B.E. Sem.VIII – [INFT]

Data Warehousing and Mining

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks

Data Warehousing :

1. **Overview and Concepts:** Need for data warehousing, Basic elements of data warehousing, Trends in data warehousing.
2. **Planning and Requirements:** Project planning and management, Collecting the requirements.
3. **Architecture and Infrastructure:** Architectural components, Infrastructure and metadata.
4. **Data Design and Data Representation:** Principles of dimensional modeling, Dimensional modeling advanced topics, data extraction, transformation and loading, data quality
5. **Information Access and Delivery:** Matching information to classes of users, OLAP in data warehouse, Data warehousing and the web.
6. **Implementation and Maintenance:** Physical design process, data warehouse deployment, growth and maintenance.

Data Mining :

1. **Introduction:** Basics of data mining, related concepts, Data mining techniques.
2. **Data Mining Algorithms:** Classification, Clustering, Association rules.
3. **Knowledge Discovery :** KDD Process
4. **Web Mining:** Web Content Mining, Web Structure Mining, Web Usage mining.
5. **Advanced Topics:** Spatial mining, Temporal mining.
6. **Visualisation :** Data generalization and summarization-based characterization, Analytical characterization: analysis of attribute relevance, Mining class comparisons: Discriminating between different classes, Mining descriptive statistical measures in large databases
7. **Data Mining Primitives, Languages, and System Architectures:** Data mining primitives, Query language, Designing GUI based on a data mining query language, Architectures of data mining systems
8. **Application and Trends in Data Mining:** Applications, Systems products and research prototypes, Additional themes in data mining, Trends in data mining

Reference:

1. Data Warehousing Fundamentals *(Paulraj Ponnian)*, John Wiely.
2. Data Mining Introductory and Advanced Topics *(M.H.Dunham)*, Pearson Education.
3. Data Mining Concepts and Techniques *(Han, Kamber)*, Morgan Kaufmann.
4. The Data Warehouse Lifecycle toolkit *(Ralph Kimball)*, John Wiley.
5. Mastering Data Mining *(M Berry and G. Linoff)*, John Wiley.
6. Building the Data Warehouses *(W.H.Inmon)*, Wiley Dreamtech.
7. The Data Warehouse Toolkit *(R.Kimpall)*, John Wiley.
8. Decision Support and Data Warehouse systems *(E.G. Mallach)*, TMH.

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B.E. Sem.VIII – [INFT]

Geographical Information System

SYLLABUS

Lectures : 4 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks

1. **Introduction to GIS:**
   Introduction , Definition of GIS, Evolution of GIS, Component of GIS.

2. **Maps And GIS:**
   Map scale, Classes of map, Mapping process, Coordinate systems, Map projection, Spatial framework for mapping locations, Topographic mapping, Attribute data for Thematic mapping.

3. **Digital Representation of Geographic Data:**
   Technical issues of digital representation of data, Database and Database management System, Raster geographic data representation, Vector geographic data representation, Object oriented geographic data representation, Relationship between Data representation and Data analysis.

4. **Data Quality And Standards:**
   Concepts and definition of data quality, Component of geographic data, Data quality assessment, Spatial data error management, Geographic data standards, Geographic data standards and GIS development.

5. **GIS Data Processing, Analysis and Visualization:**
   Raster based GIS data processing, Vector based GIS data processing, Human computer interaction and GIS, Visualization of geographic information, Principles of Cartographic design in GIS, Generation of information product.

6. **Data Modeling:**
   Digital Terrain Modeling, Approaches to digital terrain data modeling, Acquisition of digital terrain data, Data processing, Analysis and visualization, Spatial modeling, Descriptive statics, Spatial autocorrelation, Quadrat counts and Nearest- Neighbor analysis, Trend surface analysis, Gravity models.

7. **GIS Project Design And Management:**
   Software engineering as applied to GIS, GIS project planning, System analysis and study user requirement, Geographic database design methodology, GIS application software design methodology, System implementation, System maintenance and support.

8. **GIS Issues and Future of GIS:**
   Issues of implementing GIS, Trend of GIS development, GIS, applications and GIS users.

References:

1. Concepts and Techniques of Geographic Information Systems *(C.P. Lo, Albert K.W. Yeung)*, PHI
2. Introduction to Geographic Information Systems *(Kang-Tsung Chang),* TMH
3. An Introduction to Geographical Information System *(Ian Heywood, Sarah Cornelius, Steve Carver),* Person Education
4. Principles of Geographical Information System *(Peter A Burrough, R.A. McDonnell)*, Oxford Press.

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B.E. Sem.VIII – [INFT]

Information Security

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks

1. **Introduction:** Security, Attacks, Computer criminals, Method of defense

2. **Program Security:** Secure programs, Non-malicious program errors, Viruses and other malicious code, Targeted malicious code, Controls against program threats

3. **Operating System Security:** Protected objects and methods of protection, Memory address protection, Control of access to general objects, File protection mechanism, Authentication: Authentication basics, Password, Challenge-response, Biometrics.

4. **Database Security:** Security requirements, Reliability and integrity, Sensitive data, Interface, Multilevel database, Proposals for multilevel security

5. **Security in Networks:** Threats in networks, Network security control, Firewalls, Intrusion detection systems, Secure e-mail, Networks and cryptography, Example protocols: PEM, SSL, IPsec

6. **Administrating Security:** Security planning, Risk analysis, Organizational security policies, Physical security.

7. **Legal, Privacy, and Ethical Issues in Computer Security: P**rotecting programs and data, Information and law, Rights of employees and employers, Software failures, Computer crime, Privacy, Ethical issues in computer society, Case studies of ethics

Reference:

1. Security in Computing *(C.P. Pfleeger, and S.L. Pfleeger)*, Pearson Education.
2. Computer Security: Art and Science *(Matt Bishop)*, Pearson Education.
3. Cryptography And Network Security: Principles and practice *(Stallings)*
4. Network Security (*Kaufman, Perlman, Speciner)*
5. Network Security : A Beginner's Guide *(Eric Maiwald)*, TMH
6. Java Network Security (*Macro Pistoia)*, Pearson Education
7. Principles of information security *(Whitman, Mattord)*, Thomson

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B.E. Sem.VIII – [INFT]

Multimedia Systems

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks

1. **Multimedia Systems Introduction :** Multimedia application, Multimedia system architecture, Evolving technologies for multimedia systems, defining objects for multimedia systems, Multimedia data interface standards

2. **Compression and Decompression :** Types of compression, Binary image compression schemes, Color, Gray scale, Still video image compression, Video image compression, Audio compression, Fractal compression, Data and File Format Standards: Rich text format, TIFF, RIFF, MIDI, JPEG, AVI, MPEG.

3. **Multimedia Input/Output Technologies :** Key technologies issues, Pen input, Video and Image display system, Printout technology, Image scanners, Digital Voice and Audio, Full motion video

4. **Storage and Retrieval Technologies :** Magnetic media technology, Optical media, Hierarchical storage management, Cache management for storage system, Image and video databases: Indexing and Retrieval.

5. **Architectural and Telecommunications Considerations :** Specialized computational processors, Memory systems, Multimedia board solutions, LAN/WAN connectivity, Multimedia transport across ATM networks, Multimedia across wireless, Distributed object models.

6. **Multimedia Networking :** Multimedia networking applications, Streaming stored audio and video, RTP, Scheduling and policing mechanisms, Integrated services, RSVP.

7. **Multimedia Application Design :** Multimedia application classes, Types of multimedia systems, Virtual reality design, Components of multimedia systems, Organizing multimedia databases, application workflow design issues, Distributed application design issues, Applications like Interactive, Television, Video Conferencing, Video-on-demand, Educational applications and authoring, Industrial applications, Multimedia archives and digital libraries.

8. **Multimedia Authoring and User Interface :** Multimedia authoring systems, Hyper media application design considerations, User interface design, information access, Object display/playback issues.

9. **Hypermedia Messaging :** Mobile messaging, Hyper media message components, Hypermedia linking and embedding, Creating hypermedia messages, integrated multimedia message standards, Integrated document management, The world-wide web, Open hypermedia systems, Content based navigation.

10. **Distributed Multimedia Systems :** Components of distributed multimedia systems, Distributed client server operations, Multimedia object servers, Multi-server network topologies, Distributed multimedia database, Managing distributed objects.

11. **Multimedia System Design :** Methodology and considerations, Multimedia systems design examples.

Reference:

1. Multimedia Systems Design *(Prabhat K. Andheigh, Kiran Thakrar)*, PHI John F.
2. Multimedia Systems *(Koegel Bufor)*, Pearson Education.
3. Multimedia Communications *(Free Halshall)*, Person Education.
4. Multimedia Computing, Communications and Applications *(R.Steimnetz, K.Nahrstedt)*, Person Education.
5. Multimedia Communication Systems: Techniques, Standards, and Networks *(K.R. Rao, D. Milovanovic)*
6. Multimedia Database Systems *(Subrahmanian)*, M. Kaufman
7. Multimedia Communications: Directions and Innovations *(J.D. Gibson)*, Academic Press, Hardcourt India.
8. Computer Networking *(J.F.Kurose, K.W.Ross)*, Pearson Education.

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B.E. Sem.VIII – [INFT]

Neural Networks & Fuzzy Systems

SYLLABUS

Lectures : 4 Hrs.
Practical : 2 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks

1. **Introduction:**
   Biological neurons, McCulloch, and Pitts models of neuron, Types of activation function, Network architectures, Knowledge representation. Learning process: Error-correction learning, Supervised learning, Unsupervised learning, Learning Rules.

2. **Single Layer Perceptron:**
   Perceptron convergence theorem, Method of steepest descent – least mean square algorithms.

3. **Multilayer Perceptron:**
   Derivation of the back-propagation algorithm, Learning Factors.

4. **Radial Basis and Recurrent Neural Networks:**
   RBF network structure, theorem and the reparability of patterns, RBF learning strategies, K–means and LMS algorithms, comparison of RBF and MLP networks, Hopfield networks: energy function, spurious states, error performance.

5. **Simulated Annealing:**
   The Boltzmann machine, Boltzmann learning rule, Bidirectional Associative Memory.

6. **Fuzzy logic:**
   Fuzzy sets, Properties, Operations on Fuzzy sets, Fuzzy relations, Operations on fuzzy relations, The extension principle, Fuzzy measures, Membership functions, Fuzzification and defuzzification methods, Fuzzy controllers.

Reference:

1. Neural Network a – Comprehensive Foundation *(Simon Haykin)*, Pearson Education
2. Introduction to Artificial Neural Systems *(Zurada J.M.)*, Jaico Publishers
3. Fuzzy Logic with Engineering Applications *(Thimothy J.Ross)*, McGraw Hill
4. Introduction to Applied Fuzzy Electronics *(Ahmad Ibrahim)*, PHI
5. Artificial Neural Networks *(Yegnanarayana B.)*, PHI
6. An Introduction to Fuzzy Control *(Driankov D., Hellendoorn H. & Reinfrank M.)*, Norosa Publishing House.
7. Fuzzy Systems Design Principles *(Berkan R.C., and Trubatch S.L.)*, IEEE Press

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B.E. Sem.VIII – [INFT]

Robotics

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks

1. **Robotic Manipulation :**
   Automation and Robots, Classification, Application, Specification, Notations.

2. **Direct Kinematics :**
   Dot and cross products, Co-ordinate frames, Rotations, Homogeneous, Co-ordinates, Link co-ordination arm equation, (Five-axis robot, Four axis robot, Six axis robot).

3. **Inverse Kinematics :**
   General properties of solutions tool configuration five axis robots, Three-Four axis, Six axis robot (Inverse kinematics).

   Workspace analysis and trajectory planning work envelop and examples, workspace fixtures, Pick and place operations, Continuous path motion, Interpolated motion, Straight-line motion.

4. **Robot Vision :**
   Image representation, Template matching, Polyhedral objects, Shane analysis, Segmentation (Thresholding, region labeling, Shrink operators, Swell operators, Euler numbers, Perspective transformation, Structured Illumination, Camera calibration).

5. **Task Planning :**
   Task level programming, Uncertainty, Configuration, Space, Gross motion, Planning, Grasp planning, Fine-motion Planning, Simulation of planer motion, Source and goal scenes, Task planner simulation.

6. **Moments of Inertia.**

7. **Principles of NC and CNC Machines.**

Reference:

1. Fundamentals of Robotics- Analysis and control *(Robert Shilling)*, PHI.
2. Robotics *(Fu, Gonzales and Lee)*, McGraw Hill
3. Introduction to Robotics *(J.J.Craig)*, Person Education
4. Robotics and AI *(Staughard)*, PHI.
5. Industrial Robotics *(Grover, Wiess, Nagel, Oderey)*, McGraw Hill
6. Robotics and Mecatronics *(Walfram Stdder)*, TMH.
7. Introduction to Robotics *(Niku)*, Pearson Education
8. Robot Engineering *(Klafter, Chmielewski, Negin)*, PHI
9. Robotics and Control *(Mittal, Nagrathe)*, TMH

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B.E. Sem.VIII – [INFT]

Software Testing

SYLLABUS

Lectures : 4 Hrs.
Practical : 2 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks

1. **Introduction:**
   Defect, Defect Vs failures, Process problems and defect rates. The business perspective for testing.

2. **Building a Software Testing Strategy:**
   Computer system strategic risk, Economics of testing, Common computer problems, Economics of SDLC testing, Testing– an organizational issue, Establishing a testing policy, Structured approach to testing, Test strategy, Testing methodology.

3. **Establishing a Software Testing Methodology:**
   Introduction, Verification and validation, Functional and structural testing, Workbench concept, Considerations in developing testing methodologies.

4. **Determining Software Testing Techniques:**
   Testing techniques/tool selection process, Selecting techniques/tools, Structural system testing techniques, Functional system testing techniques, unit testing techniques, Functional testing and analysis.

5. **Selecting and Installing Software Testing Tools:**
   Testing tools–Hammers of testing, Selecting and using the test tools, Appointing managers for testing tools.

6. **Software Testing Process:**
   Cost of computer testing, life cycle testing concept, Verification and validation in the software development process, Software testing process, Workbench skills.

7. **Software Testing Process:**
   Access Project Management Development Estimate and Status, Test Plan, Requirements Phase Testing, Design Phase Testing, Program Phase Testing, Execute Test and Record Results, Acceptance Test, Report Test Result, Testing Software Installation, Test Software Change, Evaluate Test Effectiveness.

8. **Testing Specialized Systems and Applications:**
   Client/Server systems, RAD, System documentation, Web based systems, Off–the–self software, Multi platform environment, Security, Data Warehouse

9. **Building Test Document:**
   Uses, Types, Responsibility, Storage, Test plan documentation, Test analysis report documentation

Reference:

1. Effective Methods for Software Testing *(W.E. Perry)*, John Wiley.
2. Testing Computer Software *(Kaner C., Nguyen H., Falk J.)*, John Wiely.
3. Software Testing Techniques *(Boris Beizer)*, Dreamtech
4. Introducing Software Testing *(Louise Tamres)*, Pearson Education.

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