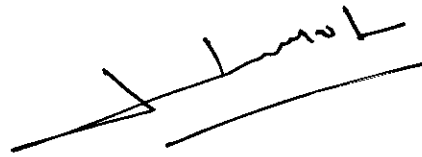


**Department of Computer Science & Application**  
**Bilaspur University, Bilaspur (C. G.)**  
Scheme and Syllabus

**Five Years Integrated B.Sc./M.Sc.(Computer Science)/ M.Sc. (Computer Science)**

**III<sup>nd</sup> Semester**

Course Code	Course Name	T	P/ T	C	Sessional Marks	End Semester Marks	Total Marks
MCS 901	Ad-Hoc Wireless Network	4	1	5	25	75	100
MCS 902	Big Data Analytics	4	1	5	25	75	100
MCS 903	Data warehousing and Data mining	4	1	5	25	75	100
MCS 904 (Elective)	(A) Graph Theory (B) Image Processing (C) Pattern Recognition	4	1	5	25	75	100
MCS 905	WEKA and Hadoop Lab	-	5	5	25	75	100



## MCS-901 Adhoc Wireless Network

### UNIT – 1

**Introduction:** Introduction to wireless Networks. Characteristics of Wireless channel, Ad hoc Networks: Introduction, Issues in Ad hoc wireless networks, Adhoc mobility models, applications.

### UNIT – 2

**MAC:** MAC Protocols for Ad hoc wireless Networks: Introduction, Issues in designing a MAC protocol for Ad hoc wireless Networks, Design goals of a MAC protocol for Ad hoc wireless Networks, Classification of MAC protocols, Contention based protocols with reservation mechanisms.

### UNIT –3

**MAC:** Contention-based MAC protocols with scheduling mechanism, MAC protocols that use directional antennas, IEEE standards: 802.11a, 802.11b, 802.11g, 802.15 and 802.16.

### UNIT – 4

**Routing :** Routing protocols for Ad hoc wireless Networks: Introduction, Issues in designing a routing protocol for Ad hoc wireless Networks, Classification of routing protocols, Proactive routing protocol, Reactive Routing protocol, Hybrid routing protocol, Hierarchical routing protocols, Power aware routing protocols.

### UNIT – 5

**Transport Layer:** Transport layer protocols for Ad hoc wireless Networks: Introduction, Issues in designing a transport layer protocol for Ad hoc wireless Networks, Design goals of a transport layer protocol for Ad hoc wireless Networks, Classification of transport layer solutions, TCP over Ad hoc wireless Networks.

### TEXT/REFERENCE BOOKS:

1. "Ad hoc Wireless Networks – Architectures and Protocols", C. Siva Ram Murthy and B.S.Manoj, Pearson Education, 2004
2. "Wireless Sensor Networks", Feng Zhao and Leonidas Guibas, , Morgan Kaufman Publishers, 2004.
3. "Adhoc Mobile Wireless Networks", C.K.Toh, Pearson Education, 2002.
4. 'Wireless Mesh Networking' Thomas Krag and Sebastin Buettrich, , O'Reilly Publishers, 2007.



## MCS-902 BIG DATA ANALYTICS

### UNIT- I

**Introduction** :Big Data and its importance, Characteristics of Big Data, What Comes Under Big Data, Who's Generating Big Data, Challenges in Handling Big Data, How Big Data Impact on IT, Big Data Analytics, Big data applications, Future of Big Data, Risks of Big Data.

### UNIT -II

**Introduction To Hadoop** :Introduction to Hadoop, Hadoop Architecture, Design Principles of Hadoop, Advantages of Hadoop, Hadoop Storage: Hadoop Distributed File System (HDFS), Properties of HDFS, NameNode, Secondary NameNode, DataNode, Goals of HDFS, Hadoop vs. Other Systems.

### UNIT III

**HADOOP MapReduce** :Hadoop MapReduce, MapReduce paradigm, Resource manager, Node manager, Partitioner, combiner.

### UNIT IV

**YARN** :Introduction to YARN, YARN Framework, Classic MapReduce Vs YARN, Schedulers: FIFO, Fair, Capacity.

### UNIT V

**HADOOP Ecosystem**: Spark, Hive, HBase, Pig, Sqoop, Oozie.

### TEXT/ REFERENCE BOOKS

1. "Professional Hadoop Solutions", Boris Iubinsky, Kevin t. Smith, Alexey Yakubovich, Wiley, 2015.
2. "Understanding Big data ", Chris Eaton, Dirk deRoos et al., McGraw Hill, 2012.
3. "HADOOP: The definitive Guide" , Tom White, O Reilly 2012.
4. "Big Data Analytics with R and Hadoop", Vignesh Prajapati, Packet Publishing 2013.
5. "Oracle Big Data Handbook", Tom Plunkett, Brian Macdonald et al , Oracle Press, 2014.
6. <http://www.bigdatauniversity.com/>
7. "Big Data and Business analytics", Jy Liebowitz, CRC press, 2013.

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## MCA-903 Data Mining and Data Warehousing

### UNIT-I

**Introduction:** What is data mining, Why it is important ?, Mining on what kind of data, Data mining Functionalities, steps of data mining, Knowledge discovery.

### UNIT-II

**Data Warehouse:** Meaning, Definition, OLTP Vs. OLAP, Data warehouse architecture, , Data cube and OLAP technology

### UNIT-III

**Association Rule:** Basic concept, Frequent item set mining: Apriori algorithm etc., Mining various kind of association rules: Mining Multilevel association rules, Mining multidimensional association rules

### UNIT-IV

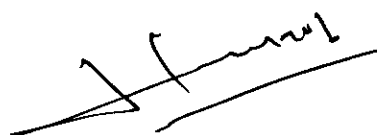
**Classification and prediction:** What is classification and prediction? , Decision tree algorithms: CART, ID3 C4.5, CHAID , Baysian classification, Rule based classification, Classification by backpropogation, Support vector machine, Association classification and other classification methods, Prediction using Regression and Neural Network methods, Accuracy measures, Ensemble methods.

### UNIT-V

**Cluster analysis and Data mining Tool:** What is cluster analysis?, Partitioning method, Hierarchical methods, Experiments with WEKA data mining tool for Classification, prediction, data preprocessing, feature selection with experimental data of various domains.

### Reference

1. Data Mining: Concepts and Techniques, Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishes (Elsevier, 2nd edition), 2006
2. Data Mining Methods for Knowledge Discovery , Cios, Pedrycz, Swiniarski, Kluwer Academic Publishers, London – 1998
3. Data mining techniques, Arun K Pujari, Universities Press (India) private limited, 2007.
4. Data Mining, Data Warehousing and OLAP, Gajendra Sharma, S.K. Kateria and Sons, 2010.



## **Elective 1- MCS- 904(A)**

### **Digital Image Processing**

#### **UNIT- I**

Digital Image Fundamentals and Transforms: Elements of visual perception, Image Sampling and quantization, Basic relationship between pixels, Basic geometric transformations, Introduction to Fourier Transform and DFT, Properties of 2D Fourier Transform, FFT Separable Image Transforms, Walsh, Hadamard, Discrete Cosine Transform, Haar, Slant, Karhunen, Loeve transforms.

#### **UNIT- II**

Image Enhancement Techniques: Spatial Domain Methods: Basic grey level transformation, Histogram equalization, Image Subtraction, Image Averaging, Spatial filtering: Smoothing, Sharpening filters: Laplacian filters, Frequency domain filters: Smoothing, Sharpening filters, Homomorphic filtering.

#### **UNIT- III**

Image Restoration: Model of Image Degradation/Restoration process, Noise models, inverse filtering, least mean square filtering, Constrained least mean square filtering, Blind image restoration, Pseudo inverse, Singular value decomposition.

#### **UNIT- IV**

Image Compression: Lossless compression: Variable length coding, LZW coding, Bit plane coding, predictive coding, DPCM. Lossy Compression: Transform coding, Wavelet coding, Basic of Image compression standards: JPEG, MPEG, Basic of Vector quantization.

#### **UNIT- V**

Image Segmentation and Representation; Edge detection, Thresholding, Region Based segmentation, Boundary Representation: Chain codes: Polygonal approximation, Boundary segments, boundary descriptors: Simple descriptors, Fourier descriptors, Regional descriptors, Simple descriptors, Texture

#### **TEXT/REFERENCE BOOKS**

1. "Digital Image processing", R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education, 2nd Edition, 2003.
2. "Fundamentals of Digital Image processing", A.K.Jain , PHI.
3. " Digital Image processing using MAT LAB", Rafael C. Gonzalez, Richard E Woods and Steven L. Edition, PEA, 2004.
4. "Digital Image Processing", William K. Pratt, John Wiley, 3rd Edition, 2004.
5. "Fundamentals of Electronic Image Processing", Weeks Jr., SPIC/IEEE Series, PHI.
6. "Image Processing Analysis and Machine Vision", Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, Thompson Learniy (1999)
7. "Digital Image Processing and Applications", Chanda Dutta Magundar, PHI, 2000



## Elective 2- MCS-904 (B) Graph Theory

### UNIT -I

Graphs, Sub graphs, some basic properties, various example of graphs & their sub graphs, walks, path & circuits, connected graphs, disconnected graphs and component, Euler graphs, various operation on graphs, Hamiltonian paths and circuits, the travelling sales man problem.

### UNIT- II

Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, counting trees, spanning trees, fundamental circuits, finding all spanning trees of a graph and a weighted graph, prim's algorithm, Kruskal algorithm and Dijkstra Algorithm.

### UNIT -III

Cuts sets and cut vertices, some properties, all cut sets in a graph, fundamental circuits and cut sets, connectivity and separability, network flows Planer graphs, combinatorial and geometric dual: Kuratowski graphs, detection of planarity, geometric dual, Discussion on criterion of planarity, thickness and crossings.

### UNIT -IV

Vector space of a graph and vectors, basis vector, cut set vector, circuit vector, circuit and cut set subspaces, Matrix representation of graph – Basic concepts; Incidence matrix, Circuit matrix, Path matrix, Cut-set matrix and Adjacency matrix.

### UNIT -V

Coloring, covering and partitioning of a graph, chromatic number, chromatic partitioning, chromatic polynomials, matching, covering, four color problem Discussion.

### REFERENCE/TEXT BOOKS

1. Graph theory with applications to Engineering and Computer Science, Deo, N, PHI
2. Introduction to Graph Theory, Gary Chartrand and Ping Zhang, TMH
3. Introduction to Graph Theory, Robin J. Wilson, Pearson Education
5. Graph theory and application., Bondy and Murthy, Addison Wesley.
6. Schaum's Outline of Graph Theory, V. Balakrishnan, TMH
7. Graph Theory: Modelling, Applications and Algorithms, Geir Agnarsson, Pearson Education



## **Elective -3 MCA-904 (C)** **Pattern Recognition**

### **Unit-I**

**Introduction:** Basics of pattern recognition, Design principles of pattern recognition system, Learning and adaptation, Pattern recognition approaches, Mathematical foundations – Linear algebra, Probability Theory, Expectation, mean and covariance, Normal distribution, multivariate normal densities, Chi squared test.

### **Unit-II**

**Statistical Patten Recognition:** Bayesian Decision Theory, Classifiers, Normal density and discriminate functions,

### **Unit – III**

**Parameter estimation methods:** Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component Analysis (PCA), Fisher Linear discriminate analysis, Expectation-maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models.

### **Unit - IV**

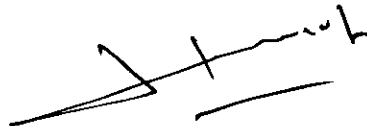
**Nonparametric Techniques:** Density Estimation, Parzen Windows, K-Nearest Neighbour Estimation, Nearest Neighbour Rule, Fuzzy classification.

### **Unit - V**

**Unsupervised Learning & Clustering:** Criterion functions for clustering, Clustering Techniques: Iterative square - error partitional clustering – K means, agglomerative hierarchical clustering, Cluster validation.

### **Reference/Text Books**

1. "Pattern Classification", Richard O. Duda, Peter E. Hart and David G. Stork, , 2<sup>nd</sup> Edition, John Wiley, 2006.
2. "Pattern Recognition and Machine Learning", C. M. Bishop, Springer, 2009.
3. "Pattern Recognition".S. Theodoridis and K. Koutroumbas, , 4th Edition, Academic Press, 2009



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**IV<sup>th</sup> Semester**

Course Code	Course Name	T	P/ T	C	Sessional Marks	End Semester Marks	Total Marks
MCS 1001	Major Project			25	-	500	500

### Important Guidelines For Major Project

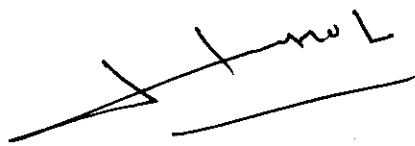
A project report has to be submitted as per the rules described below:

1. **Number of Copies:** The student should submit One hard bound copy of the Project Report with one RW/CD/DVD.
2. **No of students:** Every student has to submit separate project.
3. **Acceptance / Rejection of Project Report:** The student must submit a project report to the Head of Department/Project Guide for approval. The Head of Department/Project Guide holds the right to accept the project or suggest modifications for resubmission.
4. **Format of the Project Report :** The student must adhere strictly to the following format for the submission of the Project Report
  - I. **Paper:** The report shall be typed on white paper, A4 size or continuous computer stationary bond, for the final submission. The report to be submitted to the University must be original and subsequent copies may be photocopied on any paper.
  - II. **Typing:** The typing shall be of standard letter size, double-spaced and on one side of the paper only, using black ribbons and black carbons.
  - III. **Margins:** The typing must be done in the following margins  
 Left ----- 35mm, Right ----- 20mm  
 Top ----- 35mm, Bottom ----- 20mm
  - IV. **Binding:** The Report shall be Rexene bound in black. Plastic, spiral bound Project Reports not be accepted.
  - V. **Front Cover:** The front cover should contain the following details:
 

**TOP :** The title in block capitals of 6mm to 15mm letters.  
**CENTER :** Full name in block capitals of 6mm to 10mm letters.  
**BOTTOM :** Name of the University, year of submission- all in block capitals of 6mm to 10mm letters on separate lines with proper spacing and centring.
  - VI. **Blank Sheets:** At the beginning and end of the report , two white black bound papers should be provided, one for the purpose of binding and other to be left blank.
5. **Abstract:** Every report should have an abstract following the Institute's Certificate. The abstract shall guide the reader by highlighting the important material contained in the individual chapters, section, subsection etc.
6. **Certificates etc:** The report should contain the following:



- i. Certificate from Company
  - ii. Institute Certificate: Successful completion of project by competent authority.
  - iii. Acknowledgment
  - iv. List of Figures
  - v. Tables
  - vi. Nomenclature and Abbreviations
7. **Contents of the Project Report:** The project report must contain following in form of chapter, however student may include any other relevant chapter(s):
- i. **Company Profile:** This chapter should highlight the company details. This would be chapter 1 and should include the main stream activity of the company, the product line of the company and the details of the department where the student has carried out his/her project work. This should not exceed two pages or 800 words.
  - ii. **Introduction to the project:** This chapter shall highlight the purpose of project work, it will also define the chapters to be followed in the Project Report.
  - iii. **Scope of work:** Brief scope of the project work done
  - iv. **Existing System and Need for proposed System:** If there is some system already in use, then give brief detail of it in order to help to understand the enhancements carried out by the student in the existing system.
  - v. **Operating Environment:** Hardware and Software required and used
  - vi. **Proposed System:** Which may contain following:
    - a. **Objectives to be fulfilled:** clearly define the objective(s) of the system.
    - b. **User Requirements:** State the requirements of the use in an unambiguous manner.
    - c. **Requirements Determination Techniques and Systems Analysis Methods Employed:** Use the formal methods to describe the requirements of the use like Fact Finding Methods, Decision Analysis, Data Flow Analysis etc.
    - d. **Prototyping:** If the prototypes has been developed prior to the detailed design, then give details of the prototype.
    - e. **System Feature:** Which includes as follows:
      - Module specifications
      - D.F.D. and ER
      - System flow charts
      - Data Dictionary
      - Structure charts
      - Database /File layouts
      - Design of Input Design of Output screens and reports
      - User Interfaces
      - Design of Control Procedures
8. **Testing procedures and Implementation phase**
9. **Problems encountered, Drawbacks and Limitations**
10. **Proposed Enhancements/ Future enhancement**
11. **Conclusions**
12. **Bibliography**
- Annexure**

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