

*Placed at the meeting of  
Academic Council  
held on 26.03.2018*

**APPENDIX - BD**  
**MADURAI KAMARAJ UNIVERSITY**  
*(University with Potential for Excellence)*  
**M.Phil. Computer Applications (Semester)**  
**(With effect from 2018-2019 onwards)**

**REGULATIONS AND SCHEME OF EXAMINATIONS**

**1. PREAMBLE**

The M.Phil. Programme is envisaged to contribute to the growth and development of the Computer Applications sector of the country. The course will create opportunities to share and disseminate computer applications researches and innovations by bringing about debates and discussions of topical importance to address critical computer applications issues.

M.Phil. is entirely based on research activities which are done in a specific direction to achieve great results. The degree stands between a master degree and Ph.D. degree and is associated to advanced research activities. First of all, the M.Phil. degree bestows us with advanced skills and knowledge and allows you to progress your learning into the area of arts or science.

**2. OBJECTIVES:**

- Appreciate that research would help to enhance efficiency, effectiveness, quality and excellence in the system of teacher computer applications.
- Develop an understanding about problems of computer applications and methodology to explore alternative solutions.
- Develop a rational conceptualization of the computer applications research.

**3. ELIGIBILITY FOR ADMISSION**

- A candidate with 55% in MCA is eligible for admission. There is 5 % relaxation for SC/ST candidates.

**4. PROCESS OF SELECTION**

The candidates aspiring for admission into Master of Philosophy in Computer Applications need to appear for an objective type entrance test followed by a personal interview. The candidates will be selected based on the merit-list and as per the guidelines for admission issued by the Government of Tamil Nadu.

## **5. DURATION**

The Course Shall be for duration of Twelve months – One full academic year Consisting of two semesters.

## **6. COURSE STRUCTURE**

There shall be three theory papers in first semester and a research dissertation work in second semester.

### **I Semester**

Paper I: RESEARCH METHODOLOGY

Paper II: INFORMATION SECURITY

Paper III: Elective Paper – one among the following

E1: DIGITAL IMAGE PROCESSING AND MACHINE VISION

E2. DATA MINING

E3. MOBILE COMPUTING

### **II Semester**

Dissertation and Viva-Voce.

## **7. EXAMINATION PATTERN**

The candidates of Master of Philosophy in Computer Applications will be assessed in the pattern of Internal assessments of 40 marks and External Examination of 60 marks. A Candidates has to secure a minimum of 50 percent of marks in internal and external put-together for a pass in the course.

### **8. Question Paper Pattern will have 2 parts namely, Part – A, Part – B**

#### **Part – A**

Five questions with internal choice from each unit, carrying Six Marks each (5 x 6 = 30)

#### **Part – B**

Three out of five questions, with questions from each unit, carrying 10 marks (3 x 10 = 30)

## **9. SCHEME**

1. The Programme will consist of two semesters.
2. In the I semester there will be three papers viz. 1. Research Methodology, 2. General Paper, 3. Elective Paper related to the project work (Each 100 marks with 60 external and 40 internal).
3. In the II semester the student has to do dissertation work (200 marks. Dissertation 150 and Viva-voce 20)
4. The Last date of Submission of dissertation is on or before 30<sup>th</sup> April.

## **10. DETAILED SYLLABUS**

### **PAPER I: RESEARCH METHODOLOGY**

#### **Unit – 1**

Basic Elements: Thesis Elements - Paper Elements - Order of Thesis and Paper Elements - Concluding Remarks - Identification of the Author and His Writing: Authors Name and Affiliation -Joint Authorship of a Paper: Genuine Authorship and Order of Authors. Identification of Writing: Title, keywords, 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-2**

Fuzzy Sets: Introduction - Basic Definitions and terminology - Set theoretic operations - MF formulation and parameterization - More in fuzzy union, intersection and complement. Fuzzy rules and fuzzy reasoning: Introduction - extension principle and fuzzy relations - fuzzy If-Then rules - fuzzy reasoning. Fuzzy Inference Systems: Introduction - Mamdani fuzzy models -Sugenofuzzy models- Tsukamoto models -Tsukamoto fuzzy models - Other considerations.

#### **Unit- 3**

Introduction to Artificial Neural Networks: Introduction - Artificial neural networks - historical development of neural networks - Biological neural networks - Comparison between the brain and the computer - Comparison between artificial neural networks - Artificial Neural Networks (ANN) terminologies. Fundamental Models of Artificial Neural Networks: Introduction – McCulloch - Pitts neuron model - Learning rules - Hebb Net. Perceptron Networks: Introduction - Single layer perceptron - Brief introduction to multilayer perceptron networks.

#### **Unit- 4**

Feed forward networks: Introduction - Back Propagation Network (BPN) - Radial Basis Function Network (RBFN). Self Organizing Feature Map: Introduction - Methods used for determining the Winner - Kohonen Self Organizing Feature maps (SOM) - Learning Vector Quantization - Max Net - Mexican Hat -Hamming Net.

#### **Unit- 5**

A gentle introduction to genetic algorithms - goals of optimization - A simple genetic algorithm - Genetic algorithms at work - Mathematical foundation - The fundamental theorem - Computer implementation of a genetic algorithm - Data structures - Reproduction, Crossover and mutation - Get with the main program - Mapping objective functions to fitness form - Codings. Rough sets – Information systems - indiscernibility and set approximation - reducts -Dependency rule generation.

**Case Studies:**Implementation of computing algorithms in R.

## **Text Books I References:**

1. J.S.R. Jang, C.T. Sun, E. Mizutani, 'Neuro - Fuzzy and Soft Computing: A computational Approach a Learning and Machine Intelligence', Pearson education, 2007. (Chapters: 2, 3, 4,)
- 2 S.N. Sivanandarn, S. Sumathi, S.N.Deepa, 'Introduction to Neural Network using MatLab 6.0', TMH, 2008. (Chapters: 2, 3, 4, 8, 9),
3. B.N. Basu, "Technical Writing", PHI, Pvt., Ltd., New Delhi, 2007. (Chapters: 4, 5, 6, 7, 8).
4. Aboul Ella Hassanien, Zbigniew Suraj, Dominik Slezak and Pawanlingras: Rough Computing, Theories, Technologies, and Applications, Information science reference, New York, 2008. (Unit V - Chapter 2).
5. Genetic Algorithms in Search Optimization and Machine Learning, David E. Goldberg, Pearson Education, 2007. (Chapters: 1, 2, 3)
6. <http://www.mas.ncl.ac.uk/~ndjwl/teaching/sim/R-intro.html>
7. <http://www.stat.berkeley.edu/~spector/R.pdf>
8. <http://cran.r-project.org/doc/manuals/R-intro.pdf>
9. [http://www.computerworld.com/s/article/9239625/Beginner\\_s\\_guide\\_to\\_R\\_Introduction](http://www.computerworld.com/s/article/9239625/Beginner_s_guide_to_R_Introduction)
10. <https://www.nceas.ucsb.edu/files/scicomp/Dloads/RProgramming/BestFirstRTutorial.pdf>
11. <http://trvr.codeschool.com/>

## **PAPER II: INFORMATION SECURITY**

### **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 Book**

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

#### **Reference Book**

- 1) William Stallings, Network Security Essentials: Applications and Standards, Pearson Education, Delhi, 2004.
- 2) Micki Krause, Harold F. Tipton, " Handbook of information Security Management", Voll-3CRCPressLLC, 2004.
- 3) Stuart Mc Clure Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 2003.
- 4) Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2002.

### **PAPER III: E1: DIGITAL IMAGE PROCESSING AND MACHINE VISION**

#### **Course Description**

Digital Image Processing takes the tremendous advances in technology and combines them with the powerful human ability to visualize and interpret data. Image processing expands the unique human ability to visualize and interpret data; scientists worldwide have recognized that DIP is an essential tool for education, research and technology.

## **Course Learning Outcome**

To understand the representation of digital images and apply the techniques in real time systems and applications.

Analyze and implement Image processing algorithms.

### **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", 3<sup>rd</sup> Edition, Pearson Education, 2008.
2. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing using MATLAB", 2<sup>nd</sup> Edition, Prentice Hall of India, 2002.
3. E.R. Davies, Machine Vision-Theory Algorithms Practicalities, 3<sup>rd</sup> Ed. Elsevier. 2005.

**Reference Books:**

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, *Machine Vision*, McGraw-Hill, 1995.

## **PAPER III: E2. DATA MINING**

**Unit I**

Introduction – Data Mining Functionalities – Classification of Data Mining Systems – Major Issues – Data Warehouse and OLAP Technology for Data Mining – Data Processing, Case Studies on OLAP, Data warehousing.

**Unit II**

Data Mining Primitives, Languages, and System Architecture – Concepts Description, Characterization and Comparison, case studies on Mining, semantic web mining.

**Unit III**

Mining Association Rules in Large Databases – Classification and Prediction, Analysis on classification and examples for predictions.

**Unit IV**

Cluster Analysis – Mining Complex types of data, cluster analysis, Project proposals.

**Unit V**

Applications and Trend in Data Mining, Mini Project proposal preparation on Data mining

**Text Books:**

Data Mining: Concepts and Techniques, Han. J and Kamber. M, Morgan Kaufmann Publishers, San Francisco, 2002.

### **Reference Books:**

1. Introduction to Data Mining, Herbert A. Edelstin, Springa Verlay, USA. First Edition, 2003
2. Principles of Data Mining (Adaptive Computation and Machine Tools), David J.Hand, Heikki Mannila, Padhraic Smyth, MIT Press, USA, 2001.
3. Data Mining with Microsoft SQL Server 2000, Deidman, Claude PHI New Delhi, 2000.

## **PAPER III: E3. MOBILE COMPUTING**

### **Unit I**

#### **Wireless Communication Fundamentals:**

Introduction – Wireless Transmission – Frequencies for radio transmission - signals – Antennas – Signal Propagation – Multiplexing – Modulations – Spread Spectrum – MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks.

### **Unit II**

#### **Telecommunication Systems:**

GSM – System Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Handover – Security – GPRS.

### **Unit III**

#### **Wireless Networks:**

Wireless LAN – IEEE 802.11 Standards – Architecture – Services – HIPER LAN – AdHoc Network – Blue tooth.

### **Unit IV**

#### **Network Layer:**

Mobile IP – Dynamic host Configuration Protocol – Routing – DSDV – DSR – AODV – ZRP – ODMR.

### **Unit V**

#### **Transport and Application Layers:**

TCP Over Wireless Networks – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery – Transmission / Timeout Freezing – Selective Retransmission – Transaction oriented TCP – WAP Architecture – WDP – WTLS – WTP – WSP – WML – WML Script – WAE – WTA.



**Textbooks:**

1. Mobile Communication, Jochen Schiller, Second Ed, Pearson Education 2003.
2. Wireless Communication and Networks, William Stallings, Second Ed, Prentice Hall of India / Pearson Education, 2004

**Reference Books:**

1. Principles of Wireless Networks, Kaveh Pahlavan, Prasanth Krishnamoorthy, Pearson Education, 2003.
2. Principles of Mobile Computing, Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, New York, 2003.
3. Adhoc Mobile Wireless Networks, C.K.Toh, Pearson Education, 2002.