RAJAH SERFOJI GOVERNMENT COLLEGE

(AUTONOMOUS)

THANJAVUR-613 005

SYLLABUS

(With LOCF and CBCS)

FOR

MPhil (Computer Science)

(Applicable to the candidates admitted from the academic year 2023-2024 onwards)

VISION

Creation of globally capable, committed, empathetic and holistic persons promoting the society.

MISSION

1. Nurturing effective learning environment to the students of diverse background, developing their inherent skills and competencies through reflection and creation of knowledge and service.
2. Cultivating comprehensive learning and best practices through innovative and value driven pedagogy.
3. Contributing significantly to Higher Education through Teaching, Learning, and Research and Extension activities.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

1. Graduates will be able to accomplish professional standards in the global environment.
2. Graduates will be able to uphold integrity and human values.
3. Graduates will be able to appreciate and promote pluralism and multiculturalism in working environment.

MPhil- COMPUTER SCIENCE
PROGRAMME OUTCOMES (POs)

Upon completion of this MPhil Degree Programme, the students will be able to

1. Demonstrate the trending concepts in Computer Science.
2. Know how to use research tools for their research areas.
3. Acquire the knowledge to identify the correct researchtechniques and methodologies for their research problem.
4. Identify the new problems, and show their skill to solve problems, analyze the data and interpret the results.
5. Communicate effectively and demonstrate their research skills to the society.

MPhil- COMPUTER SCIENCE
PROGRAM SPECIFIC OUTCOMES (PSOs)

On completion of this **MPhil- Computer Science** Programme, students will be able to:

1. Know the recent developments happened in Computer Science.
2. Handle various software tools available for their research activities.
3. Identify the innovative research problems in computer science.
4. Implement the effective research techniques and methodologies for the identified research problem.
5. Analyze the results of various problems, find the insight valuable information and communicate effectively to the society for their welfare.

RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS),THANJAVUR-613005
M.Phil COMPUTER SCIENCE COURSE STRUCTURE
(For the Candidates admitted from the academic year 2022 -2023 onwards)

Semester	Code	Course	Course Title	Marks		Total	Exam Hrs	Credit
				Int.	Ext.			
I	**T1MCS1**	Core Course 1	Research Methodology	25	75	100	3	4
	T1MCS2	Core Course 2	Advanced Concepts in computer science	25	75	100	3	4
	T1MCS3	Core Course 3	Teaching and Learning Skills	25	75	100	3	4
		Core Course 4	Guide Paper*	25	75	100	3	4
			Total			**400**		**16**
				V.V	**DIS**	**Total**		
II	**T2MCSD**	Core Course 5	Dissertation and viva voce	50	150	200		8
			Grand Total			**600**		**24**

Guide Papers

S.No	Code	Title
1	**T1MCS4A**	Data Mining techniques
2	**T1MCS4B**	Cloud Computing
4	**T1MCS4C**	Network Security
5	**T1MCS4D**	Big Data Analytics
		No. of Papers
	Core Courses	4 (Each of 4 Credits)
	Project	1
	Total	5 (24 Credits)

Credits : 4 **Code: T1MCS1**
Exam Hours : 3
Medium of instruction: English

M.Phil(Computer Science) - Semester 1
(For students admitted from 2023 -2024 onwards)

CORE COURSE I – RESEARCH METHODOLOGY

COURSE OBJECTIVES:

- Acquire knowledge in research process and publication
- Understand the role of algorithm in computing
- Develop the skills in formal languages and automata
- Understand the probability and data analysis
- Develop the logical thinking

COURSE OUTCOMES:

CO's	CO–Statements	Cognitive Levels
	On successful completion of this course, students will be able to	
CO–1	Explain the basics of research	K1
CO–2	Know how to use algorithm to solve their problems in their research	K2
CO–3	Apply statistical methods in their research work	K3
CO–4	Develop their logical skills to implement research problems	K4
CO–5	Find new solutions for the unsolved problems in computer Science	K5

UNIT I
Thesis Writing: Research types – objectives and approaches – Literature collection, Web browsing – Software tools – Writing review and journal articles – manuscript publication
Planning a thesis – general format – page and chapter format – footnotes – tables and figures – references and appendices

UNIT II
Analysis of algorithm: The role of algorithm in computing – Insertion sort – Analyzing and designing algorithms – growth of functions – introduction to NP – completeness

UNIT III
Formal Languages and Finite Automata: Context free grammars – Derivation trees – Simplification of context free Grammars – Chomsky normal form – Greiback normal form – The pumping lemma for context free languages-Finite state systems – Basic definitions – Non deterministic finite automata – Finite automata with epsilon moves – Regular expressions – Applications of finite Automata (Stress on theorem statement and problems only, no proof for theorems)

UNIT IV

Probability and Statistical Analysis: Probability – Fail time data analysis – Hazard models – Conditional probability – Bayes rule – System reliability – Stochastic process

UNIT V

Logics – Relations and Functions: Propositions – Precedence rules for operators – Laws of equivalence – Natural deduction system – Developing natural deduction system proofs
Relation properties – Matrix and Graph – Graph Notations for relations – Partition and covering – Equivalence relation – Compatibility relations – Partial ordering – Functions – Components – Composition of function – Inverse functions – Binary and n-ary operations

BOOKS FOR STUDY:

1. Kothari C. R. *"Research Methodology – methods and techniques*", 2nd Edition, Wishwa Prakashjan New Delhi 1999
2. Elis Horowtz and Sartaj Sahni,"*Fundamentals of Computer algorithms",* Galgotia Publications, New Delhi 2000
3. John E. Hopcroft, Jeffery D. Ullman, *"Introduction to Automata Theory Language and Computation,*" narosa Publishing House, 1979
4. L.S. Srinath, *"Reliability Engineering,*" Third Edition, Affliated East, West press pvt. Ltd, New Delhi, 2005
5. David Gries, *"The Science of Programming"* Narosa Publishing House, 1981

BOOKS FOR REFERENCE:

1. Berny H. Durston, M. Poole, „Thesis and Assignment writing, Wiley Eastern Ltd. ND 1970
2. Misra R.P. Research Methodology – A Hand Book, Concept publishing Company, New Delhi 1988
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest „Introduction to Algorithms, Prentice Hall of India, 1998
4. E. Balagurusamy, Reliability Enginering, Tata Mc Graw Hill Publishing Ltd., New Delhi 2003
5. Leon S. Levy, ;Discrete structures of Computer Science, Wiley Eastern Ltd., 1980

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	2	3	2	2	3	2	3	1	2	2.75
CO2	3	2	2	3	1	2	3	1	2	3	2.75
CO3	3	2	3	3	2	3	2	1	3	3	3.13
CO4	2	2	2	3	3	1	2	3	2	2	2.75
CO5	1	2	3	2	3	3	2	2	3	1	2.75
Mean Overall Score (High Level Relationship between COs and POs)											2.83

Semester Question paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD COE

Credits : 4 **Code: T1MCS2**
Exam Hours : 3
Medium of instruction: English

M.Phil(Computer Science) - Semester 1
(For students admitted from 2023 -2024 onwards)

CORE COURSE II–ADVANCED CONCEPTS IN COMPUTER SCIENCE

COURSE OBJECTIVES:

- To understand the importance of image processing
- To learn about data mining and data warehousing
- To understand security in networks
- To learn about deep learning and mobile computing

COURSE OUTCOMES:

CO's	CO–Statements	Cognitive Levels
	On successful completion of this course, students will be able to	
CO–1	Explain the basics in digital image proceesing	K1
CO–2	Know how to use data warehousing in data mining	K2
CO–3	Understand the risk factors in network security	K3
CO–4	Develop their skills in deep learning	K4
CO–5	Demonstrate the need of mobile computing	K5

UNIT-I

Digital Image Processing: Fundamentals: Texture images–Structure images– Pixelrelationships–Sampling– Quantization. Image Filtering: Smoothening–Sharpening. Image Compression: Lossy and Lossless Compression–Compression standards – Thresholding. Image Segmentation: Region–based Segmentations– Edge linking and boundary detection.

UNIT-II

Data Mining and Warehousing: Data Mining: Feature extraction and description–Clustering– Classification–Indexing–Matching and Information Retrieval. Data Warehousing: Design– Dimensional Modelling–Meta data–Performance issues and indexing– VLDB issues– Development life cycle.

UNIT-III

Network and Communication Security: Data Encryption and Decryption: Symmetric– Asymmetric algorithms–Public and private keys– Data encryption standard. Communication Security and Issues: Access control– User authentication– Loss of integrity– Wiretapping–

Electronic mail security: IP security–WEB security –Intruders– Viruses–Worms– and Firewalls.

UNIT-IV

Deep Learning: Definitions and background – A three-way categorization – Deep networks for unsupervised or generative learning – Deep networks for supervised learning – Hybrid deep networks.

UNIT-V

Mobile Computing : Mobility Models in Adhoc Networks – Introduction - Random-Based Mobility Models - The Random Waypoint Model - Stochastic Properties of Random Waypoint Model - Mobility Models With Geographic Restriction - Pathway Mobility Model - Obstacle Mobility Model. Routing in Mobile Adhoc Networks – Proactive Routing Protocols – DSDV – GSR – FSR - Reactive Routing Protocols–DSR-AODV.

Text Books:

1. Rafael C. Gonzalez,Richard E. Woods, “Digital ImageProcessing”Third Edition,Pearson International Editionprepared by Pearson Education
2. Li Deng, Dong Yu, Deep Learning: Methods and Applications, Foundations and Trends in Signal Processing, Volume 7, Microsoft Research Publication, ISSN: 1932-8346. Chapters: 1,3,4,5
3. Fan Bai and Ahmed Helmy, “A survey of Mobility Models”, University ofSouthern California,U.S.A.(Chapter 1)
4. Misra, Woungang, “Guide to Wireless Ad Hoc Networks”, Springer InternationalEdition, 2011, (Chapter 4)

Reference Books:

1. UsamaM.Fayyad, Gregory Piatetsky – Shapiro, Padhrai Smyth andRamasamyUthurusamy, “Advances in Knowledge Discovery and Data Mining”, TheM.I.T. Press, 2006.
2. Jiawei Han, MichelineKamber, “Data Mining: Concepts and Techniques”, Second Ed.,Morgan Kaufmann Publishers, 2006.
3. Ralph Kimball, “The Data Warehouse Life Cycle Toolkit”, Second Ed., John Wiley andSons Inc., 2007.
4. William Stallings and Lawrie Brown, Computer Security: Principles and Practices,Second Ed., Prentice Hall, Third Ed., 2015.

5. William Stallings, "Cryptography and Network Security – Principles and practices",Prentice Hall of India, Seventh Edition, 2016.
6. Derek Atkins, "Internet Security", Second Ed Techmedia, 1998.
7. Kernel Texplan, "Communication Network Management", PHI, 1992.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	1	2	2	2	3	2	2	1	2	2.38
CO2	2	2	2	1	2	2	1	2	2	2	2.25
CO3	2	1	3	3	2	3	2	3	2	3	3.00
CO4	1	4	3	3	2	1	2	2	3	3	3.00
CO5	2	1	2	3	3	2	3	2	3	3	3.00
Mean Overall Score (High Level Relationship between COs and POs)											2.73

Semester Question paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD COE

Credits : 4 **Code: T1MCS3**
Exam Hours : 3
Medium of instruction: English

M.Phil(Computer Science) - Semester 1
(For students admitted from 2023 -2024 onwards)

COURSE III
TEACHING AND LEARNING SKILLS

COURSE OBJECTIVES:

- Acquaint different parts of computer system and their functions.
- Understand the operations and use of computers and common Accessories.
- Develop skills of ICT and apply them in teaching learning context and Research.
- Appreciate the role of ICT in teaching, learning and Research.
- Acquire the knowledge of communication skill with special reference to its elements, types, development and styles.
- Understand the terms communication Technology and Computer mediated teaching and develop multimedia /e- content in their respective subject.
- Understand the communication process through the web.
- Acquire the knowledge of Instructional Technology and its Applications.
- Develop different teaching skills for putting the content across to targeted audience.

COURSE OUTCOMES:

CO's	CO–Statements	Cognitive Levels
	On successful completion of this course, students will be able to	
CO–1	Develop skills of ICT and apply them in Teaching Learning context and Research	K1
CO–2	Learn how to use instructional technology effectively in a classroom	K2
CO–3	Have the ability to utilize Academic resources in India for their teaching	K3
CO–4	Develop different teaching skills for putting the content across to targeted audience.	K4
CO–5	Have the ability to use technology for assessment in a classroom	K5

Unit I : Computer Application Skills

Information and Communication Technology (ICT): Definition, Meaning, Features, Trends – Integration of ICT in teaching and learning – ICT applications: Using word processors, Spread sheets, Power point slides in the classroom – ICT for Research: On-line journals, e-books, ourseware, Tutorials, Technical reports, Theses and Dissertations - **ICT for Professional Development** : Concept of professional development; institutional efforts for competency building; individual learning for professional development using professional networks, OERs, technology for action research, etc.

Unit II : Communications Skills

Communication: Definitions – Elements of Communication: Sender, Message, Channel, Receiver, Feedback and Noise – Types of Communication: Spoken and Written; Non-verbal communication – Intrapersonal, interpersonal, Group and Mass communication – Barriers to communication: chanical, Physical, Linguistic & Cultural – Skills of communication: Listening, Speaking, eading and Writing – Methods of developing fluency in oral and written communication – Style, Diction and Vocabulary – Classroom communication and dynamics.

Unit III : Pedagogy

Instructional Technology: Definition, Objectives and Types – Difference between Teaching and Instruction – Lecture Technique: Steps, Planning of a Lecture, Delivery of a Lecture – Narration in tune with the nature of different disciplines – Lecture with power point presentation - Versatility of Lecture technique – Demonstration: Characteristics, Principles, planning Implementation and Evaluation – Teaching-learning Techniques: Team Teaching, Group discussion, Seminar, Workshop, Symposium and Panel Discussion.

Unit IV : E- Learning, Technology Integration and Academic Resources in India

Concept and types of e-learning (synchronous and asynchronous instructional delivery and means), m-learning (mobile apps); blended learning; flipped learning; E-learning tools (like LMS; software's for word processing, making presentations, online editing, etc.); subject specific tools for e-learning; awareness of e-learning standards- Concept of technology integration in teaching- learning processes; frameworks guiding technology integration (like TPACK; SAMR); Technology Integration Matrix- Academic Resources in India: MOOC, NMEICT; NPTEL; e-pathshala; SWAYAM, SWAYAM Prabha, National academic depository, National Digital Library; e-Sodh Sindhu; virtual labs; eYantra, Talk to a teacher, MOODLE, mobile apps, etc.

Unit V : Skills of Teaching and Technology based assessment

Teaching skills: Definition, Meaning and Nature- Types of Teaching Skills: Skill of Set Induction, Skill of Stimulus Variation, Skill of Explaining, Skill of Probing Questions, Skill of Black Board Writing and Skill of Closure – Integration of Teaching Skills – Evaluation of Teaching Skills- **Technology for Assessment:** Concept of assessment and paradigm shift in assessment; role of
technology in assessment 'for' learning; tools for self & peer assessment (recording devices; e-rubrics, etc.); online assessment (open source software's; e-portfolio; quiz makers; e- rubrics; survey tools); technology for assessment of collaborative learning like blogs, discussion forums; learning analytics.

BOOKS FOR REFERENCES:

1. Bela Rani Sharma (2007), Curriculum Reforms and Teaching Methods, Sarup and sons, New Delhi
2. Brandon Hall , E-learning, A research note by Namahn, found in: www.namahn.com/resources/ .../note-e-learning.pdf, Retrieved on 05/08/2011
3. Don Skinner (2005), Teacher Training, Edinburgh University Press Ltd., Edinburgh
4. Information and Communication Technology in Education: A Curriculum for schools and programmed of Teacher Development, Jonathan Anderson and Tom Van Weart, UNESCO, 2002.

5. Jereb, E., & Šmitek, B. (2006). Applying multimedia instruction in elearning. Innovations in Education & Teaching International, 43(1), 15-27.
6. Kumar, K.L. (2008) Educational Technology, New Age International Publishers, New Delhi.
7. Learning Management system : https://en.wikipedia.org/wiki/Learning_management_system , Retrieved on 05/01/2016
8. Mangal, S.K (2002) Essential of Teaching – Learning and Information Technology, Tandon Publications, Ludhiana.
9. Michael, D and William (2000), Integrating Technology into Teaching and Learning: Concepts and Applications, Prentice Hall, New york. 8
10. Pandey, S.K (2005) Teaching communication, Commonwealth Publishers, New Delhi.
11. Ram Babu, A abd Dandapani, S (2006), Microteaching (Vol.1 & 2), Neelkamal Publications, Hyderabad.
12. Singh, V.K and Sudarshan K.N. (1996), Computer Education, Discovery Publishing Company, New York.
13. Sharma, R.A., (2006) Fundamentals of Educational Technology, Surya Publications, Meerut
14. Vanaja, M and Rajasekar, S (2006), Computer Education, Neelkamal Publications, Hyderabad.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**Mean Score of COs**
CO1	2	1	2	2	2	3	2	2	3	2	2.63
CO2	2	2	2	1	2	2	3	2	2	2	2.50
CO3	2	1	3	3	2	3	2	3	2	3	3.00
CO4	1	4	3	3	2	3	2	2	3	3	3.25
CO5	2	1	2	3	3	2	3	2	3	3	3.00
Mean Overall Score (High Level Relationship between COs and POs)											2.88

Semester Question paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD COE

RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)

THANJAVUR -613005

GUIDE PAPERS

Credits : 4 **Code: T1MCS4A**
Exam Hours : 3
Medium of instruction: English

M.Phil(Computer Science) - Semester 1
(For students admitted from 2023 -2024 onwards)

DATA MINING CONCEPTS AND TECHNIQUES

OBJECTIVES:

- *To understand the fundamental processes, concepts and techniques of data mining*
- *To emphasis on classification, clustering and association rule mining*
- *To develop the ability to select methods and techniques appropriate for a given data mining problem.*

OUTCOMES:

CO's	CO–Statements	Cognitive Levels
	On successful completion of this course, students will be able to	
CO–1	Understand the basic concepts of data mining and its needs.	K1
CO–2	Demonstrate the functionalities of Association rule mining	K2
CO–3	Express the various clustering algorithms	K3
CO–4	Understand how the high dimensional data are clustered.	K4
CO–5	Apply the SVM algorithms in the applications.	K5

UNIT I

Introduction to Data Mining: Data mining - data mining functionalities; data pre-processing - data cleaning; missing values -data cleaning as a process; data integration and transformation; data reduction: data cube aggregation - attribute subset selection - dimensionality reduction - numerosity reduction, principal component analysis; data discretization and concept hierarchy generation for numerical and categorical data.

UNIT II

Association Rule Mining and Multirelational Data Mining : Basic Concepts and a road Map; Frequent- set Mining Methods: Apriori Algorithm and FP growth; From Association Mining to correlation analysis. **Graph mining**– mining frequent subgraphs, mining alternative substructure patterns, substructure similarity search in graph databases, community mining from multi-relational networks, multi-relational data mining

UNIT III

Clustering Analysis : Basic concepts and methods: Requirement of Clustering in Data Mining, Similarity and Distance Measures; Partitioning algorithms: k-means clustering, Nearest Neighbour, A Centroid Based Technique,Hierarchical clustering, BIRCH, Density-based methods, model-based clustering methods, outlier analysis.

UNIT IV

Advanced Cluster Analysis : Probabilistic Model-Based Clustering: Fuzzy Clusters, Expectation, Maximiztion Algorithms, Clustering High Dimensional Data: Subspace Clustering Methods, Bi-Clustering, Dimensionality Reduction Methods and Spectual Clustering, Clustering Graph and Network Data: Similarity Measures, Graph Clustering Methods, Clustering with Constraints.

UNIT IV

Classification Methods : Issues in classification; Naïve Bayesian classifier; Decision Tree; Rule Based Classification; Support Vector Machines; maximal margin classifier; Linearly separable and linearly inseparable cases; Classifier Accuracy Measures and methods to improve accuracy. Lazy learners – k-nearest neighbours, case-based reasoning.

BOOK FOR STUDY:

Han, J and Kamber, M. Data Mining: Concepts and Techniques. Morgan Kaufmann Publications, 3e, 2011.

BOOKS FOR REFERENCE:

1. Wang, J. T. L. Data Mining In Bioinformatics. Springer, UK, 1e, 2004.
2. Dunham, M.H. Data Mining - Introductory and Advanced Topics. Prentice Hall, 1e, 2002.
3. Alpaydin, E. Introduction to Machine Learning. MIT Press, 2e, 2010.

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Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	1	2	2	2	3	2	2	1	2	2.38
CO2	1	2	2	1	2	2	1	2	1	2	2.00
CO3	2	1	3	3	2	3	2	3	2	3	3.00
CO4	1	4	3	3	2	1	2	2	3	3	3.00
CO5	2	1	2	3	3	2	2	2	3	3	2.88
Mean Overall Score (High Level Relationship between COs and POs)											2.65

Semester Question paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD COE

Credits : 4 **Code: T1MCS4B**
Exam Hours : 3
Medium of instruction: English

M.Phil(Computer Science) - Semester 1
(For students admitted from 2023 -2024 onwards)

CLOUD COMPUTING

Objectives:

- *To provide students with the fundamentals and essentials of Cloud Computing.*
- *To provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.*
- *To enable students exploring some important cloud computing driven commercial systems and applications.*
- *To expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.*
- *Analyze various cloud programming models and apply them to solve problems on the cloud.*

Outcomes:

CO's	CO–Statements	Cognitive Levels
	On successful completion of this course, students will be able to	
CO–1	Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing	K1
CO–2	Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost	K2
CO–3	Identify resource management fundamentals, i.e. resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing	K3
CO–4	Demonstrate how to manage and schedule cloud resources	K4
CO–5	Develop applications for cloud computing	K5

UNIT I

Introduction to Cloud Computing: Roots of Cloud Computing - Layers and Types of Cloud – Features of a Cloud-Infrastructure Management-Cloud Services-Challenges and Risks. Migrating into a Cloud: Introduction - Broad Approaches – Seven Step Model. Integration as a Service-Integration Methodologies - SaaS.

UNIT II

Infrastructure as a Service: Virtual Machines-Layered Architecture-Life Cycle-VM Provisioning Process- Provisioning and Migration Services. Management of Virtual Machines Infrastructure -Scheduling Techniques. Cluster as a Service-RVWS Design-Logical Design. Cloud Storage - Data Security in cloud Storage- Technologies.

UNIT III

Platform and Software as a Service: Integration of Public and Private Cloud- Techniques and Tools-Framework ArchitectureResourceProvisioning Services - Hybrid Cloud. Cloud based solutions for Business Applications- Dynamic ICT services-Importance of quality and Security in clouds-Dynamic Data Center-case studies. Workflow Engine in the cloud – Architecture - Utilization.Scientific Applications for cloud – Issues – Classification – SAGA – Map Reduce Implementation.

UNIT IV

Cloud Resource Virtualization. Virtualization, Layering and Virtualization, Virtual machine monitors, Virtual Machines,Performance and Security Isolation, Full Virtualization and Paravirtualization, Hardware support for Virtualization.

UNIT V

Cloud Resource Management and Scheduling. Policies and Mechanism for Resource Management, Application of control theoryto task scheduling on acloud, Stability of a two-level Resource Allocation Architecture, Scheduling Algorithms forComputing Clouds, Resource Management and Dynamic Scaling.

BOOKS FOR STUDY:

1. RajkumarBuyya, James Broberg, and AndrzejGoscinski :*Cloud Computing Principles and Paradigms*, John Willey & Sons, Inc, 2011.
2. Dan C Marinescu: *Cloud Computing Theory and Practice*. Elsevier(MK)2013.

BOOKS FOR REFERENCE:

1. George Reese, ―*Cloud Application Architectures*, O'Reilly Media, Inc, First Edition, 2009.
2. Michael Miller, ―*Cloud Computing: Web based Applications That Change the Way You Work and Collaborate Online*, QUE Publishing, 2009.

RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)

THANJAVUR -613005

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	1	2	2	2	2	2	2	1	2	2.25
CO2	1	1	2	1	2	2	1	3	3	2	2.25
CO3	2	1	1	2	2	3	2	3	3	1	2.50
CO4	1	4	3	3	1	1	2	3	2	3	2.88
CO5	2	1	2	3	3	2	2	2	3	2	2.75
Mean Overall Score (High Level Relationship between COs and POs)											2.53

Semester Question paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD COE

Credits : 4 **Code: T1MCS4C**
Exam Hours : 3
Medium of instruction: English

M.Phil(Computer Science) - Semester 1
(For students admitted from 2023 -2024 onwards)

NETWORK SECURITY

Objectives:

- *To understand the security attacks and techniques to overcome attacks*
- *To highlight the principles of block ciphers and encryption standards*
- *To know about public key encryption and hash functions*
- *To learn about authentication applications*
- *To understand various mechanism for system security*

Outcomes:

CO's	CO–Statements	Cognitive Levels
	On successful completion of this course, students will be able to	
CO–1	Explain the different types of attacks	K1
CO–2	Elaborate the techniques used to prevent from attacks	K2
CO–3	Elaborate the encryption techniques in various levels	K3
CO–4	Explication how to authenticate the application through various mechanisms	K4
CO–5	Provide best solutions for network security.	K5

UNIT I

Introduction: Security Trends – The OSI Architecture – Security Attacks – Security Services – Security Mechanisms – A model for Network Security – Classic Encryption Techniques – Symmetric Cipher Model – Substitution Techniques – Transposition techniques – Rotor Machines – Stegnography.

UNIT II

Block Ciphers and Data Encryption Standards: Block Cipher - Principles - Data Encryption Standard – The strength of DES – Differential and Linear Cryptanalysis – Block Cipher design principles – Advanced encryption Standard – The AES Cipher

UNIT III

Public Key Encryption and Hash functions: Principles of Public Key Crypto Systems – The RSA algorithm – Message Authentication – Authentication Requirements – Authentication Functions – Message Authentication codes – Hash Functions – Security of Hash Functions and MAC - Whirlpool – HMAC – CMAC – Digital Signatures – Authentication Protocols – Dig ital Signature standard

UNIT IV

Authentication Applications: Kerberos – X.509 Authentication Service – PKI – Electronic Mail Security - Pretty Good Piracy – S/MIME – IP Security – IP Security Overview – IP

Security Architecture – Authentication Header – Key Management – Web Security – Web Security ConsiderationsSSL and Transport Layer Security

UNIT V

System Security: Intruders – Intrusion Detection – Password Management – Viruses – DOS and DDOS Attacks – Firewalls – Firewall Design Principles – Trusted Systems – IT Security Evaluation

Text Book:

William Stallings, ―Cryptography and network Security – Principles and Practices‖, Prentice Hall (Pearson Education), Fourth Edition, 2006

Reference Book:

Atul Kahate, ―Cryptography and Network Security‖, Tata MgGraw Hill Publications, New Delhi.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	1	2	2	2	2	2	2	1	2	2.25
CO2	1	1	2	1	2	2	1	3	3	2	2.25
CO3	2	1	3	2	2	3	2	3	3	1	2.75
CO4	1	4	3	3	2	1	2	3	2	3	3.00
CO5	2	1	2	3	3	2	2	2	3	2	2.75
Mean Overall Score (High Level Relationship between COs and POs)											2.60

Semester Question paper Pattern:

Maximum Marks: 75 Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD COE

Credits : 4 **Code: T1MCS4D**
Exam Hours : 3
Medium of instruction: English

M.Phil(Computer Science) - Semester 1
(For students admitted from 2023 -2024 onwards)

BIG DATA ANALYTICS

COURSE OBJECTIVES:

- *To understand fundamentals for bigdata and its issues*
- *To highlight the features about NoSQL*
- *To know about big data analytics and its functions*
- *To learn about Hadoop architecture*
- *To understand the fundamentals of Map-Reduce and HBase*

COURSE OUTCOMES:

CO's	CO–Statements	Cognitive Levels
	On successful completion of this course, students will be able to	
CO–1	Explain the various sources of bigdata and its characteristics	K1
CO–2	Know how to store and access data using NoSQL	K2
CO–3	List the list of big data analytics and their functions	K3
CO–4	Use Hadoop and Map-Reduce to manage big data issues	K4
CO–5	Understand how to manage bigdata issues effectively	K5

UNIT I

Fundamentals of Big Data **:** The Evolution of Data Management – Understanding the waves of Managing Data – Defining Big Data – Building a Successful Big Data Management Architecture – Examining Big Data Types : Defining Structured Data – Defining Unstructured Data – Looking at Real Time and Non Real Time Requirements - Operational Databases – Organizing Data Services and Tools – Analytical Data Warehouses – Big Data Analytics – Big Data Applications.

UNIT II

No SQL Management: Introduction to NOSQL – Difference between SQL and NOSQL-Types of NOSQL Databases-NOSQL Data Model-relational vs Aggregate Data Models – Schema less Map-Reduce – Partitioning and Combining – Composing Map-Reduce Calculations

UNIT III

Big Data Analyitics : Defining Big Data Analytics : Using Big Data to get Results – Modifying Business Intelligence Products to Handle Big Data – Studying Big Data Analytics Examples – Big Data Analytics Solutions – Understanding Text Analytics and Big Data : Exploring Unstructured Data – Analysis and Extraction Techniques – Putting Results Together with

Structured Data – Putting Big Data to use – Text Analytics Tools for Big Data – Customized Approaches for Analysis of Big Data : Characteristics of a Big Data Analysis Framework.

UNIT IV

Basics Of Hadoop**:** Introduction to Hadoop - Hadoop Architecture- Map Reduce in Hadoop - Data format – Analyzing Data with Hadoop - Design of Hadoop Distributed File System (HDFS) – HDFS Concepts

UNIT V

Map Reduce **:** MapReduce Fundamentals : Tracing the Origins of MapReduce - Understanding the map Function - Adding the Reduce Function - Putting Map and Reduce Together - Optimizing MapReduce Tasks - Exploring - Building a Big Data Foundation with the Hadoop Ecosystem - Storing Big Data with HBase - Mining Big Data with Hive -Interacting with the Hadoop Ecosystem.

BOOKS FOR REFERENCE:

1. Michael Minelli, Michele Chambers, AmbigaDhiraj ,“Big Data, Big Analytics”,
2. John Willey , 2013 2. Chris Eaton, Dirk Deroos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, Tata McGraw Hill Education, 2012
3. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
4. Richael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
5. Tom White, "Hadoop:The Definitive Guide", Third Edition, O'Reilley, 2012.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	1	2	2	2	2	2	2	1	2	2.25
CO2	1	1	2	1	2	2	1	2	3	2	2.13
CO3	2	1	3	2	2	3	2	3	2	3	2.88
CO4	1	4	3	3	2	1	2	3	3	3	3.13
CO5	2	1	2	3	3	2	2	2	3	2	2.75
Mean Overall Score (High Level Relationship between COs and POs)											2.63

Semester Question paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD COE

Credits : 8 **Code: T2MCSD**
Medium of instruction: English

M.Phil(Computer Science) - Semester 2
(For students admitted from 2023 -2024 onwards)

CORE COURSE –V THESIS AND VIVA VOCE

COURSE OBJECTIVES:

- To should know about what is research
- To learn about how to solve a research problem
- To understand any statistical analysis
- To know the various stages of thesis development

COURSE OUTCOMES:

CO's	CO–Statements	Cognitive Levels
	On successful completion of this course, students will be able to	
CO–1	Understand how to do research	K1
CO–2	Describe the findings into descriptive form using various diagrams	K2
CO–3	Develop the software tool to implement and check the findings	K3
CO–4	Do testing with various data sets	K4
CO–5	Develop knowledge how to do research in various domain	K5

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	2	2	1	2	2	2	2	2.50
CO2	2	2	2	1	3	2	3	2	2	2	2.63
CO3	2	3	3	2	2	3	3	2	2	1	2.88
CO4	1	4	3	3	2	3	3	2	1	3	3.13
CO5	2	2	2	3	3	2	3	2	1	2	2.75
Mean Overall Score (High Level Relationship between COs and POs)											2.78

Evaluation of Thesis

Evaluation of thesis: 75 Marks Viva voce: 25 Marks

Signature of the HOD COE