2 compulsory & at		Nar			
List of Pra Assignmen List of Boo Text Book Name of A Reference	e developed actical: Sl. No nts: oks cs: Author e Books: ristopher	d: o. 1& 2 compulsory & at Title of the Book Pattern Recognition and Machine		Nar			
Skills to b List of Pra Assignmen List of Boo Text Book Name of A Name of A Reference 1. Ch M. Bishop	e developed actical: Sl. No nts: oks cs: Author e Books: ristopher o, hn Shawe- d	d: o. 1& 2 compulsory & at Title of the Book Pattern Recognition		Nar			
Skills to be List of Pra Assignmen List of Boo Text Book Name of A Name of A Reference 1. Chi M. Bishop 2. Joh Taylor and NelloCrist	e developed actical: Sl. No nts: oks cs: Author e Books: ristopher b, hn Shawe- d tianini,	d: o. 1& 2 compulsory & at Title of the Book Pattern Recognition and Machine Learning. Kernel Methods for Pattern Analysis.	Edition/ISSN/ISBN	Nar			
Skills to b List of Pra Assignmen List of Boo Text Book Name of A Name of A Reference 1. Ch M. Bishop 2. Joh Taylor and NelloCrist List of equ	e developed actical: Sl. No nts: oks cs: Author e Books: ristopher b, hn Shawe- d tianini,	d: o. 1& 2 compulsory & at Title of the Book Pattern Recognition and Machine Learning. Kernel Methods for	Edition/ISSN/ISBN	Nar			
Skills to b List of Pra Assignmen List of Boo Text Book Name of A Name of A Reference 1. Ch M. Bishop 2. Joh Taylor and NelloCrist List of equ Sl. No.	e developed actical: Sl. No nts: oks cs: Author e Books: ristopher b, hn Shawe- d tianini,	d: o. 1& 2 compulsory & at Title of the Book Pattern Recognition and Machine Learning. Kernel Methods for Pattern Analysis.	Edition/ISSN/ISBN	Nar			
Skills to b List of Pra Assignmen List of Boo Text Book Name of A Name of A Reference 1. Ch M. Bishop 2. Joh Taylor and NelloCrist List of equ	e developed actical: Sl. No nts: oks cs: Author e Books: ristopher b, hn Shawe- d tianini,	d: o. 1& 2 compulsory & at Title of the Book Pattern Recognition and Machine Learning. Kernel Methods for Pattern Analysis.	Edition/ISSN/ISBN	Nar			

71.								
71.								
	ester Examina	ation Schei	me. Max	kimum Ma	rks-70.	Time al	lotted-	
Group	Unit	Objective (MCQ only correct ans			Subjective	e Questions	stions	
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks	
А	ALL	10	10					
В	ALL			5	3	5	70	
С	ALL			5	3	15		
	given on top of tion Scheme f	<u> </u>	<u> </u>	of each	Question to set	-	tion to be vered	
A		ALL	<u>question</u>	11	10	<u>10</u>	, ei eu	
B		ALL	5		5	3		
C		ALL	15		5	3		
Examinat	tion Scheme f	for Practica	al Sessional e	xaminatio	n:	I		
	Internal Sess		inuous Evalu	ation				
	Examination:			1		1	40	
Five No of								
Experime	nts							
External E	Examination: E	xaminer-					60	
experimen								
	periment(one f sisting 5 studen							
	V	'iva voce						

Name of the Course: M.Tech. in Internet of Things						
Subject:Constitution of India						
Course Code:PGCS(IoT)205A Semester: 2 <sup>nd</sup>						
Duration: 24 Hours	Maximum Marks: 100					
Teaching Scheme	Examination Scheme					
Theory:02	End Semester Exam: 70					
Tutorial:	Attendance : 5					
Practical:	Continuous Assessment: 25					
Credit: 02						
Aim:	Aim:					

AIM:	
Sl. No.	
1.	Discuss the growth of the demand for civil rights in India for the bulk of Indians
	before the arrival of Gandhi in Indian politics.
2.	Discuss the intellectual origins of the framework of argument that informed the

	conceptualization of social reforms leading to revolution in Ind	ia.						
3.	Discuss the circumstances surrounding the foundation of the Congress Socialist							
5.	Party [CSP] under the leadership of Jawaharlal Nehru and the e							
	the proposal of direct elections through adult suffrage in the In							
4.	Discuss the passage of the Hindu Code Bill of 1956.		Stitution					
	· · · · · · · · · · · · · · · · · · ·							
Sl. No.								
	I'm dougton dath o manuface informain a tho taxin the map of liberty							
1.	Understand the premises informing the twin themes of liberty a civil rights perspective							
2.	To address the growth of Indian opinion regarding modern Ind							
	constitutional role and entitlement to civil and economic rights		as the					
	emergence of nationhood in the early years of Indian nationalis							
3.	To address the role of socialism in India after the commenceme							
	BolshevikRevolution in 1917 andinitial drafting of the Indian C	onstituti	on.					
Pre-Requ	iisite:							
Sl. No.								
1.								
2.								
Contents		Hrs./w	eek					
Chapter	Name of the Topic	Hours	Marks					
01	History of Making of the Indian Constitution:	4	14					
	HistoryDrafting Committee, (Composition & Working)							
02	Philosophy of the Indian Constitution:	4	14					
	Preamble Salient Features	-						
03	Contours of Constitutional Rights & Duties:	4	14					
	• Fundamental Rights	-						
	Right to Equality							
	Right to Freedom							
	Right against Exploitation							
	Right to Freedom of Religion							
	Cultural and Educational Rights							
	Right to Constitutional Remedies							
	Directive Principles of State Policy							
	• Fundamental Duties.							
04	Organs of Governance:	4	14					
• -	• Parliament							
	Composition							
	Qualifications and Disqualifications							
	Powers and Functions							
	Executive							
	• President							
	• Governor							
	Council of Ministers							
	• Judiciary, Appointment and Transfer of Judges,							
	Qualifications							
	Powers and Functions							
05	Local Administration:	4	4					
	District's Administration head: Role and Importance,							
	Municipalities: Introduction, Mayor and role of Elected							
	Representative CEO of Municipal Corporation.							
	Pachayati raj: Introduction, PRI: ZilaPachayat.							
	• Elected officials and their roles, CEO ZilaPachayat: Position							

	and role.								
	• Bloo	ck level: Orgar	nizational Hie	erarchy (Diffe	erent				
	department								
		age level: Role			l officials,				
	• Imp	ortance of gra	iss root dem	ocracy					
06	Election Co	mmission					4	10	
00		tion Commiss	ion. Bole and	d Functioning	7		4	10	
		ef Election Cor				ers.			
	• Inst								
	women.								
07									
	Cash Tatal						24	70	
	Sub Total:	accmont Evan	ination & Dr	onaration of	Somoctor		24 4	70	
	Examination	essment Exan 1	nnauon & Pr	eparation of s	semestel.		4	30	
	Total:						28	100	
Practica							•		
List of B	ooks								
Text Boo		1		T					
Name of	Author	Title of the	Book				me of the		
						Pul	olisher		
Referen	ce Books:								
1. T	`he					Gov	vernme	nt	
Constitu	tion of					Pul	blicatio	n.	
India, 19	950 (Bare								
Act),									
	Dr. S. N. Busi,	framing of		1st Edition	n, 2015.				
	Ambedkar	Constitutio		7th Edn Lor		ia Navi	- 2014		
3. N	1. P. Jain,	Indian Cons Law,	stitution	7th Edn., Lex		exis Nexis, 2014.			
4. D	).D. Basu,	Introductio	n to the			Ιο	vic Novi	s, 2015.	
т. L	.D. Dasu,	Constitutio				LCA	IS NEXI	5, 2013.	
List of e	quipment/ap			xperiments:					
Sl. No.			<u> </u>						
73.									
74.									
75.									
76.									
77.							_		
	lester Examin	nation Schem	e. Max	imum Mark	s-70.	Т	'ime all	otted-	
3hrs.	11	Objection	0		Cubia -ti-	0	ati		
Group	Unit	Objective (MCQ only v	•		Subjective	e Que	suons		
		correct ansv							
		No of	Total	No of	To answer	Mar	·ks per	Total	
		question	Marks	question	-		stion	Marks	
		to be set		to be set					

А	ALL	10	10					
В	ALL			5	3	5		70
С	ALL			5	3	15		
• Only part	-	ice type questi	ion (MCQ) v	with one correct	t answer are	to be s	et in the o	bjective
				ain the order in	n answering	objectiv	ve questi	ons should
-		f the question p						
-	on Scheme f	for end seme						
Group		Chapter			Question to	) be	Question to be	
-			questi		set		answe	ered
A		ALL	1		10		10	
В		ALL	5		5		3	
С		ALL	15		5		3	
Examinat	ion Scheme	for Practica	I Sessiona	l examinatio	on:			
<b>Practical</b>	Internal Ses	sional Conti	inuous Ev	aluation				
	Examination	<b>1:</b>						
Internal <b>E</b>							40	
	s evaluation							τu
Continuou	s evaluation	n: Examiner	<u>     </u> • <b>-</b>					<b>T</b> U
Continuou External I	s evaluation E <b>xaminatio</b>	n: Examiner						
Continuou External I	s evaluation E <b>xaminatio</b> b Assignmer	n: Examiner						

Name of the Course: M.Tech. in Internet of Things					
Subject:Pedagogy Studies					
Course Code:PGCS(IoT)205B	Semester: 2 <sup>nd</sup>				
Duration: 24 Hours	Maximum Marks: 100				
Teaching Scheme	Examination Scheme				
Theory:02	End Semester Exam: 70				
Tutorial:0	Attendance : 5				
Practical:0	Continuous Assessment: 25				
Credit:02					

What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?
□ e:
Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
Identify critical evidence gaps to guide the development.
uisite:

Contents		Hrs./w	eek	
Chapter	Name of the Topic	Hours	Marks	
01	<ul> <li>Introduction and Methodology:         <ul> <li>Aims and rationale, Policy background, Conceptual framework and terminology</li> <li>Theories of learning, Curriculum, Teacher education.</li> <li>Conceptual framework, Research questions.</li> <li>Overview of methodology and Searching.</li> </ul> </li> </ul>	4	14	
02	<ul> <li>Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries.</li> <li>Curriculum, Teacher education.</li> </ul>	4	14	
03	<ul> <li>Evidence on the effectiveness of pedagogical practices</li> <li>Methodology for the in-depth stage: quality assessment of included studies.</li> <li>How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?</li> <li>Theory of change.</li> <li>Strength and nature of the body of evidence for effective pedagogical practices.</li> <li>Pedagogic theory and pedagogical approaches.</li> <li>Teachers' attitudes and beliefs and Pedagogic strategies.</li> </ul>	4	14	
04	<ul> <li>Professional development: alignment with classroom practices and follow-up support</li> <li>Peer support</li> <li>Support from the head teacher and the community.</li> <li>Curriculum and assessment</li> <li>Barriers to learning: limited resources and large class sizes</li> </ul>	4	14	
05	Research gaps and future directions <ul> <li>Research design</li> <li>Contexts</li> </ul>	4	4	
06	<ul> <li>Pedagogy <ul> <li>Teacher education</li> <li>Curriculum and assessment</li> <li>Dissemination and research impact.</li> </ul> </li> </ul>	4	10	
	Sub Total: Internal Assessment Examination & Preparation of Semester	24 4	70 30	
	Examination	20	4.0.0	
	Total:	28	100	

Name of A	luthor	Title of the Book		Edition/ISSN/ISBN		Name of the Publisher	
Reference	Pooles						
	kers J,	(2001) Class interaction primary sc	in Kenyan			Compare, 245-261.	31 (2):
2. Ag	rawal M	(2004) Curricular reform in schools: The importance of evaluation,				Journal of Curricului 36 (3): 36	n Studies,
3. Akyeampong (20) K trai doe site edu proj		(2003) Tea training in does it cours site teacher education in project (Mi country rej	icher Ghana - nt? Multi- r research USTER)			London: D	FID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J		(2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count?				Internatio Journal Ed Developm 272–282.	ucational
5. Alexander RJ		(2001) Culture and pedagogy: International comparisons in primary education.				Oxford and Blackwell.	
6. Ch	avan M	(2003) Read India: A mass scale, rapid, 'learning to read' campaign					
7.		campaign. www.pratham.org/im ages/resource%20w orking%20paper%20 2.pdf.					
End Seme 3hrs.	ster Examin	ation Schem	ie. Max	imum Mark	xs-70.	Time all	otted-
Group Unit		<b>Objective Questions</b> (MCQ only with the correct answer)		Subjective Questions			1
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
В	ALL			5	3	5	70

C ALL			5	3	15	
Only multipl	e choice type questi	on (MCQ) w	ith one corr	ect answer are to	be set in the o	objective
part.						
<ul> <li>Specific instr</li> </ul>	ruction to the studer	its to mainta	ain the orde	r in answering ob	jective questi	ons should
	top of the question p					
Examination Sche	eme for end seme	ster exami	ination:			
Group	Chapter	Marks of question		Question to b set	e Quest answe	ion to be ered
Α	ALL	1		10	10	
В	ALL	5		5	3	
С	ALL	15		5	3	
<b>Examination Sch</b>	eme for Practica	l Sessional	l examina	tion:		
<b>Practical Interna</b>	l Sessional Conti	nuous Eva	aluation			
Internal Examination	ation:					
Continuous evalua	ation					40
<b>External Examin</b>	ation: Examiner	-				
Signed Lab Assignments   10						
On Spot Experime	ent	40				
Viva voce		10				60

Name of	the Course: M.Tech. in I	nternet of Things	
	tress management by <b>Y</b>		
Course C	ode:PGCS(IoT)205C	Semester: 2 <sup>nd</sup>	
Duration	: 24 Hours	Maximum Marks: 100	
Teaching	Scheme	Examination Scheme	
Theory:02	2	End Semester Exam: 70	
Tutorial:0	)	Attendance : 5	
Practical:	0	Continuous Assessment: 25	
Credit: 02			
Aim:			
Sl. No.			
1.		in a healthy body thus improving social health	
2.	Improve efficiency		
3.			
Objective	) 2:		
Sl. No.			
1.	To achieve overall hea	lth of body and mind	
2.	To overcome stress		
3.			
Pre-Requ	lisite:		
Sl. No.			
1.			
2.			
Contents		Hrs./w	reek
Chapter	Name of the Topic	Hours	Marks
01	Definitions of Eight pa	rts of yog. (Ashtanga) 8	20
02	Yam and Niyam. Do's a	and Don't's in life. 8	30

	-	ucha, santosh	-	acharya and yay, ishwar					
03	Asan and H	Pranayam	•			8	20		
		ious yog pose							
	, ,	gularization of	f breathing te	chniques an	d its effects-				
	Types of pr Sub Total:					24	70		
			mination & Pr	eparation of	f Semester	4	30		
	Internal Assessment Examination & Preparation of Semester Examination								
	Total:					28	100		
Assignn	nents: Based	on theory							
List of B Text Bo									
	f Author	Title of the	e Book	Edition/I	SSN/ISBN	Name of th Publisher	ne		
		+							
Doforro	an Dooler								
	ce Books: dan Swami	'Yogic Asar	nas for						
•	yasiMandal,		ining-Part-						
Nagpur	, aon iunuui,	I"							
2.Swam		"Rajayoga				(Publicati			
Vivekananda,			conquering the Internal Nature"			Departme	nt),		
AdvaitaAshrama		Internal Na	ашге			Kolkata			
Advaita		+							
Advaita									
	quipment/ar	paratus for	laboratory e	xperiments	S:				
	quipment/ar	paratus for	laboratory e	xperiments	5:				
<b>List of e</b> Sl. No. 78.	quipment/ar	paratus for	laboratory e	xperiments	S:				
List of e Sl. No. 78. 79.	quipment/ar	oparatus for	laboratory e	xperiments	S:				
List of e Sl. No. 78. 79. 80.	quipment/ar	oparatus for	laboratory e	xperiment	S:				
List of e Sl. No. 78. 79. 80. 81.	quipment/ar	oparatus for	laboratory e	xperiment	S:				
List of e Sl. No. 78. 79. 80. 81. 82.	quipment/ap			xperiments		Time all	lotted-		
List of e Sl. No. 78. 79. 80. 81. 82. End Sen		nation Schen	ne. Max Questions		ks-70.	Time all	otted-		
List of e Sl. No. 78. 79. 80. 81. 82. End Sen 3hrs.	nester Exami	nation Schen Objective (MCQ only	ne. Max Questions with the		ks-70.		lotted-		
List of e Sl. No. 78. 79. 80. 81. 82. End Sen 3hrs.	nester Exami	nation Schen Objective (MCQ only correct ans	ne. Max Questions with the wer)	ximum Mar	ks-70. Subjective	Questions			
List of e Sl. No. 78. 79. 80. 81. 82. End Sen 3hrs.	nester Exami	nation Schen Objective (MCQ only correct ans No of	ne. Max Questions with the wer) Total	ximum Mar	ks-70.	Questions	Total		
List of e Sl. No. 78. 79. 80. 81. 82. End Sen 3hrs.	nester Exami	nation Schen Objective (MCQ only correct ans	ne. Max Questions with the wer)	ximum Mar	ks-70. Subjective	Questions	Total		
List of e Sl. No. 78. 79. 80. 81. 82. End Sen 3hrs.	nester Exami	nation Schen         Objective         (MCQ only)         correct ans         No of         question	ne. Max Questions with the wer) Total	<b>kimum Mar</b> No of question	ks-70. Subjective	Questions	Total		
List of e Sl. No. 78. 79. 80. 81. 82. End Sen 3hrs. Group	nester Exami Unit ALL	nation Schen Objective (MCQ only correct ans No of question to be set	ne. Max Questions with the wer) Total Marks	No of question to be set	ks-70. Subjective	e Questions Marks per question	Total Marks		
List of e Sl. No. 78. 79. 80. 81. 82. End Sen 3hrs. Group	nester Exami	nation Schen Objective (MCQ only correct ans No of question to be set	ne. Max Questions with the wer) Total Marks	<b>kimum Mar</b> No of question	ks-70. Subjective	Questions			
List of e Sl. No. 78. 79. 80. 81. 82. End Sen 3hrs. Group	nester Exami Unit ALL	nation Schen Objective (MCQ only correct ans No of question to be set	ne. Max Questions with the wer) Total Marks	No of question to be set	ks-70. Subjective	e Questions Marks per question	Total Marks		

	ion to the students of the question pa		er in answering objecti	ve questions should
Examination Scheme				
Group	Chapter	Marks of each	Question to be	Question to be
-	-	question	set	answered
Α	ALL	1	10	10
В	ALL	5	5	3
С	ALL	15	5	3
<b>Examination Schem</b>	e for Practical	Sessional examination	ation:	
Practical Internal Se	essional Contin	uous Evaluation		
Internal Examinatio	n:			
Continuous evaluation	n			40
External Examination	on: Examiner-			
Signed Lab Assignme	ents	10		
On Spot Experiment		40		
Viva voce		10		60

	the Course: M.Tech. in Int Personality development	ternet of Things through life enlightenment skills		
	Code:PGCS(IoT)205D	Semester: 2 <sup>nd</sup>		
	n: 24 Hours	Maximum Marks: 100		
Teaching	g Scheme	Examination Scheme		
Theory:0	2	End Semester Exam: 70		
Tutorial:	0	Attendance : 5		
Practical	:0	<b>Continuous Assessment:</b> 25		
Credit:02	2			
Aim:				
Sl. No.				
1.	Study of Shrimad-Bhagy personality and achieve	wad-Geeta will help the student in devel the highest goal in life	oping hi	S
2.		died Geeta will lead the nation and man	kind to p	peace and
3.		will help in developing versatile person	nality of	students.
Objectiv	e:			
Sl. No.				
1.	To learn to achieve the	highest goal happily		
2.		th stable mind, pleasing personality and	determi	nation
3.	To awaken wisdom in s	tudents		
Pre-Req	uisite:			
Sl. No.				
1.				
2.				
Contents			Hrs./w	
Chapter	-		Hours	Marks
01	Neetisatakam-Holistic d • Verses- 19,20,21,2	levelopment of personality 22 (wisdom)	8	20

	Unit		<b>Questions</b> with the	No of	Subjective To answer	-	stions	Total
End Sem								
				kimum Mark	ks-70.	Ti	Time allotted-	
	quipment/ap							
		sringar-va				Dell		
2.P.Gopi		Bhartrihar Satakam (N				Ras	htriya	Sanskrit m, New
	nandaAdva	Gita"	lagavau			Dep	artme kata	
Referen 1.Swami	ce Books:	"Srimad Bl	agavad			(Du)	blicati	on
Name of	Author	Title of the	Book	Edition/IS	SN/ISBN		ne of tl lisher	he
Assignm List of Bo Fext Boo	ooks							
	Total:						28	100
	Examination	essment Exar I	nination & Pr	reparation of	Semester		4	30
	Sub Total:	ocoment F	nination 0 D	ononation of	Some star		24	70
	Chap	oter18 – Vers	es 37,38,63					
	-	oter 4-Verses	-	y erses 50,2	<i>,</i> , , , , , , , , , , , , , , , , , ,			
		onality of Ro oter2-Verses		0				
	• Chap	oter 12 -Vers	es 13, 14, 15,	16,17, 18				
)3		ements of bas madBhagwad			56, 62, 68		8	30
22		35,Chapter 18					0	
	• Chap	oter 3-Verses	13, 21, 27, 3	5, Chapter 6-		17,		
		roach to day madBhagwad	-		41, 47, 48,			
02		ses- 71,73,75,					8	20
	• Vers	ses- 52,53,59	(dont's)					
	Vers							

В	ALL			5	3	5		70
D				5	5	5		70
С	ALL			5	3	15		
	nly multiple cho	oice type quest	ion (MCQ) w	ith one cor	rect answer a	are to be s	et in the o	bjective
-	art.							
	pecific instruction			ain the orde	er in answeri	ng objectiv	ve questi	ons should
	e given on top o							
Examina	tion Scheme	for end seme					1	
Group		Chapter	Marks	of each	Question	1 to be	Quest	ion to be
			questio	on	set		answe	ered
Α		ALL	1		10		10	
В		ALL	5		5		3	
С		ALL	15		5		3	
Examina	ation Scheme	for Practica	al Sessiona	l examina	ntion:			
Practica	l Internal Se	ssional Cont	inuous Ev	aluation				
Internal	Examination	n:						
Continuo	ous evaluation							40
External	l Examinatio	n: Examiner	<b>`-</b>					
Signed L	ab Assignme	nts	10					
On Spot	Experiment		40					
Viva voc	<u>*</u>		10					60

Name of the Course: M.Tech. in In	ternet of Things
Subject: Term Paper with Seminar	
Course Code: PGCS(IoT)294	Semester: 4 <sup>th</sup>
Duration:24 hrs	Maximum Marks:100
Teaching Scheme	Examination Scheme100
Theory:0	End Semester Exam:
Tutorial:0	Teacher's Assessment:0
Practical:04	Internal Assessment:0
Credit:2	Practical Sessional internal continuous evaluation:40
	Practical Sessional external examination:60

## Contents

Students will do projects on application areas of latest technologies and current topics of societal relevance.

## Semester III

	f the Course: M.Tech. in In	nternet of Things						
	Cloud Computing Code: PGCS(IoT)301A	Semester: 3 <sup>rd</sup>						
	n: 48 Hours	Maximum Marks: 100						
	ng Scheme	Examination Scheme						
Theory:	0	End Semester Exam: 70						
Tutorial		Attendance: 05						
Practical		Internal Assessment: 25						
Credit: 3		Practical Sessional internal continuous e	valuation	. N A				
creat: 5	•	Practical Sessional external examination		. INA				
Aim:		Flactical Sessional external examination	. NA					
Sl. No.								
1.	Identify security asne	cts of each cloud model						
2.		ement strategy for moving to the Cloud						
3.		oud instance using a public cloud service	nrovider	•				
<u> </u>		irity model to different layer	provider					
Sl. No.								
1.	The student will also b	earn how to apply trust-based security n	nodel to r	eal-				
	world security problem		10401 001	our				
2.		cepts, processes, and best practices nee	ded to su	ccessfullv				
		thin Cloud infrastructures.		j				
3.	Students will learn the basic Cloud types and delivery models and develop an							
	understanding of the risk and compliance responsibilities and Challenges for							
	each Cloud type and se	ervice						
	delivery model.							
Pre-Req	unicito.							
Sl. No.								
<u>31. NO.</u> 1.	Networking							
1. 2.	Distributed Computing	a						
۷.		6						
Content			Hrs./w	oolz				
			Hours	Marks				
Chapter 01	Introduction to Cloud	Computing	4	10				
01		s and Applications, Cloud introduction	4	10				
		nt clouds, Risks, Novel applications of						
	cloud computing	it clouds, Misks, Novel applications of						
02	Cloud Computing Arch	itecture	11	12				
02		uction Cloud computing architecture,	11	14				
		g Virtualization at the infrastructure						
	-	l computing environments, CPU						
		ssion on Hypervisors Storage						
		omputing Defined, The SPI Framework						
		The Traditional Software Model, The						
	Cloud Services Deliver							
	Cloud Deployment Mo	-						
			1	1				
		ng the Cloud, The Impact of Cloud						

03	Cloud Computing Adoption in the Enterprise	4	10
03	Security Issues in Cloud Computing	4	12
	Infrastructure Security, Infrastructure Security: The Network		
	Level, The Host Level, The Application Level, Data Security		
	and Storage, Aspects of Data Security, Data Security Mitigation Provider Data and Its Security		
	Identity and Access Management Trust Boundaries and IAM, IAM Challenges, Relevant IAM		
	Standards and Protocols for Cloud Services, IAM Practices in the Cloud Authorization Management		
0.4	the Cloud, Cloud Authorization Management	8	1(
04	Security Management in the Cloud	8	16
	Security Management Standards, Security Management in the		
	Cloud, Availability Management: SaaS, PaaS, IaaS		
	Privacy Issues Privacy Issues Data Life Cycle, Key Privacy Concerns in the		
	Privacy Issues, Data Life Cycle, Key Privacy Concerns in the Cloud, Protecting Privacy, Changes to Privacy Risk		
	Management and Compliance in Relation to Cloud Computing,		
	Legal and Regulatory Implications, U.S. Laws and Regulations,		
	International Laws and Regulations		
05	Audit and Compliance	11	15
05	Internal Policy Compliance, Governance, Risk, and	11	15
	Compliance (GRC), Regulatory/External Compliance, Cloud		
	Security Alliance, Auditing the Cloud for Compliance, Security-		
	as-a-Cloud		
06	ADVANCED TOPICS	10	5
00	Recent developments in hybrid cloud and cloud security.	10	J
	Sub Total:	48	70
	Internal Assessment Examination & Preparation of Semester	10	30
	Examination		50
	Total:		100
Practi		1	0

List of Practical: Sl. No. 1& 2 compulsory & at least three from the rest)

**Assignments**:

List of Books

**Text Books:** Edition/ISSN/ISBN **Title of the Book** Name of Author Name of the Publisher **Reference Books:** 1. John Rhoton, **Cloud Computing Publication Date:** Explained: November 2, 2009 Implementation Handbook for Enterprises, O'Reilly Media, 2. Tim Mather, **Cloud Security and** ISBN-10:

		and Comp	e ve on Risks	0596802 ber 2009	2765,Septem 9			
List of ea	uinment/a	nnaratus for	laboratory e	vnerimen	ts			
Sl. No.	uipinent/u		laboratory c	xpermen				
83.								
84.								
85.								
86.								
87.								
End Sem 3hrs.	ester Exam	ination Sche	me. Max	kimum Ma	rks-70.	Ti	ime all	otted-
Group	Unit	Objective (MCQ only correct and			Subjective	Ques	stions	
		No of question to be set	Total Marks	No of question to be set	To answer	Marl ques	ks per tion	Total Marks
A	ALL	10 10	10					
В	ALL			5	3	5		70
С	ALL			5	3	15		
pa • Sp be	rt. ecific instruc given on top	tion to the stud	lents to mainta	in the order	ect answer are to in answering ob			
Group	tion Schem	Chapter	Marks o		Question to b	<b>N</b>	Ouoct	tion to be
aroup		Chapter	question		set		answ	
A		ALL	1		10		10	cicu
B		ALL	5		5		3	
<u>C</u>		ALL	15		5		3	
	tion Schem		al Sessional e	xaminatio	-		-	
			inuous Evalu					
Internal	Examinatio	n:						40
Five No o	f							
Experime	nts							
External F	Examination	: Examiner-						60
	Note Book(f							
experimen	ts)							
-	periment(on							
group cons	sisting 5 stud					<u> </u>		
		Viva voce						

	leal Time Operating sys					
	ode:PGCS(IoT)301B	Semester: 3 <sup>rd</sup>				
	: 48 Hours	Maximum Marks: 100				
Teaching		Examination Scheme				
Theory: 3		End Semester Exam: 70				
Tutorial:		Attendance: 05				
Practical:	NA	Internal Assessment: 25				
Credit: 3		Practical Sessional internal continuous		: NA		
		Practical Sessional external examination	n: NA			
Aim:						
Sl. No.						
1.	• Explain fundame time and resource lim	ental principles for programming of real nitations.	time syste	ems with		
2.	• Describe the four time programming.	ndation for programming languages dev	veloped for	r real		
3.	Account for how	real time operating systems are designed	ed and fund	ctions		
<u>4.</u>		real time network is.	u unu run	cuonsi		
5.	• Use real time system programming languages and real time operating systems for real time applications.					
6.	• Analyse real time restrictions.	e systems with regard to keeping time a	nd resourc	ce		
Objective						
SI. No.						
1.	<b>Real-time scheduling</b>	and schedule ability analysis.				
2.	Formal specification a	and verification of timing constraints an	d properti	es.		
3.	Design methods for re		•••			
4.	Development and imp	plementation of new techniques to advan	nce the sta	te-of-the		
	art real-time systems	research.				
Pre-Requ	iisite:					
Sl. No.						
1.	<b>Operating system</b>					
2.						
Contents			Hrs./w			
Chapter	Name of the Topic		Hours	Marks		
01	Real Time Systems:		4	5		
		me Systems, Classification of Real Time				
	-	nputer Control, Types of Real Time				
	Operating Systems					
02	Requirements for Rea	l Time Systems:	4	10		
04		a rime systems: action in Real Time Systems, Hardware	T	10		
	-	ime Systems, Specialized Processors,				
	Interfaces & Communic	•				
	incriaces & communit	auons	1			

List of Bo Text Boo	oks:	ne of tl	
Assignm			
	l: be developed: ractical: Sl. No. 1& 2 compulsory & at least three from the rest)		
	Total:		100
	Internal Assessment Examination & Preparation of Semester Examination		30
	Sub Total:	48	70
	Failures, Errors, and Faults, Error Detection, Testing Techniques, A Model for Network Security, Potential Attacks to Real Time Systems, Cryptography, Authentication, Design Principles.	0	10
08	Design Analysis:Petri Nets, Petri Nets and the Modeling of Systems, Properties ofPetri Nets, Scheduler Characteristics, Real Time vs. GeneralPurpose Database, Transactions and Serializability, SchedulingRTDB Transactions, Disk SchedulingFault Tolerance Techniques and Security in RTOS:	6	5
)7	Multi- Processing Systems and Development Methodologies: Parallel Processing, Vector Computers, Multiple Tasks, Dispatcher, Yourdon Systems Method (YSM), The Ward and Mellor Essential Model, The Hatley and Pirbhai Requirements Model	6	5
06	<b>Design of Real Time Systems:</b> Planning and Development Phase, Specification for Real-Time Systems, Preliminary Design, Basic Software Engineering Principles, Basic Design Using an RTOS	6	10
05	Real Time Operating Systems – 2: Inter task Communication and Synchronization, Real Time Kernels, Practical Real Time Operating Systems	6	10
04	<b>Real Time Operating Systems – 1:</b> RTOS Overview, RTOS Components, Task Management & Memory Management, Scheduling Strategies, Commercial Real-time Operating Systems	6	10
	Triggered versus Time-Triggered, Interrupts, Overview of Real Time Languages, Few Real Time Languages, Modula 2 as Real Time Language, Ada as Real Time Language.		

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the
			Publisher
<b>Reference Books:</b>	·		·
Jane Liu,	Real-Time Systems,		Prentice Hall, 2000.
List of equipment/a	apparatus for laboratory	experiments:	ł

Sl. No.							
88.							
89.							
90.							
	ester Exami	nation Scher	ne. Max	imum Mai	rks-70.	Time a	llotted-
3hrs.							
Group	Unit	Objective (MCQ only correct ans		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
А	ALL	10	10				
В	ALL			5	3	5	70
С	ALL			5	3	15	
		of the question for end sem Chapter	ester exami		Question to l	be Que	stion to be
<b>F</b>			questio	n	set	•	vered
Α		ALL	1		10	10	
В		ALL	5		5	3	
С		ALL	15		5	3	
Examina	tion Scheme	for Practica	l Sessional e	xaminatio	n:	·	
Practical	<b>Internal Se</b>	ssional Conti	inuous Evalu	ation			
	Examinatio	n:					40
Five No of							
Experime	nts						
External F	Examination:	Examiner-					60
	Note Book(fo	-					
	xperiment(one sisting 5 stude						
group cons	sisting 5 stude	Viva voce					
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					

Name of the Course: M.tech. in Internet of Things						
Subject:Emulation and Simulation	n Methodologies					
Course Code:PGCS(IoT)301C	Semester: 3 <sup>rd</sup>					
Duration: 48 Hours	Maximum Marks: 100					
Teaching Scheme	Examination Scheme					
Theory: 3	End Semester Exam: 70					
Tutorial: 0	Attendance: 05					
Practical: NA	Internal Assessment: 25					
Credit: 3	Practical Sessional internal continuous evaluation: NA					
	Practical Sessional external examination: NA					
Aim:						
Sl. No.						
1. Key concepts, tools and	approaches for pattern recognition on complex data sets					

2.	Kernel met	hods for handling high d	limensional and non-lin	ear patterr	S			
3.	State-of-the-art algorithms such as Support Vector Machines and Bayesian networks							
4.	Theoretical concepts and the motivations behind different learning frameworks							
5.		solve real-world machine						
Objective		onve rear worra machina	e leur ning tusks. It om u					
Sl. No.								
1.	This modul	le teaches the fundament	tals of simulation and e	mulation				
1.		gies providing guidance			aluation			
2.		t scenario, select the app	propriate models, level	of granular	itv			
	metrics for simulation	statistical correctness, a	and discuss the differen	ces betwee	ก้			
3.		platforms and how to us	e them for accurate per	formance e	valuation			
	of commun							
Pre-Requ	isite:							
Sl. No.								
1.	Probability	Theory,						
2.	Computer N							
	<b>F</b>							
Contents	1			Hrs./	week			
Chapter	Name of the	e Topic		Hour				
01		tals of Discrete Event Sin	nulations (DES)	8	10			
02		ed representationfor DES		8	12			
		king, to mobility and dat						
03		n-based Granularity Requ		el. 8	12			
		el, to system-level evalua						
	-	s a function of the applic	·					
04		tals on Random Numbers		12	16			
	Statistical 7	<b>Foolsfor Performance Ev</b>	aluation, Simulation vs.					
	Emulations	5						
05	Case study	for the evaluation of con	nmunications for ITS.	8	15			
06	Recent tren	nds in simulation and em	ulation for IOT, model	4	5			
	based anda	pplication-based granul	arity presentation					
	Sub Total:			48	70			
		essment Examination & Pr	eparation of Semester		30			
	Examination	1						
	Total:				100			
Practical	:							
		_						
Skills to	be developed	1:						
I. CP		- 100 1 0 -1	le set theme if the set	ı.				
List of Pr	actical: SI. No	o. 1& 2 compulsory & at ]	least three from the res	t)				
Accient	onto.							
Assignm	ents:							
List of Bo	aka							
Text Boo								
Name of		Title of the Book	Edition/ISSN/ISBN	Name of t	he			
	auuivi			Publisher				
		1		I UDIISIIEI				

Referenc	e Books:							
	uipment/a	pparatus for	laboratory e	xperimer	nts:			
Sl. No.								
91.								
	ester Exami	ination Scher	ne. Max	kimum Ma	arks-70.	Time a	lotted-	
3hrs.				1				
Group	Unit	Objective (MCQ only correct ans			Subjectiv	e Questions		
		No of question	Total Marks	No of question	To answer	Marks per question	Total Marks	
		to be set	Marks	to be set		question	Marks	
A	ALL	10	10					
		-	-					
В	ALL			5	3	5	70	
С	ALL			5	3	15		
be	e given on top	tion to the stud of the questior <b>e for end sem</b>	n paper.		r in answering o	bjective ques	tions should	
Group	tion Scheme	Chapter	Marks of questio	f each Question to be Qu		-	estion to be swered	
Α		ALL	1		10	10		
В		ALL	5		5	3		
С		ALL	15		5	3		
		e for Practica			on:			
Practical	<b>Internal Se</b>	essional Cont	inuous Evalu	ation				
	Examinatio	n:					40	
Five No of								
Experime	nts							
External F	Examination:	Examiner-					60	
	Note Book(f							
experimen	ts)							
	periment(on							
group cons	sisting 5 stude							
		Viva voce						

Name of the Course: M.Tech. in Internet of Things						
Subject:Business Analytics						
Course Code:PGCS(IoT)302A	Semester: 3rd					
Duration: 36 Hours Maximum Marks:100						
Teaching Scheme	Examination Scheme					
Theory:03	End Semester Exam: 70					
Tutorial:0	Attendance : 5					
Practical:0	Continuous Assessment: 25					

Credit: 03	3		
Aim:			
Sl. No.			
1.	Understand the role of business analytics within an organizat	on.	
2.	Analyze data using statistical and data mining techniques and	understa	nd
	relationships between the underlying business processes of a		
3.	To gain an understanding of how managers use business anal	tics to for	mulate
	and solve business problems and to support managerial decis	ion makin	lg.
4.	To become familiar with processes needed to develop, report,	and analy	/ze
	business data.		
5.	Use decision-making tools/Operations research techniques.		
6	Mange business process using analytical and management too		
7.	Analyze and solve problems from different industries such as		
	service, retail, software, banking and finance, sports, pharmae	eutical, a	erospace
	etc.		
Objective	8:		
Sl. No.			
1.	Students will demonstrate knowledge of data analytics.		
2.	Students will demonstrate the ability of think critically in mal	ing decisi	ons
	based on data and deep analytics.		
3.	Students will demonstrate the ability to use technical skills in	predicativ	ve and
	prescriptive modelling to support business decision-making.		
4.	Students will demonstrate the ability to translate data into cle	ar, action	able
	insights.		
Pre-Requ	aisite:		
Sl. No.			
1.			
2.			
		/	
Contents		Hrs./w	1
Chapter	Name of the Topic	Hours	Marks
01	Unit1:	6	14
	Business analytics: Overview of Business analytics, Scope of		
	Business analytics, Business Analytics Process, Relationship		
	of Business Analytics Process and organisation, competitive		
	advantages of Business Analytics.		
	Statistical Tools: Statistical Notation, Descriptive Statistical		
	methods, Review of probability distribution and data modelling, sampling and estimation methods overview.		
02	Trendiness and Regression Analysis: Modelling Relationships	6	14
02	and Trends in Data, simple Linear Regression.	U	14
	Important Resources, Business Analytics Personnel, Data and		
	models for Business analytics, problem solving, Visualizing		
	and Exploring Data, Business Analytics Technology.		
03	Organization Structures of Business analytics, Team	6	14
	management, Management Issues, Designing Information		<b>- ·</b>
	Policy, Outsourcing, Ensuring Data Quality, measuring		
	contribution of Business analytics, Managing Changes.		
	Descriptive Analytics, predictive analytics, predicative		
	Modelling, Predictive analytics analysis, Data Mining, Data		
	Mining Methodologies, Prescriptive analytics and its step in		

		s analytics Pro Optimization.	ocess, Pre	scriptive Mo	odelling,				
04	Forecasting Techniques: Qualitative and JudgmentalForecasting, Statistical Forecasting Models, ForecastingModels for Stationary Time Series, Forecasting Models forTime Series with a Linear Trend, Forecasting Time Series withSeasonality, Regression Forecasting with Casual Variables,Selecting Appropriate Forecasting Models.Monte Carlo Simulation and Risk Analysis: Monte CarleSimulation Using Analytic Solver Platform, New-ProductDevelopment Model, Newsvendor Model, Overbooking Model,Cash Budget Model.							14	
05	Strategies v Oute	nalysis: Formu with the with comeProbabili ne ofInformat	hout ities,Decis	ion Tre	es, The	n	6	10	
06		nds in : Embed e, Visual data r				ita	6	4	
	Sub Total:						36	70	
		essment Examir	nation & Pr	eparation of	Semester		4	30	
	Total:								
	l: ients: Based o	on theory					40	100	
Assignm List of Bo Text Boo	ents: Based o ooks oks:	on theory Title of the B	ook	Edition/IS	SSN/ISBN		ne of th blisher		
Assignm List of Bo Text Boo	ents: Based o ooks oks:		ook	Edition/IS	SSN/ISBN		ne of th		
List of Bo Text Boo Name of	ents: Based o ooks oks:		ook	Edition/IS	SSN/ISBN		ne of th		
Assignm List of Bo Text Boo Name of Name of Reference 1.Marc J. Schniede G. Schniede Christop	ents: Based o ooks oks: Author ce Books: erjans, Dara ederjans, oher M.		llytics oncepts,	Edition/IS	SSN/ISBN	Pub	ne of th blisher		
Assignm List of Bo Text Boo Name of Name of Reference 1.Marc J. Schniede G. Schnied Christop Starkey,	ents: Based o ooks oks: Author ce Books: erjans, Dara ederjans, oher M.	Title of the B Business ana Principles, Co and Applicati	llytics oncepts, ions	Edition/IS	SSN/ISBN	Put	ne of th blisher	ne T Press.	
Assignm List of Bo Text Boo Name of Name of Reference 1.Marc J. Schniede G. Schnied Christop Starkey,	ents: Based o ooks oks: Author ce Books: erjans, Dara ederjans, oher M.	Title of the B Business ana Principles, Co	llytics oncepts, ions	Edition/IS	SSN/ISBN	Put	ne of th blisher	16	
Assignm List of Bo Text Boo Name of Name of Reference 1.Marc J. Schniede G. Schnie G. Schnie Christop Starkey, 2.James End Sem	ents: Based o ooks oks: Author ce Books: erjans, Dara ederjans, oher M. Evans,	Title of the B Business ana Principles, Co and Applicati	llytics oncepts, ions alytics	Edition/IS		Put Pea	ne of th blisher	T Press.	
Assignm List of Bo Text Boo Name of Name of 1.Marc J. Schniede G. Schnied G. Schnied Christop Starkey, 2.James	ents: Based o ooks oks: Author ce Books: erjans, Dara ederjans, oher M. Evans,	Title of the B Business ana Principles, Co and Applicati Business Ana	Ilytics oncepts, ions Alytics . Max uestions th the			Put Put	ne of th olisher arson F	T Press.	

		to be set		to be set					
A	ALL	10	10						
В	ALL			5	3	5		70	
С	ALL			5	3	15			
part • Spe	t. cific instructio	oice type questi on to the stude f the question p	nts to main					·	
Examination	on Scheme	for end seme	ster exan	nination:					
Group	Group Chapter			Marks of each question		Question to be set		Question to be answered	
Α		ALL	1		10		10		
В		ALL	5		5		3		
С		ALL	15		5		3		
Examinat	ion Scheme	for Practica	l Session	al examinat	tion:				
Practical	Internal Sea	ssional Conti	inuous Ev	valuation					
Internal E	Examination	ı:							
Continuou	s evaluation							40	
External I	Examinatio	n: Examiner	-						
Signed Lal	o Assignmei	nts	10						
On Spot E	xperiment		40						
Viva voce			10					60	

Name of the Course: M.Tech. in Internet of Things Subject:Industrial Safety						
	de:PGCS(IoT)302B	Semester: III				
Duration:		Maximum Marks:100				
<b>Teaching</b>	Scheme	Examination Scheme				
Theory:03		End Semester Exam: 70				
Tutorial:0		Attendance : 5				
Practical:0		Continuous Assessment: 25				
Credit: 03						
Aim:						
Sl. No.						
1						
2						
3.						
<b>Objective:</b>						
Sl. No.						
1.						
2.						
3.						
Pre-Requi	site:					
Sl. No.						
1.						
2.						

Contents		Hrs./week		
Chapter	Name of the Topic	Hours	Marks	
01	Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.	8	14	
02	Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.	8	14	
03	Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.	8	14	
04	Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault-finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.	8	14	
05	Periodic and preventive maintenance: Periodic inspection- concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance	4	14	
	Sub Total:	36	70	
	Internal Assessment Examination & Preparation of Semester Examination	4	30	
	Total:	40	100	

List of Bo							
Text Books: Name of Author		Title of the	Book	Edition/ISSN/ISBN		Name of the Publisher	
Reference							
1.Higgins Morrow,	&	Maintenan Engineerin Handbook,	g			Da Infor Services	
<b>2.H. P. Ga</b>	rg,	Maintenan Engineerin	се			S. Chand Compan	
3.Audels,		Pump-hydi Compresso	raulic			Mcgrew Publicat	Hill
4.Winterl	korn, Hans,	Foundation Engineerin Handbook,	ı g			Chapma London.	n & Hall
End Seme 3hrs.	ester Examin	ation Schem		kimum Mar	ks-70.	Time a	allotted-
Group	Unit	Objective (MCQ only v	vith the		Subjective	Question	S
		correct answ No of	ver) Total	No of	To answer	Marks per	Total
		question to be set	Marks	question to be set	10 answer	question	Marks
А	ALL	10	10				
В	ALL			5	3	5	70
С	ALL			5	3	15	
pa	rt.				t answer are to		
be	given on top o	on to the stude of the question for end sem	paper.		n answering ob	ojective que	stions should
Group		Chapter	Marks of questio	of each	Question to l set		estion to be wered
Α		ALL	1		10	10	
В		ALL	5		5	3	
<u>C</u>		ALL	15		5	3	
		e for Practic			on:		
		ssional Cont	tinuous Eva	luation			
	Examination						10
	us evaluation	n: Examine					40
	Examination ab Assignme		r- 10				
	Experiment	111.5	40				
	- Aperment		עד ן				

	e Course: M.Tech. in Inte	ernet of Things		
Subject:Op	erations Research			
<b>Course Co</b>	de:PGCS(IoT)302C	Semester: 3rd		
<b>Duration</b> :	36 Hours	Maximum Marks:100		
Teaching S	Scheme	Examination Scheme		
Theory:03		End Semester Exam: 70		
Tutorial:0		Attendance : 5		
Practical:0		Continuous Assessment: 25		
Credit: 03				
Aim:				
Sl. No.				
1.				
2.				
3.				
<b>Objective:</b>				
Sl. No.				
1.		o apply the dynamic programming to so	olve prob	lems of
2	discreet and continuou		•	
2.		o apply the concept of non-linear progr	amming	
3.		o carry out sensitivity analysis	1	
4.		model the real world problem and sim	ulate it.	
Pre-Requi	site:			
Sl. No.				
1.				
2.				
Contents			Hrs./w	eek
Chapter	Name of the Topic		Hours	Marks
01	<b>_</b>	ues, Model Formulation, models,	7	14
01		on, Simplex Techniques, Sensitivity		
	Analysis, Inventory Co			
02		Graphical solution revised simplex	8	14
		y - dual simplex method - sensitivity		
	analysis - parametric p			
03		ng problem - Kuhn-Tucker conditions	7	14
	min cost flow problem	- max flow problem - CPM/PERT		
04	Scheduling and sequer	icing - single server and multiple	7	14
	server models - detern	ninistic inventory models -		
	Probabilistic inventory	y control models - Geometric		
	Programming.			
05		ngle and Multi-channel Problems,	7	14
		/namic Programming, Flow in		
	Networks, Elementary	Graph Theory, Game		
	TheorySimulation		ļ	
	Sub Total:		36	70
	Internal Assessment Exa Examination	mination & Preparation of Semester	4	30

	Total:					40	100
Practical	_						
Practical	•						
Assignme	ents: Based o	on theory					
List of Bo Text Boo							
Name of		Title of the	Book	Edition/	ISSN/ISBN	Name of t	he
						Publisher	
Referenc	e Books:						
1.H.A. Ta	ha,	Operations An Introdu				PHI, 2008	
2.H.M. W	agner,	Principles				PHI, Delhi	, 1982.
	_	Operations	*				5.111
3.J.C. Pan	it,	Introductio Optimisatio				Jain Broth 2008	ers, Delhi,
		Operations				2000	
4.Hitler		Libermann	•			McGraw H	lill Pub.
<b>F</b> Dama an		Operations				2009	
5.Panner	seivain,	Operations	Research			2010	Iall of India
6.Harvey	M Wagner,	Principles Operations				Prentice H 2010	Iall of India
List of ea	uipment/ap	-		 xneriment	ts:	2010	
End Sem	ester Examin			imum Ma		Time all	lotted-
3hrs.							
Group	Unit	Objective (MCQ only w correct answ	vith the	Subjective Questions			
		No of	Total	No of	To answer	Marks per	Total
		question to be set	Marks	question to be set		question	Marks
A	ALL	10	10				
В	ALL			5	3	5	70
С	ALL			5	3	15	
• Or	nly multiple ch	oice type quest	tion (MCQ) wit		ct answer are to		objective
•	irt.	on to the start	nto to	in the ard-	in ange	aiontino con l'	ong sharle
	ecific instructi given on top c			in the order	in answering ol	ojective quest	ions should
	5 p •	1					
	tion Scheme	1					•
Group		Chapter	Marks o	t each	Question to	be Ques	tion to be

		quest	tion	set	answered
Α	ALL	1		10	10
В	ALL	5		5	3
С	ALL	15		5	3
<b>Examination Scheme</b>	for Practical	Session	nal examina	tion:	
<b>Practical Internal Se</b>	ssional Contin	uous E	valuation		
Internal Examination	1:		_		
Continuous evaluation					40
<b>External Examinatio</b>	n: Examiner-				
Signed Lab Assignment	nts	10			
On Spot Experiment		40			
Viva voce		10			60

	e Course: M.Tech. in Into ost Management of Engi			
	de:PGCS(IoT)302D	Semester: 3rd		
Duration:		Maximum Marks:100		
Teaching S	Scheme	Examination Scheme		
Theory:03		End Semester Exam: 70		
Tutorial:0		Attendance : 5		
Practical:0		<b>Continuous Assessment:</b> 25		
Credit: 03				
Aim:				
Sl. No.				
1.				
2.				
3.				
<b>Objective</b> :				
Sl. No.				
1.				
2.				
3.				
Pre-Requi	site:			
Sl. No.				
1.				
2.				
Contents			Hrs./w	oolr
Chapter	Name of the Topic		Hours	Marks
01		erview of the Strategic Cost	4	4
01	Management Proces	5	T	Т
02		ision-making; Relevant cost,	6	6
-		remental cost and Opportunity cost.	_	
		ng System; Inventory valuation;		
	<b>Creation of a Databa</b>	se for operational control; Provision of		
	data for Decision-Ma	0		
03		fferent types, why to manage, cost	6	10
		rious stages of project execution:		
	conception to comm	issioning. Project execution as		

04	conglomeration of technical and non- technical activities.		
04	8		
	Detailed Engineering activities. Pre project execution main	8	20
	clearances and documents Project team: Role of each		
	member. Importance Project site: Data required with		
	significance. Project contracts. Types and contents. Project		
	execution Project cost control. Bar charts and Network		
	diagram. Project commissioning: mechanical and process		
	Cost Behavior and Profit Planning Marginal Costing;		
	Distinction between Marginal Costing and Absorption		
	Costing; Break-even Analysis, Cost-Volume-Profit Analysis.		
05	Various decision-making problems. Standard Costing and	3	10
	Variance Analysis. Pricing strategies: Pareto Analysis.		
06	Target costing, Life Cycle Costing. Costing of service sector.	5	10
	Just-in-time approach, Material Requirement Planning,		
	Enterprise Resource Planning, Total Quality Management		
	and Theory of constraints. Activity-Based Cost		
	Management, Bench Marking; Balanced Score Card and		
	Value-Chain Analysis. Budgetary Control; Flexible Budgets;		
	Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including		
	transfer pricing.		
07	Quantitative techniques for cost management, Linear	4	10
07	Programming, PERT/CPM, Transportation problems,	<b>T</b>	10
	Assignment problems, Simulation, Learning Curve Theory.		
	Assignment problems, simulation, learning curve meory.		
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	40	100

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher

**Reference Books:** 

1.	Cost Accounting A	P	rentice Hall of
	Managerial Emphasis,	II	ndia, New Delhi
2. Charles T.	Advanced Management		
Horngren and	Accounting		
George Foster,			
3. Robert S	Management & Cost		
Kaplan Anthony A.	Accounting		
Alkinson,			
4. Ashish K.	Principles & Practices	М	/heeler publisher
Bhattacharya,	of Cost Accounting A. H.		
5. N.D. Vohra,	Quantitative	Т	ata McGraw Hill
	Techniques in	В	ook Co. Ltd.

		Manageme	ent,						
		apparatus for Anination Schen		xperiments imum Marl		Time al	lotted-		
Group	Unit	Objective (MCQ only correct ans			Subjectiv	ctive Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks		
А	ALL	10	10						
В	ALL			5	3	5	70		
• 01 pa • Sp	art. pecific instru	choice type ques	ents to maintai						
pa • Sp be Examina	nly multiple o art. pecific instruce given on top	ction to the stud p of the question <b>ie for end sem</b>	ents to maintai paper. <b>ester examir</b>	h one correct n the order in nation:	t answer are to	be set in the	ions should		
• Or pa • Sp be	nly multiple o art. pecific instruce given on top	ction to the stud p of the question	ents to maintai paper.	h one correct n the order in nation: f each	t answer are to	be set in the	ions should tion to be		
<ul> <li>Original</li> <li>Sribe</li> <li>Examinal</li> <li>Group</li> </ul>	nly multiple o art. pecific instruce given on top	ction to the stud p of the question te for end sem Chapter ALL	ents to maintai paper. ester examin Marks of question 1	h one correct n the order in nation: f each	t answer are to n answering of Question to I set 10	be set in the ojective quest be Ques answ 10	ions should tion to be		
• 0: pa • Sr be <b>Examina</b> Group A B	nly multiple o art. pecific instruce given on top	ction to the stud p of the question <b>e for end sem</b> Chapter ALL ALL	ents to maintai paper. ester examin Marks of question 1 5	h one correct n the order in nation: f each	t answer are to n answering ol Question to I set 10 5	be set in the ojective quest be Ques answ 10 3	ions should tion to be		
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<ul> <li>Original</li> <li>Sredit Sredit</li> <li><b>Examina</b></li> <li><b>Group</b></li> </ul> A B C Examina	nly multiple o art. pecific instruct given on top tion Schem	ction to the stud p of the question the for end sem Chapter ALL ALL ALL ME for Practic	ents to maintai paper. ester examin Marks o question 1 5 15 al Sessional	h one correct n the order in ation: f each f examination	t answer are to n answering of Question to I set 10 5	be set in the ojective quest be Ques answ 10 3	ions should tion to be		
<ul> <li>O: pa pa Sp be</li> <li>Sp be</li> <li>Sp be</li> <li>Sp be<td>nly multiple o art. pecific instruct given on top tion Schem ation Scher I Internal S</td><td>ction to the stud p of the question the for end sem Chapter ALL ALL ALL Me for Practic Sessional Con</td><td>ents to maintai paper. ester examin Marks o question 1 5 15 al Sessional</td><td>h one correct n the order in ation: f each f examination</td><td>t answer are to n answering of Question to I set 10 5</td><td>be set in the ojective quest be Ques answ 10 3</td><td>ions should tion to be</td></li></ul>	nly multiple o art. pecific instruct given on top tion Schem ation Scher I Internal S	ction to the stud p of the question the for end sem Chapter ALL ALL ALL Me for Practic Sessional Con	ents to maintai paper. ester examin Marks o question 1 5 15 al Sessional	h one correct n the order in ation: f each f examination	t answer are to n answering of Question to I set 10 5	be set in the ojective quest be Ques answ 10 3	ions should tion to be		
<ul> <li>O</li> <li>pa</li> <li>pa</li> <li>pa</li> <li>pa</li> <li>pa</li> <li>pa</li> <li>pa</li> <li>Sp</li> <li>ba</li> <li>ba</li> <li>Group</li> <li>A</li> <li>B</li> <li>C</li> <li>Examina</li> <li>Practica</li> <li>Internal</li> </ul>	nly multiple o art. pecific instruc- e given on top tion Schem ation Scher I Internal S Examinati	ction to the stud p of the question te for end sem Chapter ALL ALL ALL ne for Practic Sessional Con ion:	ents to maintai paper. ester examin Marks o question 1 5 15 al Sessional	h one correct n the order in ation: f each f examination	t answer are to n answering of Question to I set 10 5	be set in the ojective quest be Ques answ 10 3	ions should tion to be rered		
O     pa     pa     pa     pa     Sp     be     Sr     be     C     Examina     Group     A     B     C     Examina     Practica     Internal     Continuc	nly multiple o art. pecific instruc- e given on top tion Schem ation Scher I Internal S Examinations evaluati	ction to the stud p of the question the for end sem Chapter ALL ALL ALL Me for Practic Sessional Con ion: on	ents to maintai paper. ester examin Marks o question 1 5 15 al Sessional tinuous Eval	h one correct n the order in ation: f each f examination	t answer are to n answering of Question to I set 10 5	be set in the ojective quest be Ques answ 10 3	ions should tion to be		
<ul> <li>Original</li> <li>Spectra Spectra</li> <li>Examina</li> <li>Group</li> </ul> A B C Examina Practica Internal Continuce External	nly multiple o art. pecific instruc- e given on top tion Schem ation Scher I Internal S Examinations evaluati I Examinat	ction to the stud p of the question the for end sem Chapter ALL ALL ALL ne for Practic Sessional Con tion: Examine	ents to maintai paper. ester examin question 1 5 15 al Sessional tinuous Eval	h one correct n the order in ation: f each f examination	t answer are to n answering of Question to I set 10 5	be set in the ojective quest be Ques answ 10 3	ions should tion to be rered		
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Name of the Course: M.Tech. in Internet of Things					
Subject:Composite Materials					
Course Code:PGCS(IoT)302E	Semester: III				
Duration: 36 Hours	Maximum Marks:100				
Teaching Scheme	Examination Scheme				
Theory:03	End Semester Exam: 70				
Tutorial:0	Attendance : 5				
Practical:0	Continuous Assessment: 25				
Credit: 03					
Aim:					
Sl. No.					
1.					
2.					
3.					
Objective:					

Sl. No.					
1.					
2.					
3.					
Pre-Requ	isite:				
Sl. No.					
1.					
2.					
2.					
Contents				Umo	/
	Nome of the	Tomia		Hou	/week
Chapter 01	Name of the			Hou 7	
01		TION: Definition – Classi			14
		tics of Composite materi	•		
		of composites. Function	al requirements of		
		ent and matrix.			
		inforcement (size, shape			
		n overall composite perf			
02		EMENTS: Preparation-lay			14
		s of glass fibers, carbon			
		rs. Properties and applic			
		nforcements. Mechanica		es:	
		tures, Inverse rule of mi	xtures. Isostrain and		
	Isostress co				
03		ring of Metal Matrix Com		7	14
		ion technique, Cladding			
	-	and applications. Manuf			
	-	s: Liquid Metal Infiltratio		ng.	
		ring of Carbon – Carbon o			
		/eaving. Properties and a			
04		ring of Polymer Matrix C		of 8	14
	0	ompounds and prepregs	<i>v</i> 1		
		nethod – Filament windi		on	
	moulding –	<b>Reaction injection moul</b>	ding. Properties and		
	application	IS.			
05	Strength: La	aminar Failure Criteria-s	strength ratio, maximun	n 7	14
		ria, maximum strain crit			
	criteria, hy	grothermal failure. Lami	inate first play failure-		
	insight stre	ength; Laminate strength	-ply discount truncated		
		strain criterion; strength	design using caplet plo	ts;	
	stress conc	entrations.			
	Sub Total:			36	70
	Internal Ass	essment Examination & Pr	eparation of Semester	4	30
	Examination	1			
	Total:			40	100
Assignme	ents: Based o	on theory			
List of Bo	oks				
Text Boo	ks:				
Name of A	Author	Title of the Book	Edition/ISSN/ISBN	Name of	the
				Publishe	r

Practic	nation Schen al Internal S	Sessional Co	ntinuous	Evaluation				
	al Examinati		itiliuous	L'valuation				
	ious evaluati							40
		ion: Examin	er-					
Signed	Lab Assignn	nents	1	0				
-	t Experiment		4					
Viva vo			1	0				60
1. R	W.Cahn	Material Sc Technology		d Vol 13		VC	H, West	Germany.
Adapted	WD Callister, Jr., apted by R.Materials Science Engineering, An introduction.		g, An	nd Indian	Indian edition, 2007.		John Wiley & Sons, NY,	
Referenc	e Books:							
1. Li	ıbin.	Hand Book Composite	-	s				
2. K	K.Chawla.	Composite						
-	3. Deborah D.L. Composite M Chung. Science and Applications		1	s				
	4.Danial Gay, Suong Composite Mater V. Hoa, and Stephen Design and			S				
End Sem 3hrs.	ester Examir	nation Schem	ie. N	Maximum M	arks-70.	T	'ime all	otted-
Group	Unit	Objective (MCQ only v correct answ	vith the	IS	Subjective Questions			
		No of question to be set	Total Marks	No of question to be set			ks per stion	Total Marks
A	ALL	10	10					
п					3	5		70
	ALL			5	5	-		
В								
B C • On pa • Sp be	ALL aly multiple ch art. becific instructi	on to the stude of the question	ents to mai paper.	5) with one cor	3 rect answer are	to be se		-
B C • On pa • Sp be <b>Examina</b>	ALL aly multiple ch art. becific instructi	on to the stude of the question <b>for end sem</b>	ents to mai paper. ester exa	5 ) with one cor intain the orde i <b>mination:</b>	3 rect answer are	15 e to be se g objectiv	ve questi	ions should
B C • On pa • Sp be	ALL aly multiple ch art. becific instructi	on to the stude of the question	ents to mai paper. ester exa	5 ) with one cor intain the orde mination: ts of each	3 rect answer are	15 e to be se g objectiv	ve questi	ions should
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B C On pa • Sp be <b>Examina</b> Group	ALL aly multiple ch art. becific instructi	on to the stude of the question for end seme Chapter	ents to mai paper. ester exa Mark ques	5 ) with one cor intain the orde mination: ts of each	3 rect answer are er in answering Question t set	15 e to be se g objectiv	ve questi Quest answ	ions should

Name of the Course: M.Tech. in Internet of Things				
Subject:Waste to Energy				
Course Code:PGCS(IoT)302F	Semester: 3rd			
Duration: 36 Hours	Maximum Marks:100			

Teaching Scheme		Examination Scheme				
Theory:03		End Semester Exam: 70				
Tutorial:0	) Atte	ndance : 5				
Practical:	0 Cont	tinuous Assessment: 25				
Credit: 03						
Aim:						
Sl. No.						
1.						
2.						
3.						
Objective	ן יב					
Sl. No.						
1.						
2.						
3.						
Pre-Requ	isite:					
Sl. No.						
1.						
2.						
Contents			Hrs./w	ek		
Chapter	Name of the Topic		Hours	Marks		
01		Waste: Classification of waste as	7	14		
	fuel – Agro based, Forest resid					
	Conversion devices – Incinera					
02		- Types, slow fast – Manufacture	7	14		
		and application – Manufacture	-			
	of pyrolytic oils and gases, yie					
03	<b>Biomass Gasification: Gasifier</b>	<u> </u>	7	14		
	Downdraft and updraft gasifie					
	Design, construction and oper	ration – Gasifier burner				
	arrangement for thermal heat	ting – Gasifier engine				
	arrangement and electrical po	ower – Equilibrium and kinetic				
	consideration in gasifier oper	ation.				
04	<b>Biomass Combustion: Biomas</b>	· ·	7	14		
	types, some exotic designs, Fix					
	_	uidized bed combustors, Design,				
	construction and operation - (	Operation of all the above				
	biomass combustors.		-			
05		Calorific value and composition)	8	14		
	- Biogas plant technology and					
		tures - Biomass resources and				
		conversion processes - Thermo				
	chemical conversion - Direct o					
	gasification - pyrolysis and liq	-				
	conversion - anaerobic digest					
		tion from biomass - Bio diesel				
	production - Urban waste to e energy programme in India.	nergy conversion - Diomass				
	Sub Total:		26	70		
1	SUD I Uldi:		36	/U		

	Examination	1			of Semester	4	ŀ	30
	Total:	-				4	ł <b>0</b>	100
Practical								
Assignmo	ents: Based o	on theory						
List of Bo Text Boo								
Name of Author		Title of the Book		Edition/ISSN/ISBN		Name of the Publisher		
Referenc	e Books							
1.Desai, A		Non-Conve	entional			Wilev	/ East	ern Ltd.,
coui, 1		Energy,				1990.		
2.Khandelwal, K. C. and Mahdi, S. S.,		Biogas Technology - A Practical Hand Book -		Vol. I & II,		Tata McGraw Hill Publishing Co. Ltd., 1983.		
3.Challal, D. S.,		Food, Feed and Fuel from Biomass,				IBH P Pvt. L		hing Co. 991.
4.C. Y. WereKo- Brobby and E. B.		Biomass Conversion and Technology,					John Wiley & Sons, 1996.	
Hagan, List of og	winmont/an	naratus for	laboratory e	vnorimon	tei			
Sl. No.	[uipinent/ap	paratus ior	labol atol y e	xpermen				
92.								
93.								
94.								
94								
95.								
95. 96. <b>End Sem</b>	ester Examii	nation Schem	ne. Max	imum Ma	rks-70.	Tin	ne allo	otted-
95. 96. <b>End Sem</b> o <b>3hrs.</b>	ester Examin Unit		<b>Questions</b> with the	imum Ma	rks-70. Subjective			otted-
95. 96. <b>End Sem</b> o <b>3hrs.</b> Group	Unit	Objective (MCQ only correct ans No of question to be set	Questions with the wer) Total Marks	imum Ma No of question to be set			<b>ions</b> per	otted- Total Marks
95. 96. <b>End Sem</b> o <b>3hrs.</b> Group		Objective (MCQ only correct ans No of question	Questions with the wer) Total	No of question	Subjective	<b>Quest</b>	<b>ions</b> per	Total
95. 96. <b>End Sem</b> o <b>3hrs.</b> <b>Group</b> A	Unit	Objective (MCQ only correct ans No of question to be set	Questions with the wer) Total Marks	No of question	Subjective	<b>Quest</b>	<b>ions</b> per	Total
95. 96. <b>End Sem</b> o <b>3hrs.</b> <b>Group</b> A B	Unit ALL ALL ALL	Objective (MCQ only v correct ansNo of question to be set10	Questions with the wer) Total Marks 10	No of question to be set 5 5	Subjective To answer 3 3	e Questi Marks questi 5 15	per on	Total Marks 70
95. 96. End Semo 3hrs. Group A B C C • On pa • Sp	Unit Unit ALL ALL ALL nly multiple ch art. Decific instruct	Objective (MCQ only v correct ans)         No of question to be set         10         oice type ques         ion to the stud	Questions with the wer) Total Marks 10 tion (MCQ) with ents to maintai	No of question to be set 5 5 ch one corre	Subjective         To answer         3	e Questi Marks questic 5 15 be set in	per on	Total Marks 70
95. 96. End Semo 3hrs. Group A A B C C 0 pa sp be	Unit Unit ALL ALL ALL ALL nly multiple ch art. e given on top o	Objective (MCQ only v correct ans)         No of question to be set         10         oice type quession to the stud of the question	Questions with the wer) Total Marks 10 tion (MCQ) with ents to maintal paper.	No of question to be set 5 5 ch one corre	Subjective To answer 3 3 ect answer are to	e Questi Marks questic 5 15 be set in	per on	Total Marks 70
95. 96. End Semo 3hrs. Group A A B C C 0 pa sp be	Unit Unit ALL ALL ALL ALL nly multiple ch art. e given on top o	Objective (MCQ only v correct ans)         No of question to be set         10         oice type quession to the stud of the question	Questions with the wer) Total Marks 10 tion (MCQ) with ents to maintai	No of question to be set 5 5 ch one corre in the order nation: f each	Subjective To answer 3 3 ect answer are to	e Questi Marks questi 5 15 be set in ojective o	ions per on n the c	Total Marks 70 objective ons should

В	ALL	5		5	3	
С	ALL	15		5	3	
<b>Examination Scheme</b>	for Practical S	Session	al examinat	ion:		
Practical Internal Se	ssional Continu	ious E	valuation			
Internal Examination	1:					
Continuous evaluation	L				40	0
<b>External Examinatio</b>	n: Examiner-		-			
Signed Lab Assignment	nts	10				
On Spot Experiment		40				
Viva voce		10			6	0

Name of the Course: M.Tech. in Internet of Things Subject: Dissertation-I /Industrial Project		
Teaching Scheme	Examination Scheme100	
Theory:0	End Semester Exam:	
Tutorial:0	Teacher's Assessment:0	
Practical:20	Internal Assessment:0	
Credit:10	Practical Sessional internal continuous evaluation:40	
	Practical Sessional external examination:60	

## Content

The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following

Relevance to social needs of society

Relevance to value addition to existing facilities in the institute

Relevance to industry need

Problems of national importance

Research and development in various domain The

student should complete the following:

Literature survey Problem Definition

Motivation for study and Objectives

Preliminary design / feasibility / modular approaches

Implementation and Verification

Report and presentation

The dissertation stage II is based on a report prepared by the students on dissertation allotted to them. It may be based on:

Experimental verification / Proof of concept.

Design, fabrication, testing of Communication System.

The viva-voce examination will be based on the above report and work.

## Semester IV

Name of the Course: M. Tech. in l	Internet of Things			
Subject:Dissertation II				
Course Code:PGCS(IoT)491	Semester: 3 <sup>rd</sup>			
Teaching Scheme	Examination Scheme100			
Theory:0	End Semester Exam:			
Tutorial:0	Teacher's Assessment:0			
Practical:32	Internal Assessment:0			
Credit:16	Practical Sessional internal continuous evaluation:40			
	Practical Sessional external examination:60			
Contents	·			

Students will do projects on application areas of latest technologies and current topics of societal relevance.

## **Guidelines for Dissertation Phase-I and II**

As per the AICTE directives, the dissertation is a yearlong activity, to be carried out and evaluated in two phases i.e. Phase – I: July to December and Phase – II: January to June. The dissertation may be carried out preferably in-house i.e. department's laboratories and centers OR in industry allotted through department's T & P coordinator.

After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives. The referred literature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing and Processing (Hardware and Software), Circuits-Devices and Systems, Communication-Networking and Security, Robotics and Control Systems, Signal Processing and Analysis and any other related domain. In case of Industry sponsored projects, the relevant application notes, while papers, product catalogues should be referred and reported.

Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and phase wise work distribution, and submit the proposal within a month from the date of registration.

Phase – I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper and/or computer aided design, proof of concept/functionality, part results, A record of continuous progress.

Phase – I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend repeating the Phase-I work.

During phase – II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.

Phase – II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, A record of continuous progress.

Phase – II evaluation: Guide along with appointed external examiner shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend for extension or repeating the work