SYLLABUS EFFECTIVE FROM: JUNE, 2019
Master of Computer Application (M.C.A.) Sem. V
CHOICE BASED CREDIT SYSTEM (CBCS)

COURSE NO: PS05CMCA21
Artificial Intelligence
(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:
1. Artificial Intelligence (AI) and Knowledge Based Systems (KBS)
- Natural and Artificial Intelligence
- Testing intelligence with Turing test, and Chinese room experiment,
  Application areas of Artificial Intelligence, Data pyramid
- Production systems and AI based searches like Hill climbing and Heuristic search
- KBS structure, Components of KBS, Categories of KBS, Knowledge-Based Shell,
  Advantages, Limitations and Applications of KBS
- Knowledge acquisition, Knowledge update
- Factual and procedural knowledge representations
- Knowledge based systems development model

2. Fuzzy Logic
- Fuzzy logic and Fuzzy sets, Membership functions,
- Fuzzification and Defuzzification
- Operations on fuzzy sets
- Fuzzy functions and Linguistic variables
- Fuzzy relations, Propositions and connectives
- Fuzzy inference
- Fuzzy rules, Fuzzy control system and Fuzzy rule based systems

3. Connectionist Models
- Introduction to ANN, Biological neuron and Artificial neuron
- Hopfield model of ANN, Parallel relaxation
- Linearly separable problems, Single perceptron
- Non linearly separable problems, Fixed increment perceptron learning
- Multi layer perceptron, Back propagation in multi layer perceptron
- General Learning Paradigms: Supervised and Unsupervised Learning
- Applications of ANN and Cases

4. Genetic Algorithms and Other Soft Computing Techniques
- Introduction to Genetic Algorithm (GA),
- Fundamental concepts of GA :Gene, Population, Fitness Functions, Generations
- Encoding Strategies, Genetic operators, Fitness functions
- Typical Genetic algorithm cycle
- Function optimization, Designing special operators and Edge
  recombination, travelling salesman problem
- Schema, Genetic programming

- Constituents of soft computing, Neuro-fuzzy Systems, Neuro-genetic systems and Neuro-fuzzy-genetic systems
- Multi agent systems: Agents, Typology, Multi agent structure and Examples
- Knowledge Management
- Intelligent Technologies for Web

MAIN REFERENCE BOOKS:

1. Akerkar RA and Sajja P S, Knowledge-Based Systems, Jones & Bartlett Publishers, Sudbury, MA, USA, 2009
2. Rushell and Norvig, Modern Approach to Artificial Intelligence,Prentice Hall of India Ltd., 2006
3. Rich and Knight, Artificial Intelligence, Tata McGraw Hill Publishing Co.Ltd., 21st Indian Reprint, 2001
4. Vijyalaxmi Pai and Rajasekaran, Neural Network, Fuzzy Logic and Genetic Algorithms, Prentice Hall of India, 2003
5. Amrit Tiwan, The Knowledge Management Toolkit, Pearson Education Inc., Third Impression, 2008.

BOOKS FOR ADDITIONAL READING:

1. J S R Jang, C T Sun and E Mizutani, Neuro-Fuzzy Soft Computing, Prentice Hall of India Ltd., 1997
2. Peter Jackson, Introduction to Applied Expert systems, Pearson Education Ltd., Second Indian Reprint, 2001
3. David W Rolston: Principles of AI & ES Development, McGraw Hill, 1988.
4. David E.Goldberg, Genetic Algorithms in Search, Optimization & Machine Learning, Pearson Education, 2002

Distributed Systems, Parallel Computing and Simulation
(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:
1. Distributed Systems - I
 - Basic concepts
 - Advantages and Disadvantages of Distributed systems
 - Tightly coupled and Loosely coupled systems,
 - Hardware and Software Requirements
 - Design Issues.
 - Distributed File system Design
2. Distributed Systems – II & Parallel Processing
- Implementation Methodologies :
- System Models for Organization of processors in a Distributed systems
- Processor Allocation Models
- Synchronization Aspects
- Introduction to Parallel Processing
- Parallel Processing Terminologies
3. Simulation - I
- Introduction
- Applications
- Advantages & Disadvantages
- Examples of simulation
- Continuous system simulation
- Examples
- Numerical Integration Vs. Continuous system simulation
- Analog Vs. Digital simulation
- Discrete system simulation
- Examples
- Fixed time-step & Event-to-event model
- Simulating randomness
- Generation of non-uniformly distributed random numbers
- Monte-Carlo Computation and its applications.
4. Simulation - II
- System, System environment, attributes, activities, types of activities
- Types of models
- Principles used in modeling
- System Studies
- Types of system study
- Different computational techniques used in simulation
- Distributed lag models
- Cobweb model
- Process of simulating
- Design and Evaluation of Simulation Experiments
- Validation
- Introduction to Simulation Language

MAIN REFERENCE BOOKS :
1. Tanenbaum Andrew S: Distributed Operating System, Addison Wesley, 2001
2. Quinn Michael J: Parallel Computing – Theory and Practice (second edition), McGraw-Hill Pub., 1994
3. Hira D. S. : System Simulation, S Chand & Co., Ltd., 2001
4. Gordon Geoffrey : System Simulation, Prentice-Hall of India, New Delhi, 2001

ADDITIONAL REFERENCE BOOKS:
1. Deo Narsingh : System Simulation with Digital Computer, Prentice-Hall of India, New Delhi, 1999
2. Law A M & Kelton W D: Simulation Modeling & Analysis, Tata McGraw-Hill, International Series, 2000

COURSE NO: PS05CMCA23
Business Information Systems
(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:
1 Operations Management
- The operations function, framework for managing operations, strategic role of operations
- Strategic Planning, productivity and quality
- Forecasting in operations
- Designing product, services and processes – Product development, manufacturing process technology, Computer Integrated Manufacturing(CIM), Layout concepts
- Inventory control fundamentals – concept, costs, modeling, applications
- Material Requirements Planning (MRP) – concepts, advantages, limitations
- Introduction to Manufacturing Resource Planning (MRP-II), Just-In-Time Manufacturing (JIT)

2 Business Processes
- Introduction to business process, The process phenomenon, Kinds of Processes, Process representation and models, process domains,meta-process, engineering of processes, the engineering approach to solving problems
- Process contexts – introduction, the context for process modeling,context of the process
- Process Capture – introduction, Modeling notations, managing the modeling exercise, creating the model
- Process Design – using organization process modeling (OPM) for design
- Process Management – the problem and its context, the meta-process as a solution, the approach to the solution

3 Information Technology (IT) and Information System
- Information Technology – Introduction and its Role
- Importance of IT in Digitization.
- Information Systems – introduction, evolution and types
- IT – Support at different organization levels, Managing IT in organization
- Internet, Intranet and Extranet
- Interorganizational Information Systems

4 Business Information Systems
- Electronic Commerce and Electronic Business
- Information Systems to support Business functions – Enterprise Resource Planning (ERP), Enterprise Information Portal (EIP),Customer Relationship Management (CRM), Supply Chain Management (SCM)
- Decision Support Systems (DSS), Group DSS
- Executive Support in Enterprise

MAIN REFERENCE BOOKS:
1. James A. O'Brien, Management Information Systems, 5th Edition, Tata McGraw-Hill Publishing Company Limited, 2002 (ISBN-0-07-048637-9)
2. Warboys Brian, Business Information Systems: a Process Approach. Tata McGrawHill, 2001
3. Evertt E. Adam, Jr. Ronald J. Ebert, Production and Operations Management (Concepts, models and behavior) 5th Edition, Prentice-Hall of India, 2005 (ISBN-81-203-0838-7)
4. Kenneth C Laudon & Jane P Laudon, Management Information Systems 7th Ed, Pearson Education Asia, Inc., 2002 (ISBN – 81-7808-563-1).

BOOKS FOR ADDITIONAL READING:
1. Software Magazines on Current Topics
2. Internet Web Sites

<u>**COURSE NO: PS05CMCA24**</u>
Computer Graphics
(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:
1. Introduction, Output Primitives and 2-D transformation
- A survey of major applications of Computer Graphics and Multimedia,
- Software Standards
- Display devices (Random scan-raster scan monitors)
- Graphics Functions
- Algorithms for output primitives (Line, Circle, Character Generation) and attributes of output primitives
- Basic transformations: Translation, Rotation (about origin and about pivot point), Scaling (related to a fixed point), Reflection and Shear with examples
- Matrix representation of basic transformations and homogeneous coordinates
2. Clipping and 3D Concepts
- Viewing pipeline
- Windowing & Clipping
- Window to view port transformation, Point, Line, polygon and text clipping algorithms
- 3D coordinate systems
- 3-D display methods: Parallel projection, perspective projection
- Introduction of 3D Object representations.
- 3D transformations (translation, rotation and scaling)
- 3D viewing: Viewing pipeline
- Visible Surface detection methods: Back face detection methods and the Z- Buffer algorithm
- Introduction and need of Illumination models and surface-rendering methods
3. Image Operations
- Image Representation: Graphics Formats (GIF (Graphics Interchange Format), Microsoft Windows Bitmap (BMP), JPEG File Interchange Format, MPEG, TIFF (Tag Image File Format), PNG (Portable Network Graphic Format))
- Introduction, applications and components of Image processing system,Human vision system, Image formation
- Digitization: Sampling & Quantization
- Image Enhancement: Contrast Intensification (with examples) and smoothing (with examples), Sharpening and noise reduction
- Introduction of: Image restoration, Image compression (Lossy & Loss-less compression), Image Registration
- Multi-Valued Image processing (Multi-spectral & Multi-modal) with applications- Image analysis (Segmentations, Edge & Line detection, Feature extraction, Image description & Recognition)
- Color models (RGB, CMY, YIQ, YCbCr and HSI) and conversion between different models
4. Virtual Reality using Multimedia
- Introduction to Multimedia with its applications
- Multimedia hardware & software
- Introduction of digital medium and various facets of multimedia: digital audio, multimedia texts, hypermedia, Graphics
- Animation: two-dimensional and three-dimensional animation techniques and digital video and basic concept for color display

- Multimedia project design / development concepts
- Multimedia authoring, characteristics of authoring tools, authoring methodologies and
  multimedia programming

MAIN REFERENCE BOOKS:
1. Donald Hearn & M. Pauline Baker: Computer Graphics. PHI, 1995.
2. Foley J. D., Van Dam A.: Fundamentals of Interactive Computer Graphics,Addison-
   Wesley, 1982.
3. S. Gokul: Multimedia Magic, BPB Publication, 1998
4. B. Chanda, D. Dutta Majumder: Digital Image Processing and Analysis, PHI,2000.

BOOKS FOR ADDITIONAL READING
1. Newman W., Sproul R. F. : Principles of Interactive Computer Graphics,
McGraw-Hill, 1980.
2. F. S. Hill, J. R. : Computer Graphics. MacMillan Publishing Company,1990.
3. Rafael C. Gonzalez & Richard E. Woods: Digital Image Processing,
Addision-Wesley Publishing Company, 1993

Inhouse Project Work
(Total Marks: 100)

COURSE CONTENT :
Students are supposed to develop in-house system (Project) to demonstrate the
functions of useful and live systems.
Note: Students are supposed to prepare the project-work report and make the
presentation as well as give demonstration of the work done during the course of work.

TRENDS IN INFORMATION AND COMMUNICATION TECHNOLOGY
(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:
1. Trends in Operating System
- Comparison of different operating systems including real-time systems
- Popular features
- New trends
2. Trends in Hardware and Software Technology
- Hardware selection
- Trends in hardware technology
- New industrial requirements
- New development tools
- New technologies
- New software applications
3. Trends in Networking and Security
- New protocols
- New communication technologies
- New Security Mechanisms
- New Security Algorithms
4. Trends in Data Storage and Processing
- Data Warehousing
- Data Mining and application domains
- Introduction to Big Data
- Introduction to Cloud Computing

MAIN REFERENCE BOOKS:
1. Alex Berson, Stephen Smith &Kurt Thearling, "Building Data Mining Applications for CRM", TMH, 2000.
2. Andrew Tanenbaum, "Computer Networks",PHI, Fourth Edition, 2003.
3. Douglas E. Comer, "Computer Network and Internets", Pearson Education Asia, Second Edition, 2000.
4. Ian H. Witten & Eibe Frank, "Data Mining –Practical Machine Learning Tools and Techniques", Second Edition, ELSEVIER, 2005.
5. ICT Magazines on Current Topics
6. Tananbaum, "Distributed Operating Systems", PHI, 1995.
7. Online material

BOOKS FOR ADDITIONAL READING:
1. Solig Willium : Cryptography and Network Security, Prentice-Hall of India, 2000.
2. Behrouz Forouzan, Introduction to Data Communication & Networking,Tata McGraw Hill, 1999.

Introduction to Data Science and Big Data
(3 Lectures & 1 Seminar/Tutorial per week Total Marks: 1 00)

COURSE CONTENT:
Unit 1: Introduction to Data Science Data Analytics
• Data Science Definition
• Need and features
• Importance of Data Science in Modern Business
• Current Trends in Data Science
• Analytical Techniques
Unit 2: Introduction to Big Data and Big Data Analytics
• Types of Digital Data: Unstructured, Semi-structured and Structured
• Working with Unstructured Data
• Evolution and Definition of Big Data
• Characteristics and Need of Big Data
• Meaning and Characteristics of Big Data Analytics
• Need of Big Data Analytics
• Classification of Analytics
• Importance of Big Data Analytics
Unit 3: Introduction to the Python Programming Language
• Important characteristics of Python, key success factors, major application areas
• Data types, syntax, control structures
• Strings, input, output, basic file handling
• Lists and dictionaries
• Functions
• Classes and object-oriented programming
• Exception handing
Unit 4: Data Analytics using Python and R
• Introduction to NumPy, SciPy
• Introduction to pandas
• Introduction to Matplotlib
• Introduction to R
• Introduction to R Studio
• Developing data science applications using Python and R
Main Reference Books:
1. Davy Cielen, Arno D.B. Meysman, Mohamed Ali, Introducing Data Science: Big Data, Machine Learning and More, Using Python Tools
2. Seema Acharya, Subhashini Chellappan, Big Data and Analytics, Wiley
3. VigneshPrajapati, Big Data Anal~tics with Rand Hadoop- Packrt
4. Mark Lutz, "Learning Python", 41 Edition, O'Reilly, 2009
5. Wes McKinney, "Python for Data Analysis", O'Reilly, 2013
6. Robert I. Kabacoff, "R in Action: Data Analysis and Graphics with R",Manning, 2011

Reference Books:
1. Akerkar R.A. and Sajja, P.S. "Intelligent techniques for data science",Springer International Publishing, Switzerland, august 2016
2. Minelli, Chambers, Dhiray, Big Data Big Analytics, Wiley
3. Bart Baesens, Analytics in a Big Data World , Wiley

4. Thomas Erl, Wajid Khattak, and Paul Buhler, Big data Fundamentals: Concepts, Drives, and Techniques, , Pearson India Education Services Pvt. Ltd., 2016
5. Roger D. Peng and Elizabeth Matsui, The Art of Data Science: A Guide for Anyone Who Works with Data, LeanPub, 2016
6. Brian Caffo, Roger D. Peng and Jeffrey Leek, Executive Data Science A Guide to Training and Managing the Best Data Scientists, LeanPub, 2016
7. Alex Holmes Hadoop in Practice- Dreamtech
8. Documentation of relevant software packages
9. Other web references

<div align="center">

COURSE NO: PS05EMCA23
Web Application Frameworks
(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

</div>

COURSE CONTENT:
1 Basic Web Application Development Tools
- Introduction to HTML5, CSS3
- Interactive web pages using JavaScript
- The JQuery library
- JavaScript user interface library

2 Website Development using WordPress
- Introduction to WordPress
- Creating simple web sites using WordPress: Themes, Pages, Menus,Multimedia
  Elements
- Link management
- Use of Plugins
- Developing websites using plugins

3 Client-side Web Application Framework
- Setting up Project, project organization and management
- Templates
- MVC Architecture
- Data binding
- Dependency injection
- Routing

4 Server-side Web Application framework
- Application structure
- MVC Architecture
- Routing
- Helpers
- Libraries
- Form validation
- Session management
- Active record

MAIN REFERENCE BOOKS:
1. Dane Cameron, "HTML5, JavaScript and jQuery", Wrox publication
2. David Sawyer McFarland, "CSS3", O'reilly
3. Brad Green and Syham Seshadri, "AngularJS", O'Reilly
4. Jake Spurlock, "Bootstrap", O'Reilly
5. Mathew MacDonald, "WordPress", O'Reilly
6. Thomas Myer, "Professional CodeIgniter", Wrox Professional Guides

BOOKS FOR ADDITIONAL READING:
1. Valeri Karpov, Diego Netto, "Professional AngularJS", Wrox publication
2. Zak Ruvalcaba, Anne Boehm, "HTML5 and CSS3", Murach
3. Bear Bibeault, Yehuda Katz, "jQuery in action", 2nd edition, Dreamtech press
4. Karl Swedberg, Jonathan Chaffer, "jQuery 1.4 Reference Guide", PACKT publishing
5. Other online references