SRI MEENAKSHI GOVT. ARTS COLLEGE FOR WOMEN
(AUTONOMOUS)
MADURAI – 625 002.

DEPARTMENT OF COMPUTER APPLICATIONS

M.Phil. COMPUTER APPLICATION

SYLLABUS INTRODUCED FOR THE ACADEMIC YEAR
2019 – 2020

OUTCOME BASED EDUCATION

UNDER C.B.C.S.

SRI MEENAKSHI GOVT ARTS COLLEGE FOR WOMEN
(AUTONOMOUS)
DEPARTMENT OF COMPUTER APPLICATIONS
(Academic year 2019-20 onwards)

DEPARMENT NAME: COMPUTER APPLICATIONS

INTRODUCTION

The Department of Computer Applications blossomed in the year 1998 offering Master of Computer Applications course approved by AICTE. In August 2018 B.C.A course was started. The Department has an enterprising faculty team of 3 Assistant Professors, 2 Guest faculties and 1 Programmer. It has more than 100 research publications to its credit. They contribute their share of knowledge to academic community through Invited Talks and Paper presentations in National / International Conferences. The Department takes continuous efforts in upgrading the course content and enhancing students skills.

COURSES OFFERED:

- **B.C.A**
- **M.C.A**
- **M.Phil. COMPUTER APPLICATIONS**

VISION

Enabling Students to become enterprising Academicians, Young Entrepreneurs and Responsible Citizens.

MISSION

Imparting Quality Knowledge and Essential Virtues Treading Towards Holistic Development.

PROGRAMME OUTCOME (PO) of M.Phil.

At the end of the programme, the students will be able to:

PO1: Apply the concepts of computing in various research domains

PO2: Use machine learning to resolve environmental issues.

PO3: Practice professional ethics to accomplish holistic development.

PO4: Enhance the quest for lifelong learning.

PO5: Apply knowledge of Computing, in all the fields of learning including higher research and its extensions.

Programme Specific Outcome (PSO) of M.Phil.

PSO 1: To pursue qualitative research in the field of computing.

PSO 2: To assimilate computing ideas in various domains

PSO 3: To improve research skills and innovations.

PSO 4: To instill virtues and social responsibility.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.Phil. Computer Application Syllabus – OBE-CBCS
(For those who are admitted from June 2019 onwards)

	Sub. Code	Title of the Paper	Marks			Credits
			Int.	Ext	Total	
I – Semester						
Core Paper-1	MPCA1	Research Methodology	40	60	100	5
Core Paper-2	MPCA2	Information Security	40	60	100	5
Elective Papers			40	60	100	5
Option-1	MPCE1	Mobile Communications				
Option-2	MPCE2	Data Mining and Warehousing				
Option-3	MPCE3	Digital Image processing and Machine Vision				
Option-4	MPCE4	Grid and Cloud Computing				
II – Semester						
	MPCPW	Dissertation and Viva-voce	25	75	100	21
Total					400	36

(This syllabus will come into effect from the Academic Year 2019-2020 onwards)

- The programme will consist of two semesters with 36 credits.
- In the First Semester there will be three papers, with 5 credits each.

a. Research Methodology
b. Information Security
c. Elective Course related to the Dissertation Work

In the Second Semester the students will have to do a dissertation with 21 credits

The last date for the submission of dissertation is on or before 31st July. Attendance is compulsory. Fieldwork and library visits pertaining to research can be done with prior permission.

Current Assessment for Semester I

Two Monthly Tests	:	2 x 10 = 20 Marks
Model Exam	:	1 x 10 = 10 Marks
Seminar and Assignment	:	10 Marks
Total	:	40 Marks

Question paper Pattern for Core and Elective Courses :

Students will answer five essay questions out of 10, in 1200 words each.

Duration of examination : 3 Hours

Maximum Marks : 60 Marks

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DEPARTMENT OF COMPUTER APPLICATIONS

M.Phil. Degree Model Question Paper

B L U E P R I N T

UNIT / PART	A
I	2
II	2
III	2
IV	2
V	2

PART-A 5 x 12 = 60 (5 out of 10)

Total Marks = 60

Programme : M.Phil. **Part III: Core**
Semester : I **Hours : 6 P/W 90 Hrs P/S**
Sub. Code : MPCA1 **Credits : 5**

TITLE OF THE PAPER: Research Methodology

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	6	2	1	1	2

PREAMBLE:

1. To impart the thesis writing skills.
2. To improve the problem solving skills.
3. To focus research tools and techniques.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: Understand the elements of thesis writing.	1	18
UNIT 2 CO2: Apply the concept of data structures for NP Complete Problems.	2	18
UNIT 3 CO3: Study the principles of formal languages and finite automata.	3	18
UNIT 4 CO4: Acquire the basics of Probability	4	18
UNIT 5 CO5: Design and develop programs using MATLAB and R	5	18

SYLLABUS

UNIT I: Basic Elements: Thesis Elements – Paper Elements – Order of Thesis and Paper Elements – Concluding Remarks – Identification of the Author and His Writing: Author's Name and Affiliation – Joint Authorship of a Paper: Genuine Authorship and Order of Authors. Identification of Writing: Title, Keyboards, synopsis, preface and abstract – Typical Examples. Chapters and Sections: Introductory Chapters and Section – Core Chapters and Sections. Text-Support materials: Figures and Tables – Mathematical Expressions and Equations – References – Appendixes and Annexure – Listing of Materials. Numbering of elements: Pagination – Numbering of Chapters, Sections and Subsections – Numbering of figures and Tables – Equation Numbering – Appendix Numbering – Reference Numbering.

UNIT II: Elementary data structures – Greedy method: Knapsack problem – job sequencing with deadlines – Optimal merge patterns. Dynamic Programming: Multistage graphs – Optimal binary search trees – 0/1 Knapsack – Reliability design – The traveling salesman problem – Flow shop scheduling – Basic search and traversal techniques: The Techniques for Code Optimization. Bi-connected components and depth – first search. Backtracking the 8 – Queens problem – Sum of subsets – Hamiltonian cycles – Knapsacks Problem.

UNIT III: Formal Languages and Finite Automata: Context free Grammars – Derivation Trees simplification of context free grammars – Chomsky normal forms – Greiback Normal Forms – The Pumping Lemma for

context free Languages.
Finite State systems: Basic Definitions – Non-Deterministic Finite Automata(NFA) – Finite Automata with Epsilon Moves – Regular Expression – Applications of Finite Automata (Stress on theorem statement and problems only)

UNIT IV: : Decision Making: Introduction – Baye's Theorem – Multiple Features – Conditionally Independent Features – Decision Boundaries – Unequal Costs of Error – Estimation of Error Rates – The Leaving – One – Out Technique – Characteristic Curves – Estimating the Composition of Populations – Problems – Clustering: Introduction – Hierarchical Clustering – Partitioned Clustering – Problems.

UNIT V: Matlab and R Tools

TEXT BOOKS:

1. B.N. Basu, "Technical Writing", PHI. Pvt. Ltd., New Delhi, 2007. (chapters : 4,5,6,7 and 8).
2. Alfred V. Aho. John E. Hopcroft, Jeffrey D. Ullman," Data Structures and Algorithms, Addison Wesley Publishing Company, 1987.
3. Ellis Horowitz Sartaj Sahini. "Fundamentals of Computer Algorithms", Galgotia Publications(P), Ltd., 1993.
4. Earl Gose, Richard Johnson Baugh, Steve Jost, "Pattern Recognition and Image Analysis" – PHI, 1997. (chapters: 3,5).
5. S.N.Sivanantham, S.Sumathi, S.N. Deepa – Introduction to Neural Networks using Matlab 6.0, TMH, 2008 (chapters:12.13 – 15.5).

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1			
	Basic Elements: Thesis Elements – Paper Elements – Order of Thesis and Paper Elements – Concluding Remarks – Identification of the Author and His Writing: Author's Name and Affiliation	6	Lecture
	Joint Authorship of a Paper: Genuine Authorship and Order of Authors. Identification of Writing: Title, Keyboards, synopsis,	2	Peer teaching

	preface and abstract – Typical Examples. Chapters and Sections: Introductory Chapters and Section – Core Chapters and Sections	2	Videos
	Text-Support materials: Figures and Tables – Mathematical Expressions and Equations – References – Appendixes and Annexure – Listing of Materials. Numbering of elements: Pagination – Numbering of Chapters, Sections and Subsections – Numbering of figures and Tables – Equation Numbering – Appendix Numbering – Reference Numbering.	8	ICT
UNIT 11			
	Elementary data structures – Greedy method: Knapsack problem – job sequencing with deadlines – Optimal merge patterns.	6	Lecture
	Dynamic Programming: Multistage graphs – Optimal binary search trees – 0/1 Knapsack – Reliability design – The traveling salesman problem – Flow shop scheduling	4	Peer teaching
	Basic search and traversal techniques: The Techniques for Code Optimization. Bi-connected components and depth – first search. Backtracking the 8 – Queens problem – Sum of subsets –	8	ICT

	Hamiltonian cycles – Knapsacks Problem.		
UNIT III			
	Formal Languages and Finite Automata: Context free Grammars – Derivation Trees simplification of context free grammars – Chomsky normal forms – Greiback Normal Forms – The Pumping Lemma for context free Languages.	6	Lecture
	Finite State systems: Basic Definitions – Non-Deterministic Finite Automata(NFA) – Finite Automata with Epsilon Moves – Regular Expression – Applications of Finite Automata (Stress on theorem statement and problems only)	9	Peer teaching
		3	videos
UNIT IV			
	Decision Making: Introduction – Baye's Theorem – Multiple Features – Conditionally Independent Features – Decision Boundaries	12	Lecture
	Unequal Costs of Error – Estimation of Error Rates – The Leaving – One – Out Technique – Characteristic Curves – Estimating the Composition of Populations – Problems		
	Clustering: Introduction – Hierarchical Clustering – Partitioned Clustering – Problems.	6	Videos
UNIT V			

	Matlab and R Tools	14	ICT
		4	Videos

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)				Mean scores of Cos
	PO1	PO2	PO 3	PO4	PO5	PSO1	PSO2	PSO3	PSO 4	
CO1	3	4	2	5	5	4	4	4	3	3.8
CO2	5	3	1	3	4	3	4	4	2	3.2
CO3	3	4	2	5	5	4	4	4	2	3.7
CO4	4	3	1	5	4	3	4	4	2	3.3
CO5	5	3	2	4	3	4	5	5	2	3.7
Mean Overall Score										3.5

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$

Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Course Designer: Department of Computer Applications

Programme : M.Phil | **Part III: Core**
Semester : I | **Hours : 6 P/W 90 Hrs P/S**
Sub. Code : MPCA2 | **Credits : 5**

TITLE OF THE PAPER: INFORMATION SECURITY

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	6	2	1	1	2

PREAMBLE:

1. To focus Information security model.
2. To learn about working principles and challenges with various security algorithms.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: understand the basic techniques of Information Security.	1	18
UNIT 2 CO2: know the various encryption techniques and algorithms.	2	18
UNIT 3 CO3: learn about key management.	3	18
UNIT 4 CO4: Know about digital signatures and firewalls.	4	18
UNIT 5 CO5: Learn about electronic mail security.	5	18

SYLLABUS

UNIT I: History – What is Information Security – Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access. The SDLC The Security SDLC – Need for Security – Business Needs, Threats, Attacks, Legal, Ethical and Professional issues.

UNIT II: Introduction: Security Trends – The OSI Security Architecture – Security Attacks – Security Services – Security Mechanisms – A Model for Network Security – Classification Encryption Techniques. Symmetric Cipher Model – Substitution Techniques – Transposition Techniques – Steganography. Block Ciphers and the Data Encryption Standard : Block Cipher Principles – The Data Encryption standard – Advanced Encryption Standard: Evaluation Criteria for AES – The AES Cipher – More on Symmetric Ciphers: Multiple Encryption and Triple DES – Stream Ciphers and RC4 – Public-Key Cryptography and RSA: Principles of Public-Key Cryptosystems - The RSA Algorithm.

UNIT III: Key Management: Key Management – Diffie-Hellman Key Exchange- Elliptic Curve Arithmetic – Elliptic Curve Cryptography – Message Authentication and Hash Functions: Authentication. Requirements – Authentication Functions – Message Authentication Codes – Hash Functions – Security of Hash Functions and MACs – Hash and MAC Algorithms: Secure Hash Algorithm – HMAC – CMAC.

UNIT IV: Digital Signatures and Authentication Protocols: Digital Signatures – Authentication Protocols – Digital Signature Standard – Authentication Applications: Kerberos – X.509 Authentication Service – Public-Key Infrastructure – Firewalls: Firewall Design Principles – Trusted Systems.

UNIT V: Electronic Mail Security: Pretty Good Privacy – IP Security: IP-Security- Overview – IP Security Architecture – Authentication Header – Encapsulating Payload – Combining Security Associations – Key Management – Web Security: Secure Socket Layer and Transport Layer Security – Secure Electronic Transaction.

TEXT BOOKS:

1. William Stallings, Cryptography and Network Security Principles and Practices, Prentice-Hall of India, New Delhi, 4th Edition 2007.

REFERENCES:

1. William Stallings, Network Security Essentials: Applications and Standards, Pearson Education, Delhi, 2004.
2. Micki Krause, Harold F. Tiptott, Handbook of Information Security Management, vol-3 CRCPressLLC,2004.
3. Stuart Mc Clure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGrawHill,2003.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1			
\	History – What is Information Security – Critical Characteristics of Information, NSTISSC Security Model,	6	Lecture
	Components of an Information System, Securing the Components, Balancing Security and Access	6	Peer teaching
	The SDLC The Security SDLC – Need for Security – Business Needs, Threats, Attacks, Legal, Ethical and Professional issues	6	videos
UNIT 11			
	Introduction: Security Trends – The OSI Security Architecture – Security Attacks – Security Services – Security Mechanisms – A Model for Network Security – Classification	6	Lecture

	Encryption Techniques. Symmetric Cipher Model – Substitution Techniques – Transposition Techniques – Steganography.		
	Block Ciphers and the Data Encryption Standard : Block Cipher Principles – The Data Encryption standard – Advanced Encryption Standard: Evaluation Criteria for AES – The AES Cipher	4	Peer teaching
	More on Symmetric Ciphers:Multiple Encryption and Triple DES – Stream Ciphers and RC4 – Public-Key Cryptography and RSA: Principles of Public-Key Cryptosystems - The RSA Algorithm.	8	ICT
UNIT III			
	Key Management: Key Management – Diffie-Hellman Key Exchange-Elliptic Curve Arithmetic – Elliptic Curve Cryptography	6	Lecture
	Message Authentication and Hash Functions: Authentication. Requirements – Authentication Functions – Message jAuthentication Codes – Hash Functions – Security of Hash Functions and MACs	9	Peer teaching
	Hash and MAC Algorithms: Secure Hash Algorithm – HMAC – CMAC.	3	Videos
UNIT IV			
	Digital Signatures and	12	Lecture

	Authentication Protocols: Digital Signatures – Authentication Protocols – Digital Signature Standard		
	Authentication Applications: Kerberos – X.509 Authentication Service – Public-Key Infrastructure	4	Videos
	Firewalls: Firewall Design Principles – Trusted Systems.	2	Peer teaching
UNIT V			
	Electronic Mail Security: Pretty Good Privacy	9	Peer teaching
	IP Security: IP-Security-Overview – IP Security Architecture – Authentication Header – Encapsulating Payload – Combining Security Associations – Key Management	6	Lecture
	Web Security: Secure Socket Layer and Transport Layer Security – Secure Electronic Transaction.	14	ICT

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)				Mean scores of Cos
	PO1	PO2	PO 3	PO4	PO5	PSO1	PSO2	PSO3	PSO 4	
CO1	4	3	2	3	4	4	4	4	3	3.4
CO2	4	3	1	5	4	3	4	3	2	3.2
CO3	4	4	2	5	5	4	4	4	2	3.8
CO4	4	3	1	5	5	3	4	4	2	3.4
CO5	5	3	2	4	5	4	5	4	2	3.7
Mean Overall Score										3.5

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$

Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Course Designer: Department of Computer Applications

Programme : M.Phil. **Part III: ELECTIVE**
Semester : I **Hours : 6 P/W 90 Hrs P/S**
Sub. Code : MPCE1 **Credits : 5**

TITLE OF THE PAPER: MOBILE COMMUNICATIONS

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	6	2	1	1	2

PREAMBLE:

To enrich knowledge about Mobile Communications Concepts of:

- Several Media Access Schemes
- Different Wireless Communication Systems
- Mobile IP, the extension of the Internet Protocol into Mobile domain, Ad-hoc networks with these requirements for specific routing protocols & TCP.

WAP standard that enables Wireless and Mobile devices to use parts of the WWW from today's Fixed Internet

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: Gain the knowledge about various types of Wireless Data Networks and Wireless Voice Networks.	1	18
UNIT 2 CO2: Understand the architectures, the challenges and the Solutions of Wireless Communication those are in use.	2	18
UNIT 3 CO3: Realize the role of mobile networks.	3	18
UNIT 4 CO4: Learn about Transmission Control Protocol.	4	18
UNIT 5 CO5: Know about various protocols.	5	18

SYLLABUS

UNIT I: Medium Access Control – Motivation for Specialized MAC – SDMA – FDMA – TDMA – CDMA– Comparison of Access Mechanisms – Tele communications – GSM – DECT – TETRA – UMTS – IMT – 200 – Satellite Systems Basics – Routing – Localization – Handover – Broadcast Systems Overview – Cyclic Repetition of Data – Digital Audio Broadcasting – Digital Video Broadcasting.

UNIT II: Wireless LAN Infrared Vs Radio Transmission – Infrastructure Networks – Ad hoc Networks – IEEE 802.11 – HIPERLAN – Bluetooth – Wireless ATM Working Group – Services – Reference Model – Functions – Radio Access Layer – Handover – Location Management – Addressing Mobile Quality of Service – Access Point Control Protocol.

UNIT III: Mobile IP Goals – Assumptions and Requirement – Entities – IP Packet Delivery – Agent Advertisement and Discovery – Registration – Tunneling and Encapsulation – Optimization – Reverse Tunneling – IPv6 – DHCP – Ad hoc Networks.

UNIT IV: Traditional TCP – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit/ Fast Recovery – Transmission/ Timeout Freezing – Selective Retransmission – Transaction Oriented TCP.

UNIT V: Architecture – Datagram Protocol – Transport Layer Security – Transaction Protocol – Session Protocol – Application Environment – Wireless Telephony Application.

REFERENCES:

1. Jochen Schiller, Mobile Communications, Second Edition, Addison Wesley, 2003 (Eleventh Impression, 2013)
2. William Stallings, Wireless Communication and Networks, Pearson Education, 2005.
3. Singhal, WAP: Wireless Application Protocol, Pearson Education, 2003.
4. Lother Merk, Martin S. Nicklaus and Thomas Stober, Principles of Mobile Computing, 2nd Edition, Springer, 2003.
5. William C. Y. Lee, Mobile Communication Design Fundamentals, John Wiley, 1993.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1			
	Medium Access Control – Motivation for Specialized MAC – SDMA – FDMA – TDMA – CDMA– Comparison of Access Mechanisms – Tele communications – GSM – DECT – TETRA – UMTS – IMT – 200 – Satellite Systems Basics – Routing – Localization – Handover – Broadcast Systems Overview – Cyclic Repetition of Data – Digital Audio Broadcasting – Digital Video Broadcasting.	6	Lecture
		8	ICT
		2	Peer teaching
		2	Videos
UNIT 11			
	Wireless LAN Infrared Vs Radio Transmission –	6	Lecture

	Infrastructure Networks – Ad hoc Networks – IEEE 802.11 – HIPERLAN – Bluetooth – Wireless ATM Working Group – Services – Reference Model – Functions – Radio Access Layer – Handover – Location Management – Addressing Mobile Quality of Service – Access Point Control Protocol.	4	Peer teaching
		8	ICT
UNIT III			
	Mobile IP Goals – Assumptions and Requirement – Entities – IP Packet Delivery – Agent Advertisement and Discovery – Registration – Tunneling and Encapsulation – Optimization – Reverse Tunneling – IPv6 – DHCP – Ad hoc Networks.	6	Lecture
		9	Peer teaching
		3	videos
UNIT IV			
	Traditional TCP – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit/ Fast Recovery – Transmission/ Timeout Freezing – Selective Retransmission – Transaction Oriented TCP.	12	Lecture
		6	Videos

UNIT V			
	Architecture – Datagram Protocol – Transport Layer Security – Transaction Protocol – Session Protocol – Application Environment – Wireless Telephony Application.	14	ICT
		4	Videos

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)				Mean scores of Cos
	PO1	PO2	PO 3	PO4	PO5	PSO1	PSO2	PSO3	PSO 4	
CO1	4	3	2	4	4	5	4	4	3	3.7
CO2	5	3	1	5	4	3	4	3	2	3.3
CO3	4	4	2	5	5	4	4	4	1	3.6
CO4	4	4	2	5	5	4	4	4	2	3.7
CO5	5	3	2	4	5	4	5	4	1	3.7
Mean Overall Score										3.6

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$

Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Course Designer: Department of Computer Applications

Programme : M.Phil. **Part III: ELECTIVE**
Semester : I **Hours : 6 P/W 90Hrs P/S**
Sub. Code : MPCE2 **Credits : 5**

TITLE OF THE PAPER: DATA MINING AND WAREHOUSING

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	6	2	1	1	2

PREAMBLE: To understand the essence of data warehousing and mining and explore the various underlying techniques. To focus applications and trends in Data Mining.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: Store voluminous data for online processing	1	18
UNIT 2 CO2: Preprocess the data for mining applications. Apply the association rules for mining the data.	2	18
UNIT 3 CO3: Design and deploy appropriate classification techniques. Cluster the high dimensional data for better organization of the data.	3	18
UNIT 4 CO4: Discover the knowledge imbibed in the high dimensional system. Evolve Multidimensional Intelligent model from typical system.	4	18
UNIT 5 CO5: Evaluate various mining techniques on complex data objects.	5	18

SYLLABUS

UNIT I: Introduction: What Is Data Mining? – What Kind of Data can be mined? - What Kind of Patterns can be mined? – Which Technologies are used? – Major Issues in Data Mining. Getting to know your data: Data Objects and Attribute Types – Basic Statistical Description of Data. Data Preprocessing: An Overview – Data Cleaning – Data Integration – Data Reduction – Data Transformation and Data Discretization. Data Warehousing and Online Analytical Processing: Basic Concepts – Data Warehouse Modeling: Data Cube and OLAP - Data Warehouse Implementation – Data Generalization by Attribute-Oriented Induction. Data Cube Technology: Data Cube Computation: Preliminary Concepts – Data Cube Computation Methods.

UNIT II: Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and methods: Basic Concepts – Frequent Item set Mining Methods – Which Patterns Are Interesting? – Pattern Evaluation Methods. Advanced Pattern Mining: Pattern Mining: A Road Map – Pattern Mining in Multilevel, Multidimensional Space – Constraint-Based Frequent Pattern Mining.

UNIT III: Classification: Basic Concepts – Decision Tree Induction – Bayes Classification Methods – Rule-Based Classification – Model Evaluation and Selection – Techniques to Improve Classification Accuracy. Classification: Advanced Methods: Bayesian Belief Networks – Classification by Back Propagation – Support Vector Machines – Classification Using Frequent Patterns – Lazy Learners (or

Learning From Your Neighbors) – Other Classification Methods – Additional Topics Regarding Classification.

UNIT IV: Cluster Analysis: Basic Concepts and Methods: Cluster Analysis – Partioning Methods – Hierarchical Methods – Density-Based Methods – Grid-Based Methods – Evaluation of Clustering. Outlier Detection: Outliers And Outlier Analysis – Outlier Detection Methods – Statistical Approaches – Proximity-Based Approaches – Clustering Based Approaches – Classification Based Approaches.

UNIT V: Data Mining Trends and Research Frontiers: Mining complex data types : Mining Sequence data: Time-Series, Symbolic Sequence and Biological Sequences – Mining Graphs and Networks – Mining Other Kinds of Data . Other Methodologies of Data Mining: Statistical Data Mining – Views on Data Mining Foundations – Visual and Audio Data Mining. Data Mining Applications: Data Mining for Financial Data Analysis - Data Mining for Retail and Telecommunication Industries - Data Mining in Science and Engineering - Data Mining for Intrusion Detection and Prevention - Data Mining and Recommender Systems. Data Mining and Society: Ubiquitous and Invisible Data Mining – Privacy, Security, and Social Impacts of Data Mining – Data Mining Trends.

TEXT BOOKS:

Data Mining Concepts and Techniques – Jiawei Han, Micheline Kamber & Jain Pei, Morgan Kaufmann Publishers, Third edition 2012.

REFERENCES:

1. Usama M. Farrad, Geogory Piatetsky – Shapiro, padhrai Smyth and Ramasamy Uthurusamy, "Advances in Knowledge Discovery and Data Mining", The M.I.T. press.
2. Ralph Kimball, "The Data Warehouse Life Cycle Toolhit", John Wiley & Sons Inc.
3. Sean Kelly, "Data warehousing in Action", John Wiley & Sons Inc.
4. K.P. Soman, "Shyam Diwakar, V. Ajay "Insights into data Mining", Theory and Practice, PHI Publications Eastern Economy Edition 6th Printing, 2012.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1			
	Introduction: What Is Data Mining? – What Kind of Data can be mined? - What Kind of Patterns can be mined? – Which Technologies are used? – Major Issues in Data Mining. Getting to know your data: Data Objects and Attribute Types – Basic Statistical Description of Data.	6	Black Board Lecture
	Data Preprocessing: An Overview – Data Cleaning – Data Integration		

	– Data Reduction – Data Transformation and Data Discretization. Data Warehousing and Online Analytical Processing: Basic Concepts – Data Warehouse Modeling: Data Cube and OLAP - Data Warehouse Implementation – Data Generalization by Attribute-Oriented Induction.	6	PPT
	Data Cube Technology: Data Cube Computation: Preliminary Concepts – Data Cube Computation Methods.	6	Peer teaching
UNIT 11			
	Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and methods:	5	PPT
	Basic Concepts – Frequent Item set Mining Methods – Which Patterns Are Interesting? – Pattern Evaluation Methods.	5	Lecture
	Advanced Pattern Mining: Pattern Mining: A Road Map – Pattern Mining in Multilevel, Multidimensional Space – Constraint-Based Frequent Pattern Mining.	8	ICT
UNIT III			
	Classification: Basic Concepts – Decision Tree Induction – Bayes Classification Methods – Rule-Based Classification – Model Evaluation and Selection – Techniques to Improve Classification Accuracy.	6	Lecture
	Classification: Advanced Methods: Bayesian Belief Networks – Classification by Back Propagation – Support Vector	6	PPT

	Machines		
	Classification Using Frequent Patterns – Lazy Learners (or Learning From Your Neighbors) – Other Classification Methods – Additional Topics Regarding Classification.	6	Lecture
UNIT IV			
	Cluster Analysis: Basic Concepts and Methods: Cluster Analysis – Partioning Methods – Hierarchical Methods – Density-Based Methods – Grid-Based Methods	6	Lecture
	Evaluation of Clustering. Outlier Detection: Outliers And Outlier Analysis – Outlier Detection Methods	6	PPT
	Statistical Approaches – Proximity-Based Approaches – Clustering Based Approaches – Classification Based Approaches.	6	Lecture
UNIT V			
	Data Mining Trends and Research Frontiers: Mining complex data types : Mining Sequence data: Time-Series, Symbolic Sequence and Biological Sequences – Mining Graphs and Networks – Mining Other Kinds of Data .	7	Lecture
	Other Methodologies of Data Mining: Statistical Data Mining – Views on Data Mining Foundations – Visual and Audio Data Mining. Data Mining Applications: Data Mining for Financial Data Analysis - Data Mining for Retail and Telecommunication Industries - Data Mining in Science and Engineering - Data Mining for Intrusion Detection and Prevention - Data Mining and Recommender	5	PPT

	Systems.		
	Data Mining and Society: Ubiquitous and Invisible Data Mining – Privacy, Security, and Social Impacts of Data Mining – Data Mining Trends.	6	Lecture

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)				Mean scores of Cos
	PO1	PO2	PO 3	PO4	PO5	PSO1	PSO2	PSO3	PSO 4	
CO1	5	3	2	4	5	5	4	4	2	3.7
CO2	5	3	1	5	4	3	4	3	2	3.3
CO3	5	4	2	5	5	4	4	4	1	3.8
CO4	4	4	2	4	5	5	4	5	2	3.7
CO5	5	3	2	4	5	4	5	4	1	3.7
Mean Overall Score										3.7

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$

Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Course Designer: Department of Computer applications

Programme : M.Phil. **Part III : ELECTIVE**
Semester : I **Hours : 6 P/W 90 Hrs P/S**
Sub. Code : MPCE3 **Credits :5**

TITLE OF THE PAPER: DIGITAL IMAGE PROCESSING AND MACHINE VISION

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	6	2	1	1	2

PREAMBLE:

- To understand the representation of digital images and apply the techniques in real time systems and applications.
- Analyze and implement Image processing algorithms.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: Understand the various steps in Digital image processing.	1	18
UNIT 2 CO2: Analyze about image transformation and filters.	2	18
UNIT 3 CO3: Learn about various image processing techniques.	3	18
UNIT 4 CO4: Acquire the knowledge on colour image processing.	4	18
UNIT 5 CO5: Know the applications of image processing.	5	18

SYLLABUS

UNIT I: Digital Image Processing: Origins of Digital Image Processing, Steps in Digital Image Processing, Digital Image Fundamentals: Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Basic Relationships between Pixels, Mathematical Tools used in Digital Image Processing.

UNIT II: Image Transformation & Filters: Basic Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial Filter, Sharpening Spatial Filters, Combining Spatial Enhancement methods, Fuzzy techniques for Intensity Transformation and Spatial Filtering. Filtering in the Frequency Domain: Preliminary Concepts, Sampling and the Fourier Transforms of Sampled Functions, The Discrete Fourier Transform (DFT), Properties of the 2-D DFT, Filtering in the Frequency Domain, Image Smoothing and Sharpening using Frequency Domain Filters, Selective Filtering.

UNIT III: Image Restoration, Reconstruction and Image Segmentation: Image Degradation/Restoration process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Functions, Inverse Filtering, Wiener Square Error Filtering, Constrained Least Square Filtering, Geometric Mean Filter, Image Reconstruction from Projections. Image Segmentation: Point, Line and Edge Detection, Thresholding, Region-Based Segmentation, Segmentation Using Morphological Watersheds, Use of Motion in Segmentation.

UNIT IV: Color Image Processing: Color Fundamentals, Color Models, Pseudocolor Image Processing, Full Color Image Processing, Color Transformation, Smoothing and Sharpening, Image Segmentation Based on Color, Noise in Color Images. Wavelets and Multiresolution Processing: Multiresolution Expansion, Wavelet Transforms in One Dimension, The Fast Wavelet Transforms, Wavelet Transforms in Two Dimensions, Wavelet Packets. Image Compression: Fundamentals, Basic Compression Methods, Digital Image Watermarking.

UNIT V: Morphological Image Processing: Erosion and Dilation, Opening and Closing, The Hit-Or-Miss Transformation, Basic Morphological Algorithms, Gray-Scale Morphology. Object Recognition: Patterns and Pattern Classes, Recognition Based on Decision-Theoretic Methods. Applications of Image Processing, Medical Image Processing, Remote Sensed Image Processing.
Machine Vision.

TEXT BOOKS:

1.Rafael C. Gonzalez, Richard E. Woods, “Digital Image Processing”, 3rd Edition, Pearson Education, 2008.

2. Rafael C. Gonzalez, Richard E. Woods, “Digital Image Processing using MATLAB”,2nd Edition, Prentice Hall of India, 2002.

3. E.R. Davies, Machine Vision-Theory Algorithms Practicalities, 3rd Ed. Elsevier. 2005.

REFERENCES:

1. A.Jain,”Fundamentals of Digital Image Processing”, Prentice Hall of India.

2. Milan Sonka, V. Hlavac and R. Boyle, *Image Processing Analysis and Machine Vision*,

Brooks/colic, Thompson Learning, 1999.

3. B. Chanda and D.D. Majumder, *Digital Image Processing and Analysis*, PHI
4. W.K. Pratt, *Digital Image Processing*, John Wiley, 2006
5. David Saloman, *Data Compression: The Complete Reference*, Springer
6. Ramesh C. Jain, Brian G. Schunck, Rangachar Kasturi, Macine Vision, McGraw-Hill, 1995.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1			
	Digital Image Processing: Origins of Digital Image Processing,	6	Lecture
	Steps in Digital Image Processing, Digital Image Fundamentals	2	Peer teaching
	Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization,	2	Videos
	Basic Relationships between Pixels, Mathematical Tools used in Digital Image Processing.	8	ICT
UNIT 11			
	Image Transformation & Filters: Basic Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial	6	Lecture

	Filter, Sharpening Spatial Filters, Combining Spatial Enhancement methods, Fuzzy techniques for Intensity Transformation and Spatial Filtering.	4	Peer teaching
	Filtering in the Frequency Domain: Preliminary Concepts, Sampling and the Fourier Transforms of Sampled Functions, The Discrete Fourier Transform (DFT), Properties of the 2-D DFT, Filtering in the Frequency Domain, Image Smoothing and Sharpening using Frequency Domain Filters, Selective Filtering.	6	Lecture
UNIT III			
	Image Restoration, Reconstruction and Image Segmentation: Image Degradation/Restoration process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Functions, Inverse Filtering, Wiener Square Error Filtering, Constrained Least Square Filtering, Geometric Mean Filter, Image Reconstruction from Projections.	6	Lecture

	Image Segmentation: Point, Line and Edge Detection, Thresholding, Region-Based Segmentation, Segmentation Using Morphological Watersheds, Use of Motion in Segmentation.	9	Peer teaching
		3	videos
UNIT IV			
	Color Image Processing: Color Fundamentals, Color Models, Pseudocolor Image Processing, Full Color Image Processing, Color Transformation, Smoothing and Sharpening, Image Segmentation Based on Color, Noise in Color Images.	12	Lecture
	Wavelets and Multiresolution Processing: Multiresolution Expansion, Wavelet Transforms in One Dimension, The Fast Wavelet Transforms, Wavelet Transforms in Two Dimensions, Wavelet Packets.		
	Image Compression: Fundamentals, Basic Compression Methods, Digital Image Watermarking.	6	Videos
UNIT V			
	Morphological Image Processing: Erosion and Dilation, Opening and Closing, The Hit-Or-Miss Transformation, Basic Morphological Algorithms, Gray-Scale Morphology.	14	ICT

	Object Recognition: Patterns and Pattern Classes, Recognition Based on Decision-Theoretic Methods. Applications of Image Processing, Medical Image Processing, Remote Sensed Image Processing.	4	Videos

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)				Mean scores of Cos
	PO1	PO2	PO 3	PO4	PO5	PSO1	PSO2	PSO3	PSO 4	
CO1	4	3	2	5	5	5	4	4	1	3.6
CO2	4	3	1	5	4	4	4	4	2	3.4
CO3	4	2	2	5	5	4	4	4	1	3.4
CO4	4	2	2	4	5	5	5	5	2	3.8
CO5	5	3	2	5	4	4	5	4	1	3.7
Mean Overall Score										3.6

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$

Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Course Designer: Department of Computer Applications

Programme : M.Phil **Part III: ELECTIVE**
Semester : I **Hours : 6 P/W 90Hrs P/S**
Sub. Code : MPCE4 **Credits :5**

TITLE OF THE PAPER: GRID AND CLOUD COMPUTING

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	6	2	1	1	2

PREAMBLE:

- To impart the knowledge on Grid and Cloud Computing Concepts.
- To focus Cloud computing services available under various platforms.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: learn about grid computing.	1	18
UNIT 2 CO2: know about various types of grid architecture.	2	18
UNIT 3 CO3: Acquire knowledge on cloud computing.	3	18
UNIT 4 CO4: Know about cloud hardware and infrastructure.	4	18
UNIT 5 CO5: Analyze various cloud computing services.	5	18

SYLLABUS

UNIT I: Introduction to Grid Computing-Anatomy and Physiology of Grid –Early Grid Activities – Current Grid Activities–Grid Standards -Grid Business Areas–Grid Challenges and Applications-Grid Computing Organization and their roles.

UNIT II: Service Oriented Architecture –Web Service Architecture –Grid Architecture – Implementing Grid Architecture-Globus Toolkit –Services -Open Grid Services Architecture –Grid Scheduling and Resource Management–Framework–Grid Resource Management Systems – Principles of Local Schedulers -Grid Scheduling with QoS –Data Management –Grid Security.

UNIT III: Cloud Computing –Overview –Applications-Intranets and the Cloud –Companies in the Cloud Today-Cloud Computing Services-On Demand Computing –Discovering Cloud Services-Development Services and Tools.

UNIT IV: Cloud hardware and infrastructure-clients-security-network-services-platforms-cloud storage - Cloud software architecture issues-Classification of Cloud Implementations.

UNIT V: Operating System for the Cloud -Application Patterns and Architecture –Case Studies-Cloud

Computing services available under various platforms.

TEXT BOOKS:

1. Josh Joseph, Craig Fellenstein, "Grid Computing", IBM Press, Pearson Education, 2004.
2. Ian Foster, Carl Kesselman (eds.),"The Grid: Blueprint for a New Computing Infrastructure" Morgan Kaufmann Publishers, 2004.
3. Ahmar Abbas, "Grid Computing: A Practical Guide to Technology and Applications, Firewall Media", 2009.
4. Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, "Cloud Computing –A Practical Approach", Tata McGraw Hill Education Pvt. Ltd, 2010.
5. Michael Miller," Cloud Computing: Web based Applications that change the way you work and Collaborate online", Que Publishing, August 2008.
6. Haley Beard,"Cloud Computing Best Practices for Managing and Measuring Processes for On demand computing, Applications and Data Centers in the Cloud with SLAs",Emereo Pvt. Ltd, July 2008.
7. Prof (Dr.) Andreas Polze, "A Comparative Analysis of Cloud Computing Environments".

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1			
	Introduction to Grid Computing-Anatomy and Physiology of Grid –Early Grid Activities —	6	Lecture
	Current Grid Activities–Grid Standards -Grid Business Areas	2	Peer teaching
	Grid Challenges and Applications-	2	Videos
	Grid Computing Organization and their roles.	8	ICT
UNIT 11			
	Service Oriented Architecture –Web Service Architecture – Grid Architecture – Implementing Grid Architecture-Globus Toolkit –Services -	6	Lecture

	Open Grid Services Architecture —		
	Grid Scheduling and Resource Management– Framework–Grid Resource Management Systems	4	Peer teaching
	Principles of Local Schedulers -Grid Scheduling with QoS –Data Management – Grid Security.	8	ICT
UNIT III			
	Cloud Computing – Overview – Applications-Intranets and the Cloud	6	Lecture
	Companies in the Cloud Today-– Cloud Computing Services-On Demand Computing	9	Peer teaching
	Discovering Cloud Services-Development Services and Tools.	3	videos
UNIT IV			
	Cloud hardware and infrastructure-clients-security-network-services-platforms-cloud storage -	12	Lecture
	Cloud software architecture issues-Classification of Cloud Implementations.	6	videos
UNIT V			
	Operating System for the Cloud - Application Patterns and Architecture –	14	ICT

	Case Studies-		
	Cloud Computing services available under various platforms.	4	Videos

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)				Mean scores of Cos
	PO1	PO2	PO 3	PO4	PO5	PSO1	PSO2	PSO3	PSO 4	
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CO2	5	3	1	5	4	4	5	5	2	3.8
CO3	4	2	2	5	5	4	4	4	1	3.4
CO4	4	2	2	4	5	5	5	5	2	3.8
CO5	5	3	2	5	4	4	4	4	2	3.7
Mean Overall Score										3.7

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
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BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Course Designer: Department of Computer Applications