List of Courses Focus on Employability/ Entrepreneurship/ Skill Development

Department : *Computer Science and Information Technology*

Programme Name : *MCA*

Academic Year : 2021-22

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	MCA-102	Artificial Intelligence
02.	MCA-103	Relational Data Base Management Systems
03.	MCA-104(Elective-I(1))	Advanced Java Programming
04.	MCA-104(Elective-I(3))	Linux Operating System and ShellProgramming
05.	MCA-105(Elective-I(1))	Computer Network
06.	MCA-105(Elective-I(2))	Mobile Application Programming
07.	MCA-105(Elective-I(3))	VB.NET programming
08.	MCA-106	RDBMS LAB
09.	MCA-107	Lab Based on I / II
10.	MCA-204(Elective-I(2))	Cloud Computing
11.	MCA-204(Elective-I(3))	Neural Network and Deep Learning
12.	MCA-205(Elective-I(1))	Web Technology
13.	MCA-205(Elective-I(2))	Image Processing
14.	MCA-205(Elective-I(3))	Pattern Recognition
15.	MCA-104(Elective-I(3))	Object Oriented SoftwareEngineering
16.	MCA-205(Elective-2(2))	Multimedia
17.	MCA-205(Elective-2(2))	Linux Operating Systemand Shell Programming
18.	MCA-206	LAB based on Elective III / IV

19.	MCA-207	Minor Project
20.	MCA-301	Machine Learning
21.	MCA-302	Computer Graphics & Multimedia
22.	MCA-303	Data Mining & Data Warehousing
23.	MCA-304(Elective-V(1))	Big Data Analytics
24.	MCA-304(Elective-V(3))	Data Science using Python
25.	MCA-305 (Elective-VI(1))	Network Security
26.	MCA-401	Major Project
27.	MCA-501	Soft Computing
28.	MCA-502	Computer Graphics & Multimedia
29.	MCA-503	Data Mining & Data Warehousing
30.	MCA-504(Elective-VII(1))	Big Data Analytics
31.	MCA-505 (Elective-VIII(2))	Network Security
32.	MCA-505 (Elective-VIII(3))	Image processing
33.	MCA-601	Major Project

HEAD
DEPT OF CSIT
G.G.V. BILASPUR (C.G.)

Department of Computer Science & Information Technology
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)
SYLLABUS FOR MCA 2 YEAR DEGREE COURSE

Effective from Session 2020-21

Semester 1

Sl.no	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-101	Operating System	4		40	60	4
2	MCA-102	Artificial Intelligence	4		40	60	4
3	MCA-103	Relational Data Base Management Systems	4		40	60	4
4	MCA-104	Elective I	4		40	60	4
5	MCA-105	Elective II	4		40	60	4
6	MCA-106	RDBMS LAB		2		100	2
7	MCA-107	LAB based on Elective –I / II		2		100	2
		Total	20	04	200	500	26

Semester 2

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-201	Design and Analysis of Algorithm	4		40	60	4
2	MCA-202	Software Engineering	4		40	60	4
3	MCA-203	Optimization Techniques	4		40	60	4
	MCA-204	Elective III	4		40	60	4
	MCA-205	Elective IV	4		40	60	4
6	MCA-206	LAB based on III / IV		2		100	2
7	MCA-207	Minor Project		2		100	2
		Total	20	04	200	500	26

Semester 3

Sl.no	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-301	Machine Learning	4		40	60	4
2	MCA-302	Computer Graphics and Multimedia	4		40	60	4
3	MCA-303	Data Mining and Data Warehousing	4		40	60	4
4	MCA-304	Elective V	4		40	60	4
5	MCA-305	Elective VI	4		40	60	4
6	MCA-306	Lab based on V / VI		2			2
7	MCA-307	Minor Project		2		100	2
		Total	20	04	200	500	26

Semester 4

Sl.no	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-401	Major Project	-	-	-	500	22
		Total	-	-	-	-	22

Electives

Sl.No	Paper Code	(1)	(2)	(3)
1	MCA-104(Elective-I)	Advanced JAVA Programming	Probability and Statistics	Linux Operating System and Shell Programming
2	MCA-105(Elective-II)	Computer Network	Mobile Application Programming	V.B.Net Programming
3	MCA-204(Elective-III)	E-Commerce	Cloud Computing	Neural networks and Deep Learning
4	MCA-205(Elective-IV)	Web Technology	Image Processing	Pattern Recognition
5	MCA-304(Elective-V)	Big Data Analytics	Advanced Operating System	Data Science using Python
6	MCA-305(Elective-VI)	Compiler Design	Network Security	Parallel processing

Bridge Course: (Non Credit Course to be completed within maximum allowable duration for completing MCA course).

List of subjects:

1) Fundamentals of Computer Science
2) C programming

Total Course Credits-100
Note: electives to be decided at the start of the respective semester.

*** The syllabus is subjected to change as per the requirement.**

Artificial Intelligence

1. **Introduction:** Definitions and approaches, Foundation of A.I. , Challenges in AI, Area and Applicationsof A.I., Intelligent Agents: meaning, types, environments, examples.

2. **Problem Solving:** Problem solving as state space search, production system, writing production system and solution for a Water jug problem; some AI classical problems (statements only) cannibal missionaries, tower of Hanoi, tic tac toe, 8-puzzle, Search techniques: Breadth First, and Depth-first, Best-First Search,Hill-climbing, Heuristics, A* algorithm, local and global maxima(minima),

3. **Knowledge Representation and Reasoning**: Predicate and prepositional logic, conversion of sentences to wffs of predicate logic, Resolution, clause form, Skolem functions, Unification, Resolution in Propositional and predicate logic, Semantic Nets.

4. **Pattern Recognition:** Meaning of pattern, Pattern Recognition, Classification, Supervised & Unsupervised Learning of classifiers, K-NN, K-MEANS algorithms.

5. **Expert Systems:** Introduction, Advantages, components and participants in an expert system,Application

Readings:

1. Artificial Intelligence: E. Rich and K. Knight, Tata McGraw Hill.
2. Artificial Intelligence: A New Synthesis By Nilsson, Morgan Kaufmann.
3. Pattern Classification 2nd Edition By R.O. Duda, Hart, Stork (2001) ,John wiley, New York.
4. Pattern Recognition : Technique and Applications By Shinghal (2006) ,Oxford University Press,New Delhi.

MCA - 103

Relational Data Base Management System

1. **Overview of Database Management** :Data, Information and knowledge, Increasing use of data as a corporate resource, data processing verses data management, file oriented approach verses database oriented approach to data management; data independence, database administration roles, DBMS architecture, different kinds of DBMS users, importance of data dictionary, contents of data dictionary, types of database languages. Data models: network, hierarchical, relational. Introduction to distributed databases.

2. **Relational Model :** Entity - Relationship model as a tool for conceptual design-entities attributes and relationships. ER diagrams; Concept of keys: candidate key, primary key, alternate key, foreign key; Strong and weak entities, Case studies of ER modeling Generalization; specialization and aggregation. Converting an ER model into relational Schema. Extended ER features.

3. **Structured Query Language :**Relational Algebra: select, project, cross product different types of joins (inner join, outer joins, self join); set operations, Tuple relational calculus, Domain relational calculus, Simple and complex queries using relational algebra, stand alone and embedded query languages, Introduction to SQL constructs (SELECT…FROM, WHERE… GROUP BY… HAVING… ORDERBY….), INSERT, DELETE, UPDATE, VIEW definition and use, Temporary tables, Nestedqueries, and correlated nested queries, Integrity constraints: Not null, unique, check, primary key, foreignkey, references, Triggers. Embedded SQL and Application Programming Interfaces.

4. **Relational Database Design :**Normalization concept in logical model; Pitfalls in database design,

   update anomalies: Functional dependencies, Join dependencies, Normal forms (1NF, 2NF, 3NF). Boyce Codd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF. Issues in physical design; Concepts of indexes, File organization for relational tables, De-normalization.

5. **Introduction to Query Processing and Protecting the Database & Data Organizations :** Parsing, translation, optimization, evaluation and overview of Query Processing. Protecting the Data Base - Integrity, Security and Recovery. Domain Constraints, Referential Integrity, Assertion, Triggers, Security & Authorization in SQL.

Readings:

1. Database system concept By H. Korth and A. Silberschatz, TMH.
2. Data Base Management System By Alexies & Mathews , Vikas publication.
3. Data Base Management System By C. J. Date ,Narosha Pub.
4. Data Base Management System By James Matin .
5. Principles of Database System By Ullman.
6. An Introduction to database systems By Bipin Desai, 2011 ed.,Galgotia Publication.
7. Database Management System By A. K. Majumdar & P.Bhattacharya, TMH

MCA-104 **ELECTIVE-I** **(1)**

Advanced Java Programming

1. **Basics of Core JAVA:** class, interface, exception handling.**Collections :** Collection Interfaces, Concrete
   Collections, The Collections Framework **Multithreading :** Creating thread and running it, Multiple Thread acting on single object,Synchronization, Thread communication, Thread group, Thread priorities, Daemon Thread, Life Cycle of Thread.

2. **Networking:**Internet Addressing, InetAddress, Factory Methods, Instance Methods, TCP/IP Client Sockets, URL, URL Connection, TCP/IP Server Sockets, Datagrams.**Java Database Connectivity (JDBC):** Merging Data from Multiple Tables: Joining, Manipulating, Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures.

3. **Servlets:** Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle,HandlingHTTP get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with HttpSession

4. **Java Server Pages (JSP):** Introduction, JavaServer Pages Overview, A First JavaServer Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries, **Enterprise Java Bean:** Preparing a Class to be a JavaBean, Creating a JavaBean, JavaBean Properties,Types of beans, Stateful Session bean, Stateless Session bean, Entity bean

5. **Remote Method Invocation:** Defining the Remote Interface, Implementing the Remote Interface, Compiling and Executing the Server and the Client, **Struts:** Basics of Struts,Struts : What and Why?

   ,Model1 vs Model2 ,Struts2 Features, Steps to create Struts application ,Understanding Action class ,Understanding struts.xml file

Readings:

1. "Advanced Java 2 Platform HOW TO PROGRAM" by H. M.Deitel, P. J. Deitel, S. E. Santry – PrenticeHall
2. "Beginning Java™ EE 6 Platform with GlassFish 3 From Novice to Professional" by Antonio Goncalves
   – Apress publication

MCA-104 ELECTIVE-I (3)

Linux operating System and Shell Programming

1. **INTRODUCTION TO LINUX:** History, The Linux Architecture, Features of Linux, Internal and External Commands, Command Structure, difference between Linux and Unix, various Linux distributions, basic commands.**UTILITIES:** file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, Text processing utilities and backup utilities, Security commands. The vi editor, security by file Permissions.

2. **INTRODUCTION TO SHELLS:** Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell Edition Environment Customization. Filters. **GREP:** Operation, grep Family, Searching for File Content. **SED:** Scripts, Operation, Addresses, commands, Applications. **AWK:** Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, String Functions, Mathematical Functions, User – Defined Functions, Using System commands in awk, Applications.

3. **INTERACTIVE KORN SHELL:** Korn Shell Features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, Options, Startup Scripts, Command History, Command Execution Process. **KORN SHELL PROGRAMMING:** Basic Script concepts, Expressions, Decisions Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

4. **INTERACTIVE C SHELL:** C shell features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, On-Off Variables, Startup and Shutdown Scripts, Command History, Command Execution Scripts. **C SHELL PROGRAMMING:** Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

5. **FILE MANAGEMENT:** File Structures, System Calls for File Management – create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, Directory API – opendir, readdir, closedir, mkdir, rmdir, umask.

Readings:

1. Sumitabha Das, “Unix Concepts and Applications”, 4thEdition. TMH, 2006. (1, 2 units)
2. Behrouz A. Forouzan, Richard F. Gilbery, “Unix and shell Programming”, 1stEdition, Cengage Learning India, 2003.
3. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition.
4. Graham Glass, King Ables, “Unix for programmers and users”, 3rd Edition, Pearson Education,

MCA-105 ELECTIVE-II (1)

Computer Networks

1. **Introduction and Physical Layer :Introduction:** Goal and application Network Hardware and Software, Protocol Hierarchies, Design Issue of the layers, Interfaces and services, Connection oriented and connection less services, Service Primitives, Reference Models – The OSI Reference model, The TCP/IP Model ,Types of computer Network :LAN,MAN,WAN, Topologies, Transmission mode .

   Physical Layer :Data and signal, Analog and digital Communication, Transmission Media ,Concept of data transmission, Switching Techniques ,Communication Satellites – Geosynchronous Satellite – VSAT, Low Orbit Satellites, ISDN and ATM.

2. **Data Link Layer :** Data Link Layer design issues Data link control:Framing, Flow control. Error Detection and Correction. DLC protocol :Stop and Wait Protocol, Sliding window protocol, A Simplex protocol for noisy channel, Medium access sublayer: Channel allocation :static and dynamic ,Multiple access protocol FDDI, Data Link Layer in the Internet : SLIP,PPP. Wired and Wireless LAN protocol.

3. **Network Layer :** The Network Layer Design Issue, IP addressing, Address mapping, Error reporting ,Multicasting ,Delivery, Forwarding and Routing. The Network Layer in the Internet : The IP Protocol. subnets, Internet control protocols ,internet multicasting.

4. **Transport Layer :**The Transport layer services, The concept of client and server in terms ofsocket addressing Quality of service, Transport service primitives and buffering, Multiplexing, Crash Recovery. The Internet Transport Protocols (TCP/IP) – The TCP Service Model, The TCP protocol, The TCP segment header, TCP connection management, TCP transmission policy, TCP congestion control, TCP timer management, UDP.

5. **Presentation and Application Layer :** Network Security, Traditional Cryptography, Private key cryptography and public key cryptography, Authentication protocols, DNS ,SNMP,E-mail, application layer protocols.

Readings:

1. Data Communications and Networking By Forouzan, Tata McGraw Hill Company.
2. Computer Networks By A.S. Tanenbaum
3. Computer Network By S.S.Shinde ,New Age International Publisher.
4. Data and computer Communication by Shashi banzal ,Firewall media
5. Internetworking with TCP/IP :Principles,protocols,and Architecture Vol 1 5th Edition ,PHI publication
6. Data Communications and Computer Network by Prakash C Gupta, PHI Publication.

MCA-105 ELECTIVE-II (2)

Mobile Application Programming

1. **Introduction of Mobile Application:** Fundamentals of mobile applications, mobile Application environment and mobile operating Systems, IDEs and various Tools.

2. **Introduction of Mobility and Building blocks of Mobile Application.**: Mobile Application development Activity life cycle, Mobile Landscape, Mobile Platforms, overview of various Mobile application tools.

3. **Mobile Operating Systems:** Android library and its characteristic, iOS library and its characteristic, Windows Phone 7 library and its characteristic

4. **App functionality based User interface and Mobile functions:** Application user Interface designing, User Interface Element, Menu, interaction among the activities. Threads, Asynchronous task, Service – states and life cycles, Notifications, Broadcast receivers, Telephony and SMS API, Animation API multimedia –Audio/Video playback and record, location aware etc.

5. **Mobile Application development in Android:** Android Architecture -Android Stack –Linux Kernel, Android Runtime Environment Dalvik virtual Machine, Android Emulator. Basics Application creation and deployment in Android, Introduction of mobile application database SQLite.

Readings:

1. Professional Mobile Application Development, Jeff Mcwherter, Scott Gowell, Wrox Publisher, 1st Ed. 2012
2. Sams Teach Yourself Android Application Development in 24 Hrs, Lauren Darcy and Shane Conder, 1sted.
3:-Android Programming, Bill Philips and Brain Hardy.
4:Android Recipes : A problem-Solution Approach ,Dave Smith and Jeff friesen.

MCA-105 ELECTIVE-II (3)

VB.NET Programming

1. **.Net framework and VB.Net:** Evolution of the .NET Framework – Overview of the .Net Framework – VB.NET – Simple VB.Net Program. VARIABLES, CONSTANTS AND EXPRESSIONS: Value Types and Reference Types – Variable Declarations and Initializations – Value Data Types – Reference Data Types – Boxing and Unboxing – Arithmetic Operators – Textbox Control – Label Control – Button Control.

2. **Control Statements:** If Statements – Radio Button Control – Check Box Control – Group Box Control – Listbox Control – Checked List Box Control – Combo box Control – Select Case Statement – While Statement – Do Statement – For Statement. METHODS AND ARRAYS: Typesof Methods – One Dimensional Array – Multi Dimensional Arrays – Jagged Arrays. CLASSES: Definition And Usage of a Class – Constructor Overloading – Copy Constructor – Instance and Shared Class Members – Shared Constructors.

3. **Inheritance and Polymorphism**: Virtual Methods – Abstract Class and Abstract Methods – Sealed Classes. INTERFACES, NAMESPACES AND COMPONENTS: Definition of Interfaces – Multiple Implementations of Interfaces – Interface Inheritance – Namespaces – Components – Access Modifiers. DELEGATES, EVENTS AND ATTRIBUTES: Delegates – Events – Attributes – Reflection.

4. **Exception Handling**: Default Exception Handling Mechanism – User Defined Exception Handling Mechanism – Throw Statement – Custom Exception. MULTITHREADING: Usage Of Threads – Thread Class – Start(), Abort(), Join(), and Sleep() Methods – Suspend() And Resume() Methods – Thread Priority – Synchronization. I/O STREAMS: Binary Data Files – Text Files - Data Files – FileInfo and DirectoryInfo Classes.

5. **Additional Controls**: Timer – ProgressBar – LinkLabel – Panel – TreeView – Splitter – Menu – SDI & MDI – Dialog Boxes – Toolbar – StatusBar. DATABASE CONNECTIVITY: AdvantagesOf ADO.NET – Managed Data Providers – Developing a Simple ADO.NET Based Application –Creation of Data Table – Retrieving Data From Tables – Table Updating – Disconnected DataAccess Through Dataset Objects.

Readings:

1. Muthu C. (2008), "Visual Basic.NET", 2nd Ed., Vijay Nicole Imprints Pvt.Ltd.,.

MCA-204 **ELECTIVE-III** **(2)**

Cloud Computing

1. **Fundamental Cloud Computing-**Concepts, terminology, technologies, benefits, challenges, SLAs and business cost metrics associated with cloud computing,SaaS, IaaS, PaaS delivery models, common cloud deployment models, and cloud characteristics. Various applications of cloud computing.

2. **Cloud Architecture:** The technology architecture of cloud platforms and cloud-based solutions and services and their utilization via a set of cloud computing design patterns. hybrid cloud deployment models, compound design patterns, and solution architectures that span cloud and on-premise environments.

3. **Cloud Security & Governance**:**Cloud Security** :The cloud security mechanisms, A cloud security architecture. a set of security design patterns. **Cloud Governance :**the definition of cloud governanceprecepts, roles, practices, and processes, common governance challenges and pitfalls specific to cloudcomputing.

4. **Cloud Storage:** The cloud storage devices, structures, and technologies, cloud storage mechanisms, persistent storage, redundant storage, cloud-attached storage, cloud-remote storage, cloud storage gateways, cloud storage brokers, Direct Attached Storage (DAS), Network Attached Storage (NAS), Storage Area Network (SAN), various cloud storage-related design patterns.

5. **Cloud Virtualization& Microservices :** Core topic areas pertaining to the fundamental virtualization mechanisms and types used within contemporary cloud computing platforms are explored, along with various key performance indicators and related metrics. MicroServices of Cloud Computing.

Readings

1. Distributed Computing by Dollymore Cloud Computing (Wind) by Dr. Kumar Saurabh, 2nd Edison, Wiley India
2. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011 Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012

MCA-204 **ELECTIVE-III** **(3)**

Neural Networks and Deep Learning

1. Introduction to biological neuron, artificial neuron, biological neuron vs. artificial neuron, evolution of neural networks, basic models of artificial neural networks(ANN) : connections, learning :- supervised, unsupervised, reinforcement, activation functions, important terminology of ANN. McCulloh-Pitts neuron, linear separability, types of neural networks.

2. Perceptron Networks, implementation of AND gate, OR gate, NAND gate etc., Gradient descent algorithm, implementation of AND gate, OR gate, NAND gate etc., Building a neural controller for obstacle avoidance, Pseudo inverse solution, nonlinear separability, Back propagation(BP) networks, Derivation of BP algorithm for single hidden layer architecture, momentum terms, implementation of XOR problem using BP algorithm.

3. Radial basis function neural network (RBFNN): architecture, training algorithm, Recurrent neural network(RNN) : architecture, training algorithm, Back propagation through time (BPTT). Real time recurrent learning algorithm(RTRL), Functional link artificial neural networks (FLANN): architecture, training, delta learning rule, Extreme Learning Machine(ELM): architecture, learning algorithm, Modified multilayer neural network, modified Back propagation (BP) algorithm, Self organizing map(SOP)

4. Deep Learning : Introduction, Long short term memory(LSTM) network, Convolution neural network, Boltzman Machine network.

5. Applications: function optimization, classification, prediction, detection

Readings:

1. Neural Networks and Learning machines by Simon Haykin, PHI, 3rd Edition
2. Neural Network Design by M. Hagan, 2nd Edition, eBook
3. Principles of Soft Computing by S. N. Shivanandam and S. N. Deepa, Wiley, 2nd Edition
4. Artificial neural networks by B. Yegnanarayana, PHI.
5. Deep Learning by John D. Kelleher, MIT Press.
6. Neural networks and Deep learning by Charu C. Aggarwal, Springer, 1st Edition, 2018.
7. Research papers

MCA-205 **ELECTIVE-IV** **(1)**

Web Technology

1 **Internet Concept**: Fundamental of Web ,History of Web, Web development overview, Domain Name System (DNS),DHCP,and SMTP and other servers ,Internet service provider (ISP), Concept of IP Address, Internet Protocol, TCP/IP Architecture ,Web Browser and Web Server.

2. **HTML and DHTML:-** HTML Tag, Rules of HTML, Text Formatting and Style, List, Adding Graphics to Html Document, Tables and Layout , Linking Documents, Frame, Forms, Project in HTML, Introduction to DHTML, CSS, Class and DIV, External Style Sheet.

3. **Scripting Languages:** Java Script (JS) in Web Page, Advantage of Java Script, JS object model and hierarchy ,Handling event, Operators and syntax of JS, JS Function, Client side JS Vs Server side JS ,JS security, Introduction to VB Script, Operator and Syntax of VB Script, Dialog Boxes, Control and Loop, Function in VBS.

4. **XML:**Introduction to XML, XML in Action, Commercial Benefits of XML, Gaining Competitive advantage with XML, Programming in XML, XML Schema ,XSLT ,DOM structure model ,XML quires and transformation.

5. **Active Server Page (ASP):** Introduction ,Internet Information System (IIS),ASP object ,Server object, File system object, session ,Accessing data base with an ASP page ,ODBC – ADO connection object, common methods and properties, ADO record set object .Introduction to ASP.Net.

Readings:

1. The complete Reference By Thomos A. Powell ,TMH publication
2. Web Technology :A Developers Perspective ,N.P.Gopalan ,J.Akilandeswani,PHI Publication.
3. Java Script :The definite Guide By Flangam , O"Reilly
4. Java Script :Developers Resource by Kamran Husain and Jason Levitt PTR-PHI publication.
5."Mastering VB Script" BPB Publication.
6. World Wide Web design with HTML by Xavier Tata McGraw Hill Publication .
7. XML By Example, Sean Mc Grath Pentice Hall Publication.
8. Web Technology : A Developments Perspective , N.P. Gopalan, J. Akilandeswari, PHI Publication

MCA-205 ELECTIVE-IV (2)

Digital Image Processing

1. **Digital Image Processing (DIP):** Introduction, examples of fields that use DIP, fundamental steps in DIP, components of an image processing system. **Digital Image Fundamentals:** elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels.

2. **Image Transforms:** Two-dimensional (2D) impulse and its shifting properties, 2D continuous Fourier Transform pair, 2D sampling and sampling theorem, 2D Discrete Fourier Transform (DFT), properties of 2D DFT. **Other transforms and their properties:** Cosine transform, Sine transform, Walsh transform, Hadamard transform, Haar transform, Slant transform, KL transform.

3. **Image Enhancement: Spatial domain methods**: basic intensity transformation functions, fundamentals of spatial filtering, smoothing spatial filters (linear and non-linear), sharpening spatial filters (unsharp masking andhigh boost filters), combined spatial enhancement method. **Frequency domain methods:** basics of filtering in frequency domain, image smoothing filters (Butterworth and Gaussian low pass filters), image sharpening filters (Butterworth and Gaussian high pass filters), selective filtering.

4. **Image Restoration:** Image degradation/restoration, noise models, restoration by spatial filtering, noise reduction by frequency domain filtering, linear position invariant degradations, estimation of degradation function, inverse filtering, Wiener filtering, image reconstruction from projection.

5. **Image Compression**: **Fundamentals of data compression**: basic compression methods: Huffman coding, Golomb coding, LZW coding, Run-Length coding, Symbol based coding.

Readings

1. Gonzalez and Woods: Digital Image Processing, Pearson Education.
2. Anil Jain: Fundamentals of Digital Image Processing, PHI Learning.
3. Annadurai: Fundamentals of Digital Image Processing, Pearson Education.
4. Sonka, Hlavac and Boyle: Digital Image Processing and Computer Vision, Cengage Learning.
5. Chanda and Majumder: Digital Image Processing and Analysis, PHI Learning.
6. Jayaraman, Esakkirajan and Veerakumar: Digital Image Processing, TMH.
7. William K. Pratt, Digital Image Processing, Wiley India.

MCA-205 ELECTIVE-IV (3)

Pattern Recognition

1. **Pattern Concept:** Meaning of pattern, examples of patterns, importance of study of patterns in machine learning,meaning of labels, attributes, features, dimensions in patters with examples, pattern recognition and classification, meaning of machine learning

2. **Pattern Recognition and classification:** Meaning and importance in machine learning, supervised and unsupervised learning with meaning and examples, classifiers, k-nn classification and k-means clustering,implementation and applications

3. **Decision Trees:** Meaning of tree and hence decision tree, building a decision tree, decision tree induction,classification using a decision tree, classification using ID3

4. **Evolutionary Computing:** Meaning of evolutionary computing, various operators used in evolutionary computing, genetic algorithms and their applications, Particle Swarm Optimization and their applications, Multi-objective Genetic Algorithms with examples

5. **Ensemble of classifiers:** Meaning and importance of ensembles, boosting and AdaBoost algorithm, bagging and random forest, weak and strong learning, ensembles of classifiers with voting

Readings:

1. Pattern Classification: Duda, R.O, Peter Hart, David Stork, 2010, Wiley India
2. Data Mining: Concept and Techniques, Morgan and Kaufmann, 2001
3. Pattern Recognition: Rajjan Shinghal, Oxford University Press New Delhi, 2006
4. Ensemble Methods, Foundations and Algorithms, Zhi-Hua Zhou, A CRC Press, Chapman and Hall Book, 2010
5. Pattern Recognition, Robi Polikar, Wiley Encyclopedia of Biomedical Engineering, 2006 John Wiley & Sons, Inc

MCA- 301

Machine Learning

1. **Introduction**: Meaning and need of Machine Learning, Types of Machine Leaning: Supervised Learning, Unsupervised Learning, Semi Supervised Learning, Reinforcement Learning, Applications of Machine Learning, Type of Data in Machine Learning, Data Repository

2. **Introduction to Feature Analysis and Bayesian Theory**: Meaning of patterns and pattern classification, feature selection and curse of dimensionality, Bayesian theorem and concept learning, examples.

3. **Supervised Learning**: Introduction to supervised learning, its examples, classification models, classification algorithms with Implementation: k-nearest neighbor (kNN), Decision Tree, Random forest, Support Vector Machine (SVM),

4. **Unsupervised Learning** : Introduction to unsupervised learning, metrics for evaluating a feature, Clustering, types of clustering techniques, partitioning, hierarchical and density based clustering

5. **Modeling a classifier**: Validation, classification and prediction accuracy, confusion matrix, learning, bootstrap aggregation (bagging) , boosting, ensembles for classification

Readings:

1. Pattern Classification 2nd Edition By R.O. Duda, Hart, Stork (2001) ,John wiley, New York.

2. Pattern Recognition : Technique and Applications By Shinghal (2006) ,Oxford University Press, New Delhi.

3. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2006

MCA- 302

Computer Graphics and Multimedia

1. **Fundamentals of Computer Graphics:** Concepts and applications, Random and Raster scan devices,input-output devices: CRT, LCD, laser printer. Output primitives: Line drawing algorithm: DDA and Bresenham‟s; Circle generating algorithm: Bresenham‟s Midpoint algorithms, Ellipse: midpoint ellipse drawing algorithm. Antialising techniques: super sampling, pixel weighting, area sampling, pixel phasing Area filling: boundary fill algorithm, flood fill algorithm: Scan-line Polygon Fill Algorithm.

2. **Transformation, viewing, Clipping:** 2-D Transformation: Translation, scaling, rotation, reflection,shear, matrix representation of all homogeneous coordinates, composite transformations. Two dimensional viewing: Viewing pipeline Window-to-view port transformation. Clipping operations: Line Clipping: Cohen Sutherland and Liang-barsky, Polygon Clipping: Cohen-Sutherland-Hodgeman and Weiler – Atherton Polygon clipping.

3. **3D Transformation, Visible Surface Detection and curves:** Visible Surface detection Algorithm:Object based and image based methods, depth comparison, A-Buffer, Back face removal, Scan-line method, Depth Sorting Method Area subdivision method. 3-D Transformation: translation, scaling,rotation, reflection. Three- dimensional object representations 3-D Viewing Projections – parallel and perspective projection. Curved lines and Surfaces: Spline representations, Interpolating and approximation curves, continuity conditions Bezier curves: concept and characteristics; B-Splinecurves: concept and characteristics.

4. **Color Models and Basic Concept of Animation:** Introduction of multimedia: Properties and applications, types of medium, data stream characteristics, Basic File and Data format: BMP, JPEG,GIF, TIFF. Color models: RGB, YIQ, CMY, HSV. Animation: Basic concept, animation languages,computer-based animation, methods of controlling animation, display of animation, animation techniques: onion skinning, motion cycling, masking, morphing, and transmission ofanimation, Multimedia Authoring tools.

5. **Multimedia Systems:** Data compression: storage space, coding requirements. Source, entropy and hybrid coding some basic compression technique: runlength code, Huffman code. JPEG: Image preparation, Lossy sequential DCT –based mode, expanded Lossy DCT based mode, Lossless mode,and hierarchical mode. MPEG, Huffman Encoding, LWZ compression.

Readings:

1 Principles of interactive compo Graphics; W.M. Newman & Robert F Sproull.
2 Computer Graphics By Rogers TMH
3 Introductions to Computer Graphics AnirbanMukhopadhyay&Arup Chattopadhyay
4 Schaum's outlines -computer Graphics Mc Graw Hill International Edition.5

MCA-303

Data Mining and Data Warehousing

1. **Data Mining:** Meaning, necessity, steps, Normal searching Vs. knowledge extraction
2. **Data Mining on different types of databases:** Relational, Data Warehouses, Transactional, Object oriented, Object relational, Spatial, Temporal and time series, Text and multimedia, Heterogeneousand legacy.
3. **Data Warehouse:** Meaning, definition, OLTP Vs. OLAP, Data cube, star schema, snow flake schema, **fact** constellations, basic concepts in writing of DMQL, Three Tier Architecture of data warehouse, data mart, Indexing.
4. **Data Preprocessing :** Data cleaning, Data integration, Chi-square test, Data transformation, Data reduction, Dimensionality reduction : Principal component analysis (PCA), factor analysis (FA), Data compression : discrete Fourier Transform(DFT), discrete cosine transform (DCT), discrete Wavelet transform(DWT)
5. **Classification, Clustering and Prediction:** Meaning, k-nearest neighbourhood (k-NN), Neural network based classification, Support vector machine(SVM) classifier, Naïve Bayes classifier. Clustering : types of variables, distance measures, types of Clustering, Partioning Method: k-means, k-medoid clustering, Unsupervised : Hierarchical clustering, Prediction using Regression, nonlinear regression and Neural Network, Performance Measures. Types of training: holdout method, cross validation, leave-one-out method.
6. **Association rule mining**: Market basket analysis, support, confidence, Apriori algorithm

Readings:

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.

MCA 304 **ELECTIVE –V (1)**

Big Data Analytics

1. **Understanding Big Data**: Datasets, Data Analysis, Data Analytics-Descriptive Analysis, Diagnostics Analytics, Predictive Analytics, Prescriptive Analytics, Big Data Characteristics – volume, velocity, variety, veracity, value, Different Types of Data – Structured Data, Unstructured Data, Semi-Structured Data

2. **INTRODUCTION HADOOP**: Big Data – Apache Hadoop & Hadoop EcoSystem – MovingData in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization.

3. **HADOOP ARCHITECTURE** : Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read, NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

4. **Theory and methods for big data analytics**: Regression Modeling, Multivariate Analysis, Bayesian Modeling, Inference and Bayesian Networks, Support Vector and Kernel Methods, Analysis of Time Series: Linear Systems Analysis, Nonlinear Dynamics, Rule Induction, Decision Trees.

5. **Programming with R** : Basic Syntax, Data types, Variables, Operators, Decision Making, Loops, Functions, Vectors, lists, Matrices, Arrays, Data Frames, R Data Interfaces – CSV Files, Excel Files, Database, R charts & graphs , R statistics – Mean, Median, Mode, Linear Regression.

Readings:

1. Chris Eaton, Dirk deroos et al. , “Understanding Big data ”, McGraw Hill, 2012.
2. “Big Data Fundamentals: Concepts, Drivers & Techniques”, 1/e, 2016, Thomas Erl, Wajid Khattak, Paul Buhler, Prentice Hall.
3. “Big Data Analytics with R and Hadoop”, 1e, 2013, Vignesh Prajapati, Packt Publishing Ltd, UK.
4. “The Art of R Programming: A Tour of Statistical Software Design”,revised,2011, Norman Matloff, No Starch Press
5. . "Hadoop:The Definitive Guide," 3/e, 2012, Tom White, O'REILLY Publications.
6. "Understanding Big Data: Analytics for Enterprise Class Hadoop and streaming Data" ,2012, Paul Zikopoulos, IBM, Chris Eaton, Paul Zikopoulos, The McGraw-Hill Companies.

MCA- 304 **ELECTIVE-V (3)**

Data Science using Python

1. **Introduction to Python:** Introduction to python, variable, data type, control statements, loop statements, functions.
2. **Python for Data Science :** Numpy, Pandas, Matplotlib ,Seaborn etc
3. **Introduction to Data Science:** Introduction to data science, Overview of the data science process,Data PreProcessing.
4. **Machine Learning :** Introduction to machine learning, Linear regression and regularization, Modelselection and evaluation, **Classification:** KNN, decision trees, SVM.
5. **Clustering:** K-means, hierarchical clustering, **Dimensionality reduction:** PCA and SVD, Textmining and information retrieval, Network analysis,

Readings

1. James, G., Witten, D., Hastie, T., Tibshirani, R. An introduction to statistical learning with applicationsin Springer, 2013.
2. Han, J., Kamber, M., Pei, J. Data mining concepts and techniques. Morgan Kaufmann, 2011.
3. Hastie, T., Tibshirani, R., Friedman, J. The elements of statistical learning 2nd edition Springer.
4. Murphy, K. Machine learning: A probabilistic perspective, MIT Press.
5. Manning :Big Data using Python

MCA-305 ELECTIVE-VI (2)

Network Security

1. **Foundations of Cryptography and security:** Security trends, The OSI Security architecture Security attack, services and mechanism**,** Ciphers and secret messages, Mathematical tools for cryptography: substitution techniques, modular arithmetic, Euclid's algorithm, finite fields, polynomial arithmetic.

2. **Symmetric Cipher:** Symmetric cipher model, Design Principles of Block Ciphers, Theory of Block Cipher Design, Feistel cipher network structure, Data Encryption Standard (DES), Strength of DESTriple DES ,Modes of operation.Advance encryption Standard (AES)- Evaluation criteria of AES,AES cipher ,key distribution.

3. **Public Key cryptography and Hash function:** Prime numbers and testing for primarily, factoring large
numbers, Principles of public key cryptosystem, RSA algorithm. Key management: Diffie-Helman Key exchange, Hash and Message authentication Code (MAC), Hash and MAC algorithms, Digitalsignature.

4. **IP and Web security protocols:**Authentication application: Kerberos, Public key infrastructure .E-mail:
Pretty Good Privacy (PGP), S/MIME. IP security, Web Security: Secure Socket layer (SSL) and Transport layer security, Secure Electronic Transaction (SET).

5. **System Security**: Firewall, and Intrusion Detection system (IDS), Malicious Software.

Readings

1 . Cryptography and Network Security By William Stallings, 4th Edition Pearson Publication
2. Applied cryptography - protocols and algorithm By Buce Schneier, Springer Verlag 2003
3. Cryptography and Network Security By Atul Kahate , TMH Publication.
4. Cryptography and Network Security By Behrouz A. Forouzan, First Edition, TMH Publication.
5. Network Security:Private Communication in Public World By Charlie Kaufman,Radia Perlman and Mike Speciner ,PHI Publication.

MCA- 401

MAJOR PROJECT

Department of Computer Science & Information Technology Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

SYLLABUS FOR MCA COURSE UNDER CHOICE BASED CREDIT SYSTEM (CBCS) *

Session 2017-2018 (On and after)

MCA

Note: The decision of the GG Vishwavidyalaya for implementing CBCS system on this course shall be final, rest will remain the same.

Semester 1

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-101	Introduction to Information Technology	4		40	60	4
2	MCA-102	Computer programming & Numerical Methods	4		40	60	4
3	MCA-103	Discrete Mathematical Structures	4		40	60	4
4	MCA-104	Data Structures using C	4		40	60	4
5	MCA-105	Computer Organization	4		40	60	4
6	MCA-106	LAB: Data Structure using C		1		100	1
7	MCA-107	LAB-II: Computer Hardware and Digital Electronics		1		100	1
		Total	20	02	200	500	22

Semester 2

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-201	Principles of Operating System	4		40	60	4
2	MCA-202	Object Oriented Programming with C++	4		40	60	4
3	MCA-203	Theory of Computation	4		40	60	4
4	MCA-204	Elective I	4		40	60	4
5	MCA-205	Elective II	4		40	60	4
6	MCA-206	OOP Lab (C++)		1		100	1
7	MCA-207	LAB based on Elective- II		1		100	1
		Total	20	02	200	500	22

Semester 3

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-301	Probability and Statistics	4		40	60	4
2	MCA-302	Artificial Intelligence	4		40	60	4
3	MCA-303	Relational Data Base Management System	4		40	60	4
4	MCA-304	Elective III	4		40	60	4
5	MCA-305	Elective IV	4		40	60	4
6	MCA-306	RDBMS LAB		1		100	1
7	MCA-307	LAB based on Elective –III / IV		1		100	1
		Total	20	02	200	500	22

Semester 4

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-401	Design and Analysis of Algorithm	4		40	60	4
2	MCA-402	Compiler Design	4		40	60	4
3	MCA-403	Optimization Techniques	4		40	60	4
4	MCA-404	Elective V	4		40	60	4
5	MCA-405	Elective VI	4		40	60	4
6	MCA-406	Lab based on Elective V		1		100	1
7	MCA-407	Minor Project		1		100	1
		Total	20	02	200	500	22

Semester 5

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-501	Soft Computing	4		40	60	4
2	MCA-502	Computer Graphics and Multimedia	4		40	60	4
3	MCA-503	Data Mining and Data Warehousing	4		40	60	4
4	MCA-504	Elective VII	4		40	60	4

5	MCA-505	Elective VIII	4		40	60	4
6	MCA-506	Lab based on MATLAB		1		100	1
7	MCA-507	Minor Project		1		100	1
		Total	20	02	200	500	22

Semester 6

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-601	Major Project	-	-	-	500	15
		Total	-	-	-	-	15

Total Course Credits – 125
Note: Electives to be decided at the start of the respective semester

*** The syllabus is subjected to change as per the requirement.**

Electives

Sl.No	Paper Code	(I)	(2)	(3)
1	MCA-204 (Elective-I)	Computer Networks	System Analysis and Design	Introduction to Micro Processor
2	MCA-205 (Elective-II)	Object Oriented Software Engineering	Multimedia	Linux Operating System and Shell Programming
3	MCA-304 (Elective-III)	Advanced JAVA Programming	System Software	Neural Network
4	MCA-305 (Elective-IV)	Web Technology	Pattern Recognition	V.B.Net Programming
5	MCA-404 (Elective-V)	E-Commerce	Financial Accounting	Software Testing
6	MCA-405 (Elective-VI)	Mobile Application Programming	C# and .net Framework	Cloud Computing
7	MCA-504 (Elective-VII)	Big Data Analytics	Advanced Operating System	Parallel Processing
8	MCA-505 (Elective-VIII)	Management Information System	Network Security	Image Processing

MCA-501

Soft Computing

1. **Introduction** -What is soft computing, important soft computing techniques

2. **Artificial Neural Network** :Biological neural network Vs Artificial neural network, Neuron Model and Neural Network Architectures, ANN terminologies, ANN benefits, Supervised learning network :Error back propagation network, Perceptron learning (single layer only),Unsupervised learning network :Kohonen self organizing feature maps (SOM)

3. **Fuzzy Logic-**Crisp set Vs Fuzzy set, Operations on Fuzzy sets, Fuzzy relation, Membership function, Fuzzy arithmetic and Fuzzy measures

4. **Genetic Algorithm –** Introduction, representations of GA by binary and real-valued numbers, Genetic Operators and Parameters: Selection, crossover, mutation, elitism, Genetic Algorithms inProblem Solving

5 **Swarm Intelligence:** Meaning, Particle Swarm Optimization: basics, terminology, problem solving using PSO

Readings:

1. Principles of soft computing , S.N.Shivanandan and S.N. deepa Wiley India publication ,First Indian edition ,2008.
2. A Comprehensive Foundation to Neural Networks , Simon Haykins , Prentice Hall
3. Fuzzy Sets and Fuzzy Logic: Theory and Applications , G. J. Klir, and B. Yuan, PHI learning ,2011.
4. Dr.G.Canon, Fuzzy Logic and Fuzzy Decision Making: Concepts and Applications, Galgotia Publication.
5. D. E. Goldberg, Genetic Algorithms in Search, Optimization, and Machine Learning, Addison-Wesley, 1989.
6. Jang,Sun and Mizutani :Neuro-Fuzzy and soft computing :A computational Approach to learning and machine intelligence ,PHI learning ,2011.
7. N.K. Sinha & M. M. Gupta(Eds), Soft Computing and Intelligent Systems: Theory & Applications, Academic Press, 2000.

MCA- 502

Computer Graphics and Multimedia

1. **Fundamentals of Computer Graphics:** Concepts and applications, Random and Raster scan devices,input-output devices: CRT, LCD, laser printer. Output primitives: Line drawing algorithm: DDA and Bresenham‟s; Circle generating algorithm: Bresenham‟s Midpoint algorithms, Ellipse: midpoint ellipse drawing algorithm. Antialising techniques: super sampling, pixel weighting, area sampling, pixel phasing Area filling: boundary fill algorithm, flood fill algorithm: Scan-line Polygon Fill Algorithm.

2. **Transformation, viewing, Clipping:** 2-D Transformation: Translation, scaling, rotation, reflection,shear, matrix representation of all homogeneous coordinates, composite transformations. Two dimensional viewing: Viewing pipeline Window-to-view port transformation. Clipping operations: Line Clipping: Cohen Sutherland and Liang-barsky, Polygon Clipping: Cohen-Sutherland-Hodgeman and Weiler – Atherton Polygon clipping.

3. **3D Transformation, Visible Surface Detection and curves:** Visible Surface detection Algorithm:Object based and image based methods, depth comparison, A-Buffer, Back face removal, Scan-line method, Depth Sorting Method Area subdivision method. 3-D Transformation: translation, scaling,rotation, reflection. Three- dimensional object representations 3-D Viewing Projections – parallel and perspective projection. Curved lines and Surfaces: Spline representations, Interpolating and approximation curves, continuity conditions Bezier curves: concept and characteristics; B-Spline curves: concept and characteristics.

4. **Color Models and Basic Concept of Animation:** Introduction of multimedia: Properties and applications, types of medium, data stream characteristics, Basic File and Data format: BMP, JPEG,GIF, TIFF. Color models: RGB, YIQ, CMY, HSV. Animation: Basic concept, animation languages,computer-based animation, methods of controlling animation, display of animation, animation techniques: onion skinning, motion cycling, masking, morphing, and transmission of animation, Multimedia Authoring tools.

5. **Multimedia Systems:** Data compression: storage space, coding requirements. Source, entropy and hybrid coding some basic compression technique: runlength code, Huffman code. JPEG: Image preparation, Lossy sequential DCT –based mode, expanded Lossy DCT based mode, Lossless mode,and hierarchical mode. MPEG, Huffman Encoding, LWZ compression.

Readings:

1 Principles of interactive compo Graphics; W.M. Newman & Robert F Sproull.
2 Computer Graphics By Rogers TMH
3 Introductions to Computer Graphics AnirbanMukhopadhyay&Arup Chattopadhyay

MCA-503

Data Mining and Data Warehousing

1. **Data Mining:** Meaning, necessity, steps, Normal searching Vs. knowledge extraction

2. **Data Mining on different types of databases:** Relational, Data Warehouses, Transactional, Object oriented, Object relational, Spatial, Temporal and time series, Text and multimedia (i) Heterogeneous and legacy.

3. **Data Warehouse:** Meaning, definition, OLTP Vs. OLAP, Data cube, star, snow flake,constellations, basic concepts in writing of DMQL, Three Tier Architecture, Indexing.

4. **Data Preprocessing :** Noisy data, Inconsistent data, Data integration, Data transformation, Dimensionality reduction, Data compression.

5. **Classification, Clustering and Prediction:** Meaning, Neural network based classification, k-nearest neighbourhood (kNN) classifiers, Clustering, Types of Clustering, Partioning Method: k-means clustering, Prediction using Regression and Neural Network, Performance Measures.

Readings:

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.

MCA 504 ELECTIVE –VII (1)

Big Data Analytics

1. **Understanding Big Data**: Datasets, Data Analysis, Data Analytics-Descriptive Analysis, Diagnostics Analytics, Predictive Analytics, Prescriptive Analytics, Big Data Characteristics – volume, velocity, variety, veracity, value, Different Types of Data – Structured Data, Unstructured Data, Semi-Structured Data

2. **INTRODUCTION HADOOP**: Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Datain and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization.

3. **HADOOP ARCHITECTURE** : Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read, NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

4. **Theory and methods for big data analytics**: Regression Modeling, Multivariate Analysis, Bayesian Modeling, Inference and Bayesian Networks, Support Vector and Kernel Methods, Analysis of Time Series: Linear Systems Analysis, Nonlinear Dynamics, Rule Induction, Decision Trees.

5. **Programming with R** : Basic Syntax, Data types, Variables, Operators, Decision Making, Loops, Functions, Vectors, lists, Matrices, Arrays, Data Frames, R Data Interfaces – CSV Files, Excel Files, Database, R charts & graphs , R statistics – Mean, Median, Mode, Linear Regression.

Readings:

1. Chris Eaton, Dirk deroos et al. , “Understanding Big data ”, McGraw Hill, 2012.
2. “Big Data Fundamentals: Concepts, Drivers & Techniques”, 1/e, 2016, Thomas Erl, Wajid Khattak, Paul Buhler, Prentice Hall.
3. “Big Data Analytics with R and Hadoop”, 1e, 2013, Vignesh Prajapati, Packt Publishing Ltd, UK.
4. “The Art of R Programming: A Tour of Statistical Software Design”,revised,2011, Norman Matloff, No Starch Press
5. . "Hadoop:The Definitive Guide," 3/e, 2012, Tom White, O'REILLY Publications.
6. "Understanding Big Data: Analytics for Enterprise Class Hadoop and streaming Data" ,2012, Paul Zikopoulos, IBM, Chris Eaton, Paul Zikopoulos, The McGraw-Hill Companies.
7. "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications",2014, Bart Baesens, Wiley Publications .

MCA-505 ELECTIVE-VIII (2)

Network Security

1. **Foundations of Cryptography and security:** Security trends, The OSI Security architecture Security attack, services and mechanism**,** Ciphers and secret messages, Mathematical tools for cryptography: substitution techniques, modular arithmetic, Euclid's algorithm, finite fields, polynomial arithmetic.

2. **Symmetric Cipher:** Symmetric cipher model, Design Principles of Block Ciphers, Theory of Block Cipher Design, Feistel cipher network structure, Data Encryption Standard (DES), Strength of DES Triple DES ,Modes of operation.Advance encryption Standard (AES)- Evaluation criteria of AES,AES cipher ,key distribution.

3. **Public Key cryptography and Hash function:** Prime numbers and testing for primarily, factoring large numbers, Principles of public key cryptosystem, RSA algorithm. Key management: Diffie-Helman Key exchange, Hash and Message authentication Code (MAC), Hash and MAC algorithms, Digital signature.

4. **IP and Web security protocols:**Authentication application: Kerberos, Public key infrastructure .E-mail: Pretty Good Privacy (PGP), S/MIME. IP security, Web Security: Secure Socket layer (SSL) andTransport layer security, Secure Electronic Transaction (SET).

5. **System Security**: Firewall, and Intrusion Detection system (IDS), Malicious Software.

Readings

1 . Cryptography and Network Security By William Stallings, 4th Edition Pearson Publication
2. Applied cryptography - protocols and algorithm By Buce Schneier, Springer Verlag 2003
3. Cryptography and Network Security By Atul Kahate , TMH Publication.
4. Cryptography and Network Security By Behrouz A. Forouzan, First Edition, TMH Publication.
5. Network Security:Private Communication in Public World By Charlie Kaufman,Radia Perlman and Mike Speciner ,PHI Publication.

MCA-505 ELECTIVE-VIII (3)

Digital Image Processing

1. **Digital Image Processing (DIP):** Introduction, examples of fields that use DIP, fundamental steps in DIP, components of an image processing system. **Digital Image Fundamentals:** elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels.
2. **Image Transforms:** Two-dimensional (2D) impulse and its shifting properties, 2D continuous Fourier Transform pair, 2D sampling and sampling theorem, 2D Discrete Fourier Transform (DFT), properties of 2D DFT. **Other transforms and their properties:** Cosine transform, Sine transform, Walsh transform, Hadamard transform, Haar transform, Slant transform, KL transform.
3. **Image Enhancement: Spatial domain methods**: basic intensity transformation functions, fundamentals of spatial filtering, smoothing spatial filters (linear and non-linear), sharpening spatial filters (unsharp masking and high boost filters), combined spatial enhancement method. **Frequency domain methods:** basics of filtering in frequency domain, image smoothing filters (Butterworth and Gaussian low pass filters), image sharpening filters (Butterworth and Gaussian high pass filters), selective filtering.
4. **Image Restoration:** Image degradation/restoration, noise models, restoration by spatial filtering, noise reduction by frequency domain filtering, linear position invariant degradations, estimation of degradation function, inverse filtering, Wiener filtering, image reconstruction from projection.
5. **Image Compression**: **Fundamentals of data compression**: basic compression methods: Huffman coding, Golomb coding, LZW coding, Run-Length coding, Symbol based coding.

MCA- 601

MAJOR PROJECT

HEAD
DEPT OF CSIT
G.G.V. BILASPUR (C.G.)

Department : *Computer Science and Information Technology*

Programme Name : *B.Sc(CS)*

Academic Year : 2021-22

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	(SSCICR0305L)	Internet Technologies
02.	SSCICR0306L	Database Management Systems
03.	SSCICR0307L	Computer Networks
04.	SSCISC0301(L+P)-A	HTML and XML Programming
05.	SSCISC0301(L+P)-B	UNIX / LINUX programming
06.	(SSCICR0409L)	Software Engineering
07.	SSCIGE0404(L+P)	Multimedia and Applications
08.	SSCISC0402(L+P)-A	PHP Programming
09.	SSCISC0402(L+P)-B	MATLAB
10.	SSCIDS0502(L+P)-A	Image Processing
11.	SSCIDS0502(L+P)-B	Soft Computing
12.	SSCICR0614(L+P)	Computer Graphics
13.	(SSCIDS0603L)-A	Big Data Analytics
14.	(SSCIDS0603L)-B	Data Mining
15.	(SSCIDS0604)	Major Project

HEAD
DEPT OF CSIT
G.G.V. BILASPUR (C.G.)

School of Mathematical and Computational Sciences:

B.Sc. Honours Computer Science, Department of CSIT, GGV, Bilaspur

Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week
I	Core-1	**(SSCICR0101L)**	Programming Fundamentals using C++	4	4
	Core -1 Practical	**(SSCICR0101P)**	Lab Based on Programming Fundamentals using C++	2	4
	Core -2	**(SSCICR0102L)**	Data Structures	5	5
	Core -2 Tutorial	**(SSCICR0102T)**	Tutorials Based on Data Structures	1	1
	Generic Elective -1 (GE- IA)	**(SSCIGE0101L)**	Introduction to Programming using C	4	4
	Generic Elective - Practical	**(SSCIGE0101P)**	Lab Based on Introduction to Programming using C	2	4
	Ability Enhancement Compulsory Course (AECC)	**(SSCICC0101L)**	English Communication / MIL (Hindi Communication)	4*	4
	ECA	**(SSCIEC0101)**	ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others	2	(2)
			TOTAL	24	28

Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week
II	Core-3	MS/CS /C-203L **(SSCICR0203L)**	Programming in JAVA	4	4
	Core -3 Practical	MS/CS /C-203P **(SSCICR0203P)**	Lab Based on Programming in JAVA	2	4
	Core -4	MS/CS /C-204L **(SSCICR0204L)**	Discrete Structures	5	5
	Core -4 Tutorial	MS/CS /C-204T **(SSCICR0204T)**	Tutorial on Discrete Structures	1	1
	Generic Elective -2 (GE-IB)	MS/CS /GE-202L **(SSCIGE0202L)**	Introduction to Internet Technologies	4	4
	Generic Elective - Practical	MS/CS /GE-202P **(SSCIGE0202P)**	Lab Based on Internet Technologies	2	4
	Ability Enhancement Compulsory Course (AECC)	MS/CS /AE-201/ES **(SSCICC0202L)**	Environmental Science	4*	4
	ECA	**(SSCIEC0202)**	ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others	2	(2)
			Total	24	28
SUMMER Internship: 15 days			**Swayam Swachhta / NSS / Industrial/ others**	**2**	**100**

Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week
III	Core-5	**(SSCICR0305L)**	Internet Technologies	5	5
	Core -5 Tutorials	**(SSCICR0305T)**	Tutorials on Internet Technologies	1	1
	Core -6	**(SSCICR0306L)**	Database Management Systems	4	4
	Core -6 Practical	**(SSCICR0306P)**	Lab based on Database Management System	2	4
	Core - 7	**(SSCICR0307L)**	Computer Networks	5	5
	Core – 7 Tutorial	**(SSCICR0307T)**	Tutorial on Computer Networks	1	1
	Generic Elective -3	**(SSCIGE0303L)**	Introduction to Database Systems	4	4

	(GEII-A)				
	Generic Elective - Practical	**(SSCIGE0303P)**	Lab Based on Database System	2	4
	Skill Enhancement Course (SEC - 1)	**(SSCISC0301L)**	**A.HTML and XML Programming** B. UNIX/LINUX Programming	2	2
			Total	26	30

Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week
IV	Core-8	MS/CS /C-408L **(SSCICR0408L)**	Computer System Architecture	5	5
	Core -8 Tutorials	MS/CS /C-408T **(SSCICR0408T)**	Tutorials on Computer System Architecture	1	1
	Core -9	MS/CS/C-409L **(SSCICR0409L)**	Software Engineering	4	4
	Core -9 Practical	MS/CS /C-409P **(SSCICR0409P)**	Lab Based on Software Engineering	2	4
	Core - 10	MS/CS /C-410L **(SSCICR0410L)**	Design and Analysis of Algorithms	5	5
	Core -10 Tutorials	MS/CS/C-410T **(SSCICR0410L)**	Tutorials on Design and Analysis of Algorithms	1	1
	Generic Elective -4 (GEII-B)	MS/CS/GE-404L **(SSCIGE0404L)**	Multimedia and Applications	4	4
	Generic Elective - Practical	MS/CS /GE-404P **(SSCIGE0404P)**	Lab Based on Multimedia and Applications	2	4
	Skill Enhancement Course (SEC - 2)	MS/CS/SEC-402 **(SSCISC0402L+P)**	A.PHP Programming B.MATLAB	2	2
			TOTAL	26	30
SUMMER Internship: 15 days			**Swayam Swachhta / NSS / Industrial/ others**	**2**	**100**

Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week
V	Core-11	MS/CS /C-511L **(SSCICR0511L)**	Operating System	5	5
	Core -11 Tutorials	MS/CS /C-511T **(SSCICR0511T)**	Tutorials based on Operating system	1	1
	Core -12	MS/CS /C-512L **(SSCICR0512L)**	Theory of Computation	5	5
	Core -12 Tutorials	MS/CS /C-512T **(SSCICR0512T)**	Tutorials on Theory of Computation	1	1
	Discipline Specific Elective (DSE-1)	MS/CS/DSE-501L(A) MS/CS/DSE-501L(B) **(SSCIDS0501L)**	A Information Security B Operation Research	5(A) 5(B)	5(A) 5(B)
	DSE-1 - Tutorials	MS/CS/DSEP-501T(A) MS/CS/DSET-501T(B) **(SSCIDS0501T)**	A Tutorials on Information Security B Tutorials on Operation Research	1(A) 1(B)	1(A) 1(B)
	Discipline Specific Elective (DSE-2)	MS/CS/DSE-502L(A) MS/CS/DSE-502L(B) **(SSCIDS0502L)**	A Image Processing B Soft Computing	4(A) 4(B)	4(A) 4(B)
	DSE-2 - Practical	MS/CS/DSET-502P(A) MS/CS/DSEP-502P(B) **(SSCIDS0502P)**	A Lab Based on Image Processing B Lab Based on Soft Computing	2(A) 2(B)	4(A) 4(B)
			TOTAL	24	26

Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week
VI	Core-13	MS/CS /C-613L **(SSCICR0613L)**	Artificial Intelligence	5	5
	Core -13 Tutorials	MS/CS /C-613T **(SSCICR0613T)**	Tutorials on Artificial Intelligence	1	1
	Core -14	MS/CS/C-614L **(SSCICR0614L)**	Computer Graphics	4	4
	Core -14 Practical	MS/CS /C-614P **(SSCICR0614T)**	Lab based on Computer Graphics	2	4
	Discipline Specific Elective (DSE-3)	MS/CS/DSE-601L(A) MS/CS/DSE-601L (B) **(SSCIDS0603L)**	A Big Data Analytics B Data Mining	5(A) 5(B)	5(A) 5(B)
	DSE-3 - Tutorials	MS/CS/DSET-601T(A) MS/CS/DSET-601T(B) **(SSCIDS0603T)**	A Tutorials on Big Data Analytics B Tutorials on Data Mining	1(A) 1(B)	1(A) 1(B)
	Discipline Specific Elective (DSE-4) + DSE-4 – Practical **Or** Dissertation/ Project work followed by seminar	MS/CS/PW **(SSCIDS0604)**	Project work followed by seminar	4+2=6 **Or** 5 +1=6	8
			TOTAL	24	28
			TOTAL CREDITS	**152 + 4 (SI)**	

COMPUTER SCIENCE (C-V): Internet Technologies Theory: 60 Lectures

Java **(5 lectures)**

Use of Objects, Array and ArrayList class

JavaScript *(15 lectures)*

Data types, operators, functions, control structures, events and event handling.

JDBC **(10 lectures)**

JDBC Fundamentals, Establishing Connectivity and working with connection interface, Working with statements, Creating and Executing SQL Statements, Working with Result Set Objects.

JSP *(20 lectures)*

Introduction to JavaServer Pages, HTTP and Servlet Basics, The Problem with Servlets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, Implicit JSP Objects, Conditional Processing, Displaying Values, Using an expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Database Access.

Java Beans **(10 Lectures)**

Java Beans Fundamentals, JAR files, Introspection, Developing a simple Bean, Connecting to DB

Recommended Books:

1. Ivan Bayross, Web Enabled Commercial Application Development Using Html, Dhtml,javascript, Perl Cgi , BPB Publications, 2009.
2. Cay Horstmann, BIG Java, Wiley Publication , 3rd Edition., 2009
3. Herbert Schildt , Java 7, The Complete Reference, , 8th Edition, 2009.
4. Jim Keogh ,The Complete Reference J2EE, TMH, , 2002.
5. O'Reilly , Java Server Pages, Hans Bergsten, Third Edition, 2003.

COMPUTER SCIENCE (CORE -V): Internet Technologies Tutorial Tutorial : 15 lectures

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COMPUTER SCIENCE (C-VI): Database Management Systems

Theory:60 Lectures

Lectures

***1.** Introduction (6)*

Characteristics of database approach, data models, database system architecture and data Independence.

***2.** Entity Relationship(ER) Modelling (8 Lectures)*

Entity types, relationships, constraints.

***3.** Relation data model (20 Lectures)*

Relational model concepts, relational constraints, relational algebra, SQLqueries

4. Database design (15 Lectures)

Mapping ER/EER model to relational database, functional dependencies,Lossless decomposition, Normalforms(upto BCNF).

5. Transaction Processing (3 Lectures)

ACID properties, concurrency control

6. File Structure and Indexing (8 Lectures)

Operations on files, File of Unordered and ordered records, overview of File organizations, Indexing structures for files(Primary index, secondary index, clustering index), Multilevel

+

indexing using B and B trees.

th

Books Recommended:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6 Edition, Pearson Education, 2010.
2. R. Ramakrishanan, J. Gehrke, Database Management Systems Edition, McGraw-Hill, 3rd 2002.
th
3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6 Edition, McGraw Hill, 2010.

4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and applicationProgramming, 6th Edition, Pearson Education,2013.

COMPUTER SCIENCE LAB (C-VI): Database Management SystemsLab
Practical: 60 Lectures

Create and use the following database schema to answer the given queries.

EMPLOYEE Schema

Field	Type	NULL	KEY	DEFAULT
Eno	Char(3)	NO	PRI	NIL
Ename	Varchar(50)	NO		NIL
Job_type	Varchar(50)	NO		NIL
Manager	Char(3)	Yes	FK	NIL
Hire_date	Date	NO		NIL
Dno	Integer	YES	FK	NIL
Commission	Decimal(10,2)	YES		NIL
Salary	Decimal(7,2)	NO		NIL

DEPARTMENT Schema

Field	*Type*	*NULL*	*KEY*	**DEFAULT**
Dno	Integer	No	PRI	
	NULLDname	Varchar(50)		
	Yes	NULL		
Location	Varchar(50)	Yes		New Delhi

Query List

1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee withthe Employee Number appearing first.
2. Query to display unique Jobs from the Employee Table.
3. Query to display the Employee Name concatenated by a Job separated by a comma.

4. Query to display all the data from the Employee Table. Separate each Column by a comma andname the said column as THE_OUTPUT.
5. Query to display the Employee Name and Salary of all the employees earning more than $2850.
6. Query to display Employee Name and Department Number for the Employee No= 7900.
7. Query to display Employee Name and Salary for all employees whose salary is not in the rangeof $1500 and $2850.
8. Query to display Employee Name and Department No. of all the employees in Dept 10 andDept 30 in the alphabetical order by name.
9. Query to display Name and Hire Date of every Employee who was hired in 1981.
10. Query to display Name and Job of all employees who don_t have a current Manager.
11. Query to display the Name, Salary and Commission for all the employees who earncommission.
12. Sort the data in descending order of Salary and Commission.
13. Query to display Name of all the employees where the third letter of their name is _A_.
14. Query to display Name of all employees either have two _R_s or have two _A_s in theirname and are either in Dept No = 30 or their Manger_s Employee No = 7788.
15. Query to display Name, Salary and Commission for all employees whose Commission Amountis 14 greater than their Salary increased by 5%.
16. Query to display the Current Date.
17. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after sixmonths of employment.
18. Query to display Name and calculate the number of months between today and the date eachemployee was hired.
19. Query to display the following for each employee <E-Name> earns < Salary> monthly butwants < 3 * Current Salary >. Label the Column as Dream Salary.
20. Query to display Name with the 1st letter capitalized and all other letter lower case and lengthof their name of all the employees whose name starts with _J_, _A_ and _M_.
21. Query to display Name, Hire Date and Day of the week on which the employee started.
22. Query to display Name, Department Name and Department No for all the employees.

23. Query to display Unique Listing of all Jobs that are in Department # 30.

24. Query to display Name, Dept Name of all employees who have an _A_ in their name.
25. Query to display Name, Job, Department No. And Department Name for all the employeesworking at the Dallas location.

26. Query to display Name and Employee no. Along with their Manger_s Name and the Manager_semployee no; along with the Employees_ Name who do not have a Manager.

27. Query to display Name, Dept No. And Salary of any employee whose department No. and salary matches both the department no. And the salary of any employee who earns acommission.

28. Query to display Name and Salaries represented by asterisks, where each asterisk (*)signifies $100.

29. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees

30. Query to display the number of employees performing the same Job type functions.

31. Query to display the no. of managers without listing their names.

32. Query to display the Department Name, Location Name, No. of Employees and theaverage salary for all employees in that department.

33. Query to display Name and Hire Date for all employees in the same dept. as Blake.

34. Query to display the Employee No. And Name for all employees who earn more thanthe average salary.
35. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a _T_.

36. Query to display the names and salaries of all employees who report to King.

37. Query to display the department no, name and job for all employees in the Sales department.

COMPUTER SCIENCE (C-VII): Computer Networks Theory: 60 Lectures

1. Introduction to Computer Networks **(8 Lectures)**

Network definition; network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite.

2. Data Communication Fundamentals and Techniques **(10 Lectures)**

Analog and digital signal; data-rate limits; digital to digital line encoding schemes; pulse code modulation; parallel and serial transmission; digital to analog modulation-; multiplexing techniques- FDM, TDM; transmission media.

3. Networks Switching Techniques and Access mechanisms **(10 Lectures)**

Circuit switching; packet switching- connectionless datagram switching, connection-oriented virtual circuit switching; dial-up modems; digital subscriber line; cable TV for data transfer.

4. Data Link Layer Functions and Protocol **(10 Lectures)**

Error detection and error correction techniques; data-link control- framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ; Point to Point Protocol on Internet.

5. Multiple Access Protocol and Networks **(5 Lectures)**

CSMA/CD protocols; Ethernet LANS; connecting LAN and back-bone networks- repeaters, hubs, switches, bridges, router and gateways; Routing; routing algorithms; network layer protocol of Internet –IP protocol, Internet control protocol. Transport services-error and flow control, Connection establishment and release- three way handshake.

8. Overview of Application layer protocol **(5 Lectures)**

Overview of DNS protocol; Overview of WWW &HTTP protocol.

Reference Books

1. B. A. Forouzan: Data Communications and Networking, Fourth edition, THM ,2007.
2. A. S. Tanenbaum: Computer Networks, Fourth edition, PHI , 2002

COMPUTER SCIENCE (C-VII): Computer Networks Tutorial **Tutorial : 15 lectures**

Generic Elective -3 (GE- 3A) Subject – Introduction to Database System

Theory: 60 lectures

Database: Introduction to database, relational data model, DBMS architecture, data independence, DBA, database users, end users, front end tools **14L**

E-R Modeling: Entity types, entity set, attribute and key, relationships, relation types, E- R diagrams, database design using ER diagrams **14L**

Relational Data Model: Relational model concepts, relational constraints, primary and foreign key, normalization: 1NF, 2NF, 3NF **14L**

Structured Query Language: SQL queries, create a database table, create relationships between database tables, modify and manage tables, queries, forms, reports, modify, filter and view data. **18L**

Reference Books :

1. P. Rob, C. Coronel, Database System Concepts by, Cengage Learning India, 2008
2. R. Elmsasri,S. Navathe Fundamentals of Database Systems, Pearson Education, Fifth Edition, 2007
3. MySQL : Reference Manual

Generic Elective (GE- 3) LAB : Database System Practical

Practical : 15 Lectures

Introduction to Database System Lab *Practical: 15 lectures*

1) Create a database having two tables with the specified fields, to computerize a librarysystem of a Delhi University College.
LibraryBooks (Accession number, Title, Author, Department, PurchaseDate,Price)
IssuedBooks (Accession number, Borrower)

a) Identify primary and foreign keys. Create the tables and insert at least 5 records ineach table.
b) Delete the record of book titled —Database System Concepts‖.
c) Change the Department of the book titled —Discrete Maths‖ to —CS‖.
d) List all books that belong to —CS‖ department.
e) List all books that belong to —CS‖ department and are written by author —Navathe‖.
f) List all computer (Department=‖CS‖) that have been issued.
g) List all books which have a price less than 500 or purchased between —01/01/1999‖and —01/01/2004‖.

2) Create a database having three tables to store the details of students of Computer Department.

Personal information about Student (College roll number, Name of student, Date of birth, Address, Marks(rounded off to whole number) in percentage at 10 + 2, Phonenumber) Paper Details (Paper code, Name of the Paper)

Student's Academic and Attendance details (College roll number, Paper code, Attendance, Marks in home examination).

a) Identify primary and foreign keys. Create the tables and insert at least 5 records ineach table.
b) Design a query that will return the records (from the second table) along with the name of student from the first table, related to students who have more than 75%attendance and more than 60% marks in paper 2.
c) List all students who live in —Delhi‖ and have marks greater than 60 in paper 1.
d) Find the total attendance and total marks obtained by each student.
e) List the name of student who has got the highest marks in paper 2.

3) Create the following tables and answer the queries given below:**Customer (CustID, email, Name, Phone, ReferrerID)**
Bicycle (BicycleID, DatePurchased, Color, CustID, ModelNo)
BicycleModel (ModelNo, Manufacturer, Style) Service (StartDate, BicycleID, EndDate)

a) Identify primary and foreign keys. Create the tables and insert at least 5 records in eachtable.
b) List all the customers who have the bicycles manufactured by manufacturer —Honda‖.
c) List the bicycles purchased by the customers who have been referred by customer —C1‖.
d) List the manufacturer of red colored bicycles.
e) List the models of the bicycles given for service.

4) Create the following tables, enter at least 5 records in each table and answer the queriesgiven below.

EMPLOYEE (Person_Name, Street, City) WORKS (Person_Name, Company_Name, Salary)COMPANY (Company_Name, City)
MANAGES (Person_Name, Manager_Name)

a) Identify primary and foreign keys.
b) Alter table employee, add a column —email‖ of type varchar(20).
c) Find the name of all managers who work for both Samba Bank and NCB Bank.
d) Find the names, street address and cities of residence and salary of all employees whowork for —Samba Bank‖ and earn more than $10,000.
e) Find the names of all employees who live in the same city as the company for whichthey work.
f) Find the highest salary, lowest salary and average salary paid by each company.
g) Find the sum of salary and number of employees in each company.
h) Find the name of the company that pays highest salary.

5) Create the following tables, enter at least 5 records in each table and answer the

queriesgiven below.

Suppliers (SNo, Sname, Status, SCity)Parts (PNo, Pname, Colour, Weight, City) Project (JNo, Jname, Jcity) Shipment (Sno, Pno, Jno, Qunatity)

a) Identify primary and foreign keys.
b) Get supplier numbers for suppliers in Paris with status>20.
c) Get suppliers details for suppliers who supply part P2. Display the supplier list in increasing order of supplier numbers.
d) Get suppliers names for suppliers who do not supply part P2.
e) For each shipment get full shipment details, including total shipment weights.
f) Get all the shipments where the quantity is in the range 300 to 750 inclusive.
g) Get part nos. for parts that either weigh more than 16 pounds or are supplied bysuppliers S2, or both.
h) Get the names of cities that store more than five red parts.
i) Get full details of parts supplied by a supplier in London.
j) Get part numbers for part supplied by a supplier in London to a project in London.
k) Get the total number of project supplied by a supplier (say, S1).
l) Get the total quantity of a part (say, P1) supplied by a supplier (say, S1).

SKILL ENHANCEMENT COURSE (SEC-1) A HTML and XML programming

Tutorials:60

HTML Programming

- *Unit-I: Introduction* *(1L)*
- **Unit-II: The Basics** (2L)
  - The Head, the Body
  - Colors, Attributes
  - Lists, ordered and unordered
- *Unit-III: Links* *(3L)*
  - Introduction
  - Relative Links, Absolute Links
  - Link Attributes
  - Using the ID Attribute to Link Within a Document
- *Unit-IV: Images* *(2L)*
  - Putting an Image on a Page
  - Using Images as Links
  - Putting an Image in the Background
- *Unit V: – Tables* *(4L)*
  - Creating a Table
  - Table Headers
  - Captions
  - Spanning Multiple Columns
  - Styling Table
- *Unit VI – Forms* *(3L)*
  - Basic Input and Attributes
  - Other Kinds of Inputs
  - Styling forms with CSS
  - Where To Go From Here

Book Recommended:

1. Virginia DeBolt , Integrated HTML and CSS A Smarter, Faster Way to Learn Wiley / Sybex , 2006
2. Cassidy Williams, Camryn Williams Introduction to **HTML** and CSS, O'Reilly, 2015

Software Lab Based on HTML:

Q.1 Create an HTML document with the following formatting options:

I. Bold

II. Italics

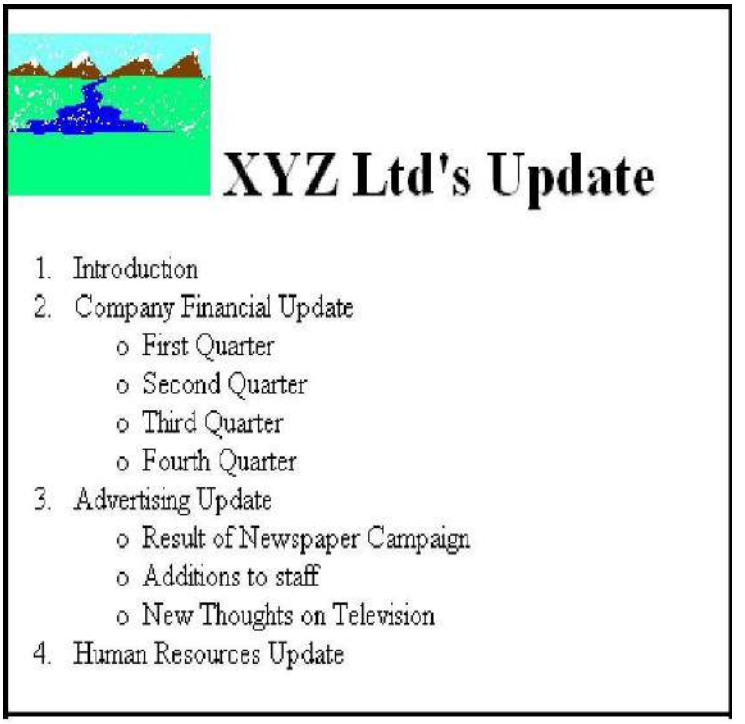
V. Font (Type, Size and Color)

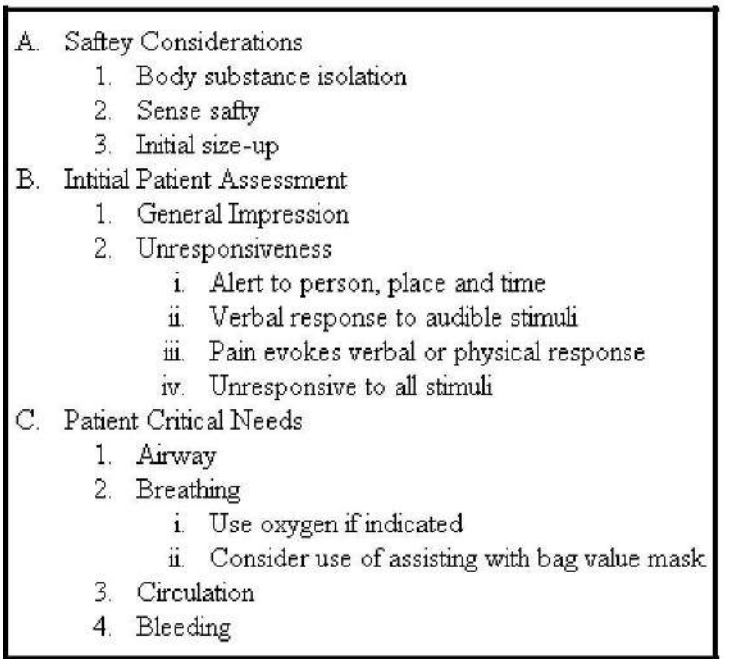
X. Pre tag

Q.2 Create an HTML document which consists of:

I. Ordered List
II. Unordered List III. Nested List
IV. Image

56





Q.3 Create an HTML document which implements Internal linking as well as External linking. Q.4
Q4 Create a table using HTML which consists of columns for Roll No., Student_s name and grade.

Result		
Roll No.	Name	Grade

Q.5 Create a Table with the following view:

Q.6

				Place an image here

Create a form using HTML which has the following types of controls:

I. Text Box
II. Option/radio buttons
III. Check boxes
IV. Reset and Submit buttons

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Please fill the following boxes to help us send the emails and our news letter:
First Name:
Last Name:
Business:
We must have a correct e-mail address to send you the news letter:
Email:
How did you hear about XYZ News Magazine and Emails?
◉ Here on the Web ○ In a magazine ○ Television ○ Other
Would you like to be on our regular mailing list?
☑ Yes, we love junk emails

Reset Send it in!

Q.7 Create HTML documents (having multiple frames) in the following three formats:

Frame1
Frame2

Frame1	
Frame2	Frame3

4. XML Programming

Introduction: Understanding Mark-up Languages, Introduction to XML and its

Goals. (3L)

XML Basics: XML Structure and Syntax, Document classes and Rules. (5L)

Other XML Concepts: Scripting XML, XML as Data, Linkingwith XML. (4L)

XML with Style: XSL –Style Sheet Basics, XSL basics, XSL style sheets. (3L)

Books Recommended

1. XML in action web technology by William J. Pardi
2. Step by Step XML by Michael J. Young

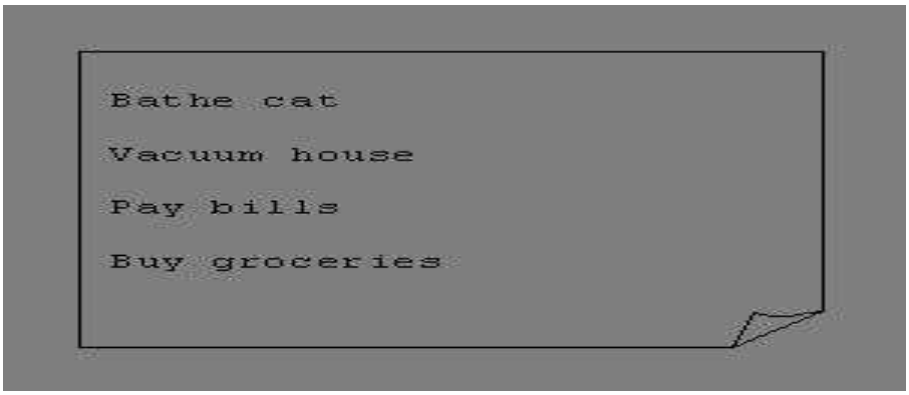
Software Lab Based on XML:

Exercise #1 – Information Structure

In this exercise, student will practice identifying the structure of an information object. For the sample document provided below:

Label the information structures you see, including containing structures.

1. Draw a tree representation of the structure.



Exercise 2# Deconstructing an XML Document

In this exercise, student will practice identifying the explicit structure within an XML document. In a sense, this is the reverse of what you did in Exercise #1. For the sample XML markup below, create a document-like representation (or a simple drawing) for the content contained within the XML tags:

<book>

<coverInfo>

<title>The XML Handbook</title>

<author>Charles F. Goldfarb</author>

<author>Paul Prescod</author>

<edition>Second</edition>

<description>The definitive XML resource: applications, products, and technologies. Revised and expanded—over 600 new pages.
</description>

</coverInfo>

</book>

Exercise #3 – Creating XML Markup

In this exercise, create some XML markup based on the tree representation from Exercise #1 above, and the content from the original sample document.

Exercise #4 – Well-Formedness

This exercise checks your understanding of the constraints for well-formedness. Are the following document instances well-formed? Explain any NO answers.

<list><title>The first list</title><item>An item</list>

<item>An item</item><item>Another item</item>

<para>Bathing a cat is a <emph>relatively</emph> easy task as long as the cat is willing.</para>

<bibl><title>How to Bathe a Cat<author></title>Merlin Bauer<author></bibl>

Exercise #5-Well Formedness

This exercise is a bit more challenging than the previous example. Here is a fragment of an XML document instance. Identify all the places where it fails to match the constraints for well-formedness.

<PROCEDURE><TITLEHow to Bathe a Cat</TITLE>

<OVERVIEW>

This procedure tells you how to bathe a cat. <WARNING></OVERVIEW>Cats don't like to take baths. You could get hurt doing this. Be sure to obtain all the required protective gear before you start. </WARNING><EQUIPEMENT><ITEM>Hockey Mask <ITEM>Padded Full-body Kevlar Armor</ITEM><ITEM>Tub full of warm water</ITEM><ITEM>Towels </ITEM><ITEM>First Aid kit</ITEM><ITEM>Cat Shampoo</ITEM> <EQUIPMENT><INSTRUCTIONS> <STEP> Locate the cat, who by now is hiding under the bed.</STEP><STEP>Place the cat in the tub of water.</STEP> <ITEM>Using the First Aid kit, repair the damage to your head and arms.</STEP> <STEP>Place the cat back in the tub and hold it down.</STEP> <STEP>Wash it really fast, then make an effort to dry it with the towels.</STEP> <STEP>Decide not to do this again. </STEP> </INSTRUCTIONS>

Note: Cover more exercises based on XML Programming theory concepts.

Skill Enhancement Course (SEC - 1) B Linux / Unix Programming

Syllabus

- What is linux/unix Operating systems (5L)
- Difference between linux/unix and other operating systems
- Features and Architecture
- Various Distributions available in the market
- Installation, Booting and shutdown process

- System processes (an overview)
- External and internal commands
- Creation of partitions in OS
- Processes and its creation phases – Fork, Exec, wait

User Management and the File System (5 L)

- Types of Users, Creating users, Granting rights
- User management commands
- File quota and various file systems available
- File System Management and Layout, File permissions
- Login process, Managing Disk Quotas
- Links (hard links, symbolic links)

Shell introduction and Shell Scripting (6L)

- What is shell and various type of shell, Various editors present in linux
- Different modes of operation in vi editor
- What is shell script, Writing and executing the shell script
- Shell variable (user defined and system variables)
- System calls, Using system calls
- Pipes and Filters
- Decision making in Shell Scripts (If else, switch), Loops in shell
- Functions
- Utility programs (cut, paste, join, tr , uniq utilities)
- Pattern matching utility (grep)

Reference Books:

1. Sumitabha, Das, Unix Concepts And Applications, Tata McGraw-Hill Education, 2006

2. Michael Jang RHCSA/ RHCE Red Hat Linux Certification: Exams (Ex200 & Ex300) (Certification Press), 2011

3. Nemeth Synder & Hein, Linux Administration Handbook, Pearson Education, 2nd Edition ,2010

4. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Unix Network Programming,

The sockets Networking API, Vol. 1, 3rd Edition,2014

Software Lab Based on Linux:

1. Write a shell script to check if the number entered at the command line is prime or not.
2. Write a shell script to modify ―cal‖ command to display calendars of the specified months.
3. Write a shell script to modify ―cal‖ command to display calendars of the specified rangeof months.
4. Write a shell script to accept a login name. If not a valid login name display message – ―Entered login name is invalid‖.
5. Write a shell script to display date in the mm/dd/yy format.

6. Write a shell script to display on the screen sorted output of —who‖ command along withthe total number of users .
7. Write a shell script to display the multiplication table any number,
8. Write a shell script to compare two files and if found equal asks the user to delete theduplicate file.
9. Write a shell script to find the sum of digits of a given number.
10. Write a shell script to merge the contents of three files, sort the contents and then displaythem page by page.
11. Write a shell script to find the LCD(least common divisor) of two numbers.
12. Write a shell script to perform the tasks of basic calculator.
13. Write a shell script to find the power of a given number.
14. Write a shell script to find the binomial coefficient C(n , x).
15. Write a shell script to find the permutation P(n,x).
16. Write a shell script to find the greatest number among the three numbers.
17. Write a shell script to find the factorial of a given number.
18. Write a shell script to check whether the number is Armstrong or not.
19. Write a shell script to check whether the file have all the permissions or not.
20. Write a program to show the pyramid of special character —*.

DSE-2(A) Digital Image Processing

Theory: 60 Lectures

1. Introduction *(6 Lectures)*

Light, Brightness adaption and discrimination, Pixels, coordinate conventions, Imaging Geometry, Perspective Projection, Spatial Domain Filtering, sampling and quantization.

2. Spatial Domain Filtering *(7 Lectures)*

Intensity transformations, contrast stretching, histogram equalization, Correlation and convolution, Smoothing filters, sharpening filters, gradient and Laplacian.

3. Filtering in the Frequency domain **(8 Lectures)**

Hotelling Transform, Fourier Transforms and properties, FFT (Decimation in Frequency and Decimation in Time Techniques), Convolution, Correlation, 2-D sampling, Discrete Cosine Transform, Frequency domain filtering.

4. Image Restoration *(8 Lectures)*

Basic Framework, Interactive Restoration, Image deformation and geometric transformations, image morphing, Restoration techniques, Noise characterization, Noise restoration filters, Adaptive filters, Linear, Position invariant degradations, Estimation of Degradation functions, Restoration from projections.

5. Image Compression *(10 Lectures)*

Encoder-Decoder model, Types of redundancies, Lossy and Lossless compression, Entropy of an information source, Shannon's 1st Theorem, Huffman Coding, Arithmetic Coding, Golomb Coding, LZW coding, Transform Coding, Sub-image size selection, blocking artifacts, DCT implementation using FFT, Run length coding, FAX compression (CCITT Group-3 and Group-4), Symbol-based coding, JBIG-2, Bit-plane encoding, Bit-allocation, Zonal Coding, Threshold Coding, JPEG, Lossless predictive coding, Lossy predictive coding, Motion Compensation

6. Wavelet based Image Compression **(5 Lectures)**

Expansion of functions, Multi-resolution analysis, Scaling functions, MRA refinement equation, Wavelet series expansion, Discrete Wavelet Transform (DWT), Continuous Wavelet Transform, Fast Wavelet Transform, 2-D wavelet Transform, JPEG-2000 encoding, Digital Image Watermarking.

7. Morphological Image Processing **(7 Lectures)**

Basics, SE, Erosion, Dilation, Opening, Closing, Hit-or-Miss Transform, BoundaryDetection, Hole filling, Connected components, convex hull, thinning, thickening, skeletons,pruning, Geodesic Dilation, Erosion, Reconstruction by dilation and erosion.

8. *Image Segmentation* *(9 Lectures)*

Boundary detection based techniques, Point, line detection, Edge detection, Edge linking, local processing, regional processing, Hough transform, Thresholding, Iterative thresholding, Otsu's method, Moving averages, Multivariable thresholding, Region-based segmentation, Watershed algorithm, Use of motion in segmentation

Reference Books

1. R C Gonzalez , R E Woods, Digital Image Processing, 3rd Edition, Pearson Education.2008.
2. A K Jain, Fundamentals of Digital image Processing, Prentice Hall of India.1989.
3. K R Castleman, Digital Image Processing, Pearson Education.1996
4. Schalkoff, Digital Image Processing and Computer Vision, John Wiley and Sons.1989.
5. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.

Digital Image Processing Lab

Practical: 60 Lectures

1. Write program to read and display digital image using MATLAB or SCILAB
   a. Become familiar with SCILAB/MATLAB Basic commands
   b. Read and display image in SCILAB/MATLAB
   c. Resize given image
   d. Convert given color image into gray-scale image
   e. Convert given color/gray-scale image into black & white image
   f. Draw image profile
   g. Separate color image in three R G & B planes
   h. Create color image using R, G and B three separate planes
   i. Flow control and LOOP in SCILAB
   j. Write given 2-D data in image file

2. To write and execute image processing programs using point processing method
   a. Obtain Negative image
   b. Obtain Flip image
   c. Thresholding
   d. Contrast stretching

3. To write and execute programs for image arithmetic operations
   a. Addition of two images
   b. Subtract one image from other image
   c. Calculate mean value of image
   d. Different Brightness by changing mean value

4. To write and execute programs for image logical operations
   a. AND operation between two images
   b. OR operation between two images
   c. Calculate intersection of two images
   d. Water Marking using EX-OR operation

e. NOT operation (Negative image)

5. To write a program for histogram calculation and equalization using
   a. Standard MATLAB function
   b. Program without using standard MATLAB functions
   c. C Program

6. To write and execute program for geometric transformation of image
   a. Translation
   b. Scaling
   c. Rotation
   d. Shrinking
   e. Zooming

7. To understand various image noise models and to write programs for
   a. image restoration
   b. Remove Salt and Pepper Noise
   c. Minimize Gaussian noise
   d. Median filter and Weiner filter

8. Write and execute programs to remove noise using spatial filters
   a. Understand 1-D and 2-D convolution process
   b. Use 3x3 Mask for low pass filter and high pass filter

9. Write and execute programs for image frequency domain filtering
   a. Apply FFT on given image
   b. Perform low pass and high pass filtering in frequency domain
   c. Apply IFFT to reconstruct image

10. Write a program in C and MATLAB/SCILAB for edge detection using different edge detection mask
11. Write and execute program for image morphological operations erosion and dilation.
12. To write and execute program for wavelet transform on given image and perform inversewavelet transform to reconstruct image.

DSE-2(B) Soft Computing

Tutorials on DSE-2(B) Soft Computing

Introduction: Hard computing, Soft Computing, Definition. Advantages and applications of neural networks, Artificial neural network, Biological neural network, Biological neuron vs artificial neuron, evolution of neural networks. Basic models of ANN : connections, supervised learning, unsupervised and reinforcement learning, activation functions, terminologies of ANN : weights, bias, threshold, learning rate, momentum factor. McCulloch-Pitts neuron, Linear separability, Nonlinear separability, Hebb Network, Perceptron Networks : theory, learning rule, architecture, training algorithm for single output classes, training algorithm for multiple output classes, testing algorithm, Adaline, Multiple adaptive linear neurons, Back propagation network, Functional link artificial neural network(FLANN), Radialbasis function network(RBFN).

Introduction to Fuzzy logic, classical sets and Fuzzy sets, classical relation and Fuzzy relations, Membership functions, defuzzification, Fuzzy Inference systems.

Genetic algorithm : Encoding, types of selection, crossover and its types, mutation and its types, cost function, flow chart, algorithm for function optimization, real coded genetic algorithm.

Books:

1. Neural Networks and Learning Machines by Simon Haykin, PearsonEducation, 3rd Edition.
2. Principles of Soft Computing by S. N. Sivanandam and S. N. Deepa, 2nd edition, Wiley.
3. Artificial Neural Networks by B. Yegnanarayana, PHI
4. Neural Networks, Fuzzy logic and Genetic algorithm by S. Rajasekaran and G. A. Vijayalakshmi Pai, PHI

COMPUTER SCIENCE (C-XIII): Artificial Intelligence

Theory: 60 Lectures

1. Introduction **(06 Lectures)**

Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent approaches to AI, Introduction to Intelligent Agents, their structure, behavior and environment.

2. Problem Solving and Searching Techniques **(20 Lectures)**

Problem Characteristics, Production Systems, Control Strategies, Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search, A* algorithm, Constraint Satisfaction Problem, Means-End Analysis, Introduction to Game Playing, Min-Max and Alpha-Beta pruning algorithms.

3. Knowledge Representation **(20 Lectures)**

Introduction to First Order Predicate Logic, Resolution Principle, Unification, Semantic Nets, Conceptual Dependencies, Frames, and Scripts, Production Rules, Conceptual Graphs.

Programming in Logic (PROLOG)

4. Dealing with Uncertainty and Inconsistencies **(08 Lectures)**

Truth Maintenance System, Default Reasoning, Probabilistic Reasoning, Bayesian Probabilistic Inference, Possible World Representations.

5. Understanding Natural Languages **(06 Lectures)**

Parsing Techniques, Context-Free and Transformational Grammars, Recursive and Augmented Transition Nets.

BOOKS RECOMMENDED:

1. DAN.W. Patterson, Introduction to A.I and Expert Systems – PHI, 2007.
2. Russell &Norvig, Artificial Intelligence-A Modern Approach, LPE, Pearson Prentice Hall,2nd edition, 2005.
3. Rich & Knight, Artificial Intelligence – Tata McGraw Hill, 2 edition, 1991.
4. W.F. Clocksin and Mellish, Programming in PROLOG, Narosa Publishing House, 3 edition, 2001.
5. Ivan Bratko, Prolog Programming for Artificial Intelligence, Addison-Wesley, PearsonEducation, 3 edition, 2000.

TUTORIALS ON COMPUTER SCIENCE (C-XIII): Artificial Intelligence

COMPUTER SCIENCE LAB (C-XIV): Computer Graphics

Theory: 60 Lectures

1. Introduction **(5 Lectures)**

Basic elements of Computer graphics, Applications of Computer Graphics.

2. Graphics Hardware **(8 Lectures)**

Architecture of Raster and Random scan display devices, input/output devices.

3. Fundamental Techniques in Graphics **(22 Lectures)**

Raster scan line, circle and ellipse drawing, thick primitives, Polygon filling, line and polygon clipping algorithms, 2D and 3D Geometric Transformations, 2D and 3D Viewing Transformations (Projections- Parallel and Perspective), Vanishing points.

4. Geometric Modeling **(10 Lectures)**

Representing curves & Surfaces.

5. Visible Surface determination **(8 Lectures)**

Hidden surface elimination.

6. Surface rendering **(7 Lectures)**

Illumination and shading models. Basic color models and Computer Animation.

Books Recommended:

1. J.D.Foley, A.Van Dan, Feiner, Hughes Computer Graphics Principles & Practice,2 edition Publication Addison Wesley 1990.
2. D.Hearn, Baker: Computer Graphics, Prentice Hall of India 2008.
3. D.F.Rogers Procedural Elements for Computer Graphics, McGraw Hill 1997.
4. D.F.Rogers, Adams Mathematical Elements for Computer Graphics, McGraw Hill, 2nd edition 1989.

COMPUTER SCIENCE LAB (C-XIV): Computer Graphics LabPractical: 60

Lectures

1. Write a program to implement Bresenham_s line drawing algorithm.
2. Write a program to implement mid-point circle drawing algorithm.
3. Write a program to clip a line using Cohen and Sutherland line clipping algorithm.
4. Write a program to clip a polygon using Sutherland Hodgeman algorithm.
5. Write a program to apply various 2D transformations on a 2D object (use homogenouscoordinates).
6. Write a program to apply various 3D transformations on a 3D object and then applyparallel and perspective projection on it.
7. Write a program to draw Hermite/Bezier curve.

DSE 3(A) Big Data Analytics

1. Understanding Big Data: Datasets, Data Analysis, Data Analytics-Descriptive Analysis, Diagnostics Analytics, Predictive Analytics, Prescriptive Analytics, Big Data Characteristics – volume, velocity, variety, veracity, value, Different Types of Data – Structured Data, Unstructured Data, Semi-Structured Data

2. INTRODUCTION HADOOP: Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization.

4. HADOOP ARCHITECTURE: Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands, Anatomy of File Write and Read, NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks.

4. Theory and methods for big data analytics: Regression Modeling, Multivariate Analysis, Bayesian Modeling, Inference and Bayesian Networks, Support Vector and Kernel Methods, Analysis of Time Series: Linear Systems Analysis, Nonlinear Dynamics, Rule Induction, Decision Trees.

5. Programming with R : Basic Syntax, Data types, Variables, Operators, Decision Making, Loops, Functions, Vectors, lists, Matrices, Arrays, Data Frames, R Data Interfaces – CSV Files, Excel Files, Database, R charts & graphs , R statistics – Mean, Median, Mode, Linear Regression.

Readings: 1. Chris Eaton, Dirk deroos et al. , —Understanding Big data ‖, McGraw Hill, 2012.
2. -Big Data Fundamentals: Concepts, Drivers & Techniques‖, 1/e, 2016, Thomas Erl, Wajid Khattak, Paul Buhler, Prentice Hall.
3. -Big Data Analytics with R and Hadoop‖, 1e, 2013, Vignesh Prajapati, Packt Publishing Ltd, UK.
4. -The Art of R Programming: A Tour of Statistical Software Design‖,revised,2011, Norman Matloff, No Starch Press 5. "Hadoop:The Definitive Guide," 3/e, 2012, Tom White, O'REILLY Publications.
6. "Understanding Big Data: Analytics for Enterprise Class Hadoop and streaming Data" ,2012, Paul Zikopoulos, IBM, Chris Eaton, Paul Zikopoulos, The McGraw-Hill Companies.
7. "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications",2014, Bart Baesens, Wiley Publications .
8. -Mining of Massive Datasets‖, 2012, Anand Rajaraman and Jeffrey David Ullman , Cambridge University Press

Tutorials on DSE3 (A) Big Data Analytics

DSE 3 (B) **Data Mining**

Introduction, steps in knowledge discovery, architecture of data mining system, types of databases, functionalities of data mining, major issues.

Data Warehouse : difference between database and data warehouse, OLTP vs OLAP, Schemas for multidimensional databases, DMQL, Concept hierarchies, Starnet query model, three tier architecture of data warehouse.

Data Preprocessing : descriptive data summarization, data cleaning, data integration, transformation, data reduction, dimensionality reduction.

Cluster Analysis : types of variables, dissimilarity, Partitioning methods : k-means and k- medoids, Hierarchical clustering.

Classification : Meaning, issues, classification using k-NN and artificial neural network. Prediction : Meaning, regression techniques, prediction using neural network, Association rule mining : meaning, Apriori algorithm.

BOOKS

1. Data Mining concepts and techniques by J. Han and M. Kamber, 2nd Edition, Elsevier
2. Data Mining Methods for Knowledge Discovery, Cios, Pedrycz, Swiniarski,Kluwer Academic Publishers, London – 1998.

DSE 4 **Project work followed by seminar**

Discipline Specific Elective: Dissertation / Project work

The students will be allowed to work on any project based on the concepts studied in core /elective or skill based elective courses.
The group size should be maximum of three (03) students.

Each group will be assigned a teacher as a supervisor who will handle both their theory aswell lab classes.
A maximum of Four (04) projects would be assigned to one teacher.

MAJOR PROJECT

HEAD
DEPT OF CSIT
G.G.V. BILASPUR (C.G.)

Department : *Computer Science and Information Technology*

Programme Name : *M.Sc(CS)*

Academic Year : 2020-21

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	MSC-103	Relational Database Management System
02.	MSC-104	Advanced JAVA Programming
03.	MSC-105	Programming LAB in JAVA
04.	MSC-202	Design and Analysis of Algorithm
05.	MSC-203	Machine Learning
06.	MSC-204	Neural Networks and Deep Learning
07.	MSC-206	Programming LAB I Web Technology
08.	MSC-302	Artificial Intelligence
09.	MSC-303	Relational Database Management System
10.	MSC-304 (Elective-III(1))	Advanced Java Programming
11.	MSC-305(Elective_IV(1))	Web Technology
12.	MSC-305 (Elective-IV(2))	Pattern Recognition
13.	MCA-306	Lab based on III / IV
14.	MCA-307	Minor Project
15.	MSC-401	Major Project

Department of Computer Science & Information Technology (CSIT)
Guru GhasidasVishwavidyalaya, Bilaspur (C.G.)

(A Central University established by the Central University Act 2009 No. 25 of 2009)

SYLLABUS FOR M.Sc.(CS) CBCS based
Session 2021-22

Semester-I

S.No.	Subject Code	Title	Credits	Marks Internal/External		Total
1	MSC-101 (CORE- 1)	Design of Operating System	5	40	60	100
2	MSC-102 (CORE -2)	Artificial Intelligence	5	40	60	100
3	MSC-103 (CORE- 3)	Relational Data Base Management Systems	5	40	60	100
4	MSC-104 (CORE-4)	Advanced JAVA Programming	5	40	60	100
5	MSC-105 (Practical-1)	Programming Lab in JAVA	5			100
		Total	25			500

Semester-II

S.No.	Subject Code	Title	Credits	Marks Internal	External	Total
1	**MSC-201** (CORE - 5)	Design and Analysis of Algorithm	5	40	60	100
2	**MSC-202** (CORE - 6)	Machine Learning	5	40	60	100
3	**MSC-203 (DSE - 1)**	Neural Networks and Deep Learning	5	40	60	100
4	**MSC-204 (DSE - 2)**	Web Technology	5	40	60	100
5	**MSC-205 (RM - 1)**	Research Methodology	2	40	60	100
6	**MSC-206** (Practical - 2)	Programming Lab in Web Technology	5			100
		Total	27			600

Semester-III

S.No.	Subject Code	Title	Credits	Marks Internal	Marks External	Total
1	**MSC-301** (CORE - 7)	Computer Graphics and Multimedia	5	40	60	100
2	**MSC-302** (CORE - 8)	Compiler Design	5	40	60	100
3	**MSC-303 (DSE - 3)**	Data Mining and Data Warehousing	5	40	60	100
4	**MSC-304 (DSE - 4)**	Network Security	5	40	60	100
5	**MSC-305 (OE – 1)**	Open Elective*	5	40	60	100
6	**MSC-306 (Practical – 3)**	Programming Lab in Data Mining	5			100
		Total	30			600

*** Open Elective will be decided after the information of availability of courses from other departments**

Semester-IV

S.No.	Subject Code	Title	Credits	Total
1	**MSC-401** Dissertation/Field Work/Internship/Project/Industry Visit	Major Project	18	500

Open Elective offered by CSIT:

1. Programming in C/C++
2. **Data Structure Using C/C++/Python/Java**
3. RDBMS
4. **Introduction to Information Technology**
5. Linux Operating System
6. **Soft Computing**

MSC(CS)-102

ARTIFICIAL INTELLIGENCE

1. **Introduction**: Definitions and approaches, Foundation of A.I., Challenges in AI, Area and Applicationsof A.I., Intelligent Agents: meaning, types, environments, examples.

2. **ProblemSolving**: Problem solving as state space search, production system, writing production systemand solution for a Water jug problem; some AI classical problems (statements only) cannibal missionaries, tower of Hanoi, tic tac toe, 8-puzzle, Search techniques: Breadth First, and Depth-first, Best-First Search, Hill-climbing, Heuristics,A* algorithm, local and global maxima(minima),

3. **KnowledgeRepresentationandReasoning**: Predicate and prepositional logic, conversion of sentences towffs of predicate logic, Resolution, clause form, Skolem functions, Unification, Resolution inPropositional and predicate logic, Semantic Nets.

4. **PatternRecognition**: Meaning of pattern, Pattern Recognition, Classification, Supervised &Unsupervised Learning of classifiers, K-NN, K-MEANS algorithms.

5. **ExpertSystems**: Introduction, Advantages, components and participants in an expert system, Application

References:

1. Artificial Intelligence: E. Rich and K. Knight, Tata McGraw Hill.

2. Artificial Intelligence: A New Synthesis By Nilsson, Morgan Kaufmann.
3. Pattern Classification 2nd Edition By R.O. Duda, Hart, Stork (2001) ,John wiley, New York.
4. Pattern Recognition: Technique and Applications By Shinghal (2006) ,Oxford University Press, New Delhi

MSc(CS)– 103

Relational Data Base Management System

1. **Overview of Database Management** :Data, Information and knowledge, Increasing use of data as acorporate resource, data processing verses data management, file oriented approach verses databaseoriented approach to data management; data independence, database administration roles, DBMSarchitecture, different kinds of DBMS users, importance of data dictionary, contents of data dictionary,types of database languages. Data models: network, hierarchical, relational. Introduction to distributeddatabases.

2. **Relational Model**: Entity - Relationship model as a tool for conceptual design-entities attributes andrelationships. ER diagrams; Concept of keys: candidate key, primary key, alternate key, foreign key;Strong and weak entities, Case studies of ER modeling Generalization; specialization and aggregation.Converting an ER model into relational Schema. Extended ER features.

3. **Structured Query Language** :Relational Algebra: select, project, cross product different types of joins(inner join, outer joins, self-join); set operations, Tuple relational calculus, Domain relational calculus, Simple and complex queries using relational algebra, stand alone and embedded query languages, Introduction to SQL constructs (SELECT…FROM, WHERE… GROUP BY… HAVING…ORDERBY….), INSERT, DELETE, UPDATE, VIEW definition and use, Temporary tables, Nestedqueries, and correlated nested queries, Integrity constraints: Not null, unique, check, primary key, foreignkey, references, Triggers. Embedded SQL and Application Programming Interfaces.

4. **Relational Database**Design: Normalization concept in logical model; Pitfalls in database design,update anomalies: Functional dependencies, Join dependencies, Normal forms (1NF, 2NF, 3NF). BoyceCodd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF. Issues in physical design; Concepts of indexes, File organization for relational tables, De-normalization.

5. **Introduction to Query Processing and Protecting the Database & Data Organizations:** Parsing,translation, optimization, evaluation and overview of Query Processing. Protecting the Data Base -Integrity, Security and Recovery. Domain Constraints, Referential Integrity, Assertion, Triggers, Security& Authorization in SQL.

References:

MSC (CS)-104

ADVANCED JAVA PROGRAMMING

1. **Basics of Core JAVA**: class, interface, exception handling, Collections: Collection Interfaces, Concrete Collections, Collections Framework, Multithreading: Creating thread and running it, Multiple Thread acting on single object, Synchronization, Thread communication, Thread group, Thread priorities, Daemon Thread, Life Cycle of Thread. I/O

2. **Networking**: Internet Addressing, InetAddress, Factory Methods, Instance Methods, TCP/IP Client Sockets, URL, URLConnection, TCP/IP Server Sockets, Datagrams. Java Database Connectivity (JDBC): Merging Data from Multiple Tables: Joining, Manipulating, Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures.

3. **Servlets**: Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, Handling HTTP get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with HttpSession

4. **Java Server Pages (JSP**): Introduction, JavaServer Pages Overview, A First Java Server Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries, Enterprise Java Bean: Preparing a Class to be a JavaBean, Creating a JavaBean, JavaBean Properties, Types of beans, Stateful Session bean, Stateless Session bean, Entity bean.

5. **Remote Method Invocation**: Defining the Remote Interface, Implementing the Remote Interface, Compiling and Executing the Server and the Client, Struts: Basics of Struts, Struts: What and Why?, Model1 vs Model2, Struts2 Features, Steps to create Struts application, Understanding Action class, Understanding struts.xml file

References:

1. "Advanced Java 2 Platform HOW TO PROGRAM" by H. M.Deitel, P. J. Deitel, S. E. Santry – Prentice Hall
2. "Effective Java" 3rd Ed by JoushaBlouch Addition-Wesley
3. "Murach's Java Servlet & JSP" 3rd Ed. by Joel Murach, Michael Urban
4. "Beginning Java™ EE 6 Platform with GlassFish

MSc(CS)- 202

Machine Learning

1. **Introduction**: Meaning and need of Machine Learning, Types of Machine Leaning: Supervised Learning, Unsupervised Learning, Semi Supervised Learning, Reinforcement Learning, Applications of MachineLearning, Type of Data in Machine Learning, Data Repository

2. **Introduction to Feature Analysis and Bayesian Theory:** Meaning of patterns and pattern classification, feature selection and curse of dimensionality, Bayesian theoremand concept learning, examples.

3. **Supervised Learning**: Introduction to supervised learning, its examples, classification models, classificationalgorithms with Implementation: k-nearest neighbor (KNN), Decision Tree, Random forest, Support VectorMachine (SVM),

4. **Unsupervised Learning:** Introduction to unsupervised learning, metrics for evaluating a feature, clustering,types of clustering techniques, partitioning, hierarchical and density based clustering

5. **Modeling a classifier**: Validation, classification and prediction accuracy, confusion matrix, learning, bootstrap aggregation (bagging) , boosting, ensembles for classification

References:

1. Pattern Classification 2nd Edition By R.O. Duda, Hart, Stork (2001),Johnwiley, New York.
2. Pattern Recognition: Technique and Applications By Shinghal (2006) ,Oxford University Press, NewDelhi.
3. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2006

MSc(CS)-203

Neural Networks and Deep Learning

1. Introduction: Biological neuron, artificial neuron, biological neuron vs. artificial neuron, evolution of neural networks, basic models of artificial neural networks(ANN) : connections, learning :- supervised,unsupervised, reinforcement, activation functions, important terminology of ANN. McCulloh-Pitts neuron, linearseparability, types of neural networks,

2. Perceptron Networks: Implementation of AND gate, OR gate, NAND gate etc., **Gradient descent algorithm**, implementation of AND gate, OR gate, NAND gate etc., Building a neural controller for obstacle avoidance, Pseudo inverse solution, nonlinear separability. **Back propagation (BP) networks**:Derivation of BP algorithmfor single hidden layer architecture, momentum terms, implementation of XOR problem using BPalgorithm.Modifiedmultilayer neural network, modified Back propagation (BP) algorithm

3. Other Neural network architectures: Radial basis function neural network (RBFNN): architecture, training algorithm, Implementation of XOR problem using RBF, Functional link artificial neural networks (FLANN): architecture, training, delta learning rule, Extreme Learning Machine (ELM): architecture, learning algorithm, Recurrent neural network (RNN): architecture, training algorithm, Back propagation through time (BPTT). Real time recurrent learning algorithm (RTRL), Self-organizingmap (SOP).

4. DeepLearning: Introduction, Long short term memory (LSTM) network, Convolution neural network, Boltzman Machine network.

5. Applications: function optimization, classification, prediction, detection.

Readings:

1. Neural Networks and Learning machines by Simon Haykin, PHI, 3rd Edition
2. Neural Network Design by M. Hagan, 2nd Edition, eBook
3. Principles of Soft Computing by S. N. Shivanandam and S. N. Deepa, Wiley, 2nd Edition
4. Artificial neural networks by B. Yegnanarayana, PHI.
5. Deep Learning by John D. Kelleher, MIT Press.
6. Neural networks and Deep learning by Charu C. Aggarwal, Springer, 1st Edition, 2018.

MSC(CS)-204

WEB TECHNOLOGY

1 Internet Concept: Fundamental of Web ,History of Web, Web development overview, Domain NameSystem (DNS),DHCP,and SMTP and other servers ,Internet service provider (ISP), Concept of IP Address, Internet Protocol, TCP/IP Architecture ,Web Browser and Web Server.

2. **HTML and DHTML**:- HTML Tag, Rules of HTML, Text Formatting and Style, List,Adding Graphics toHTML Document, Tables and Layout , Linking Documents, Frame,

Forms, Project in HTML, Introductionto DHTML, CSS, Class and DIV, External StyleSheet.

3. **Scripting Languages**: Java Script (JS) in Web Page, Advantage of Java Script, JS object model and hierarchy ,Handling event, Operators and syntax of JS, JS Function, Client side JS Vs Server side JS ,JSsecurity, Introduction to VB Script, Operator and Syntax of VB Script, Dialog Boxes, Control and Loop, Function in VBS.

4. **XM**L:Introduction to XML, XML in Action, Commercial Benefits of XML, Gaining Competitiveadvantage with XML, Programming in XML, XML Schema ,XSLT ,DOM structure model ,XML quiresand transformation.

5. **Active Server Page (ASP)**: Introduction ,Internet Information System (IIS),ASP object ,Server object, Filesystem object, session ,Accessing data base with an ASP page ,ODBC – ADO connection object, commonmethods and properties, ADO record set object .Introduction to ASP.Net.

References:

1. The complete Reference By Thomos A. Powell ,TMH publication
2. Web Technology: A Developers Perspective, N.P.Gopalan ,J.Akilandeswani,PHI Publication.
3. Java Script :The definite Guide By Flangam , O"Reilly
4. Java Script: Developers Resource by Kamran Husain and Jason Levitt PTR-PHI publication.
1. "Mastering VB Script" BPB Publication.
2. World Wide Web design with HTML by Xavier Tata McGraw Hill Publication.
3. XML By Example, Sean Mc GrathPentice Hall Publication.
4. Web Technology : A Developments Perspective , N.P. Gopalan, J. Akilandeswari, PHI Publication

Department of Computer Science & Information TechnologyGuru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

SYLLABUS FOR MSC COURSE UNDER CHOICE BASED CREDIT SYSTEM (CBCS) *

Session 2017-18(on and after)

M.Sc(CS)

Note: The decision of the GG Vishwavidyalaya for implementing CBCS system on this course shall be final, rest willremain the same.

Semester 1

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MSC-101	Introduction to Information Technology	4		40	60	4
2	MSC-102	Computer programming & Numerical Methods	4		40	60	4
3	MSC-103	Discrete Mathematical Structures	4		40	60	4
4	MSC-104	Data Structures using C	4		40	60	4
5	MSC-105	Computer Organization	4		40	60	4
6	MSC-106	LAB-I: Data Structure using C		1		100	1
7	MSC-107	LAB-II: Computer Hardware and Digital Electronics		1		100	1
		Total	20	02	200	500	22

Semester 2

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MSC-201	Principles of Operating system	4		40	60	4
2	MSC-202	Object Oriented Programming with C++	4		40	60	4
3	MSC-203	Theory of Computation	4		40	60	4
4	MSC-204	Elective I	4		40	60	4
5	MSC-205	Elective II	4		40	60	4
6	MSC-206	OOP Lab (C++)		1		100	1
7	MSC-207	LAB based on Elective-II		1		100	1
		Total	20	02	200	500	22

Semester 3

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MSC-301	Probability and Statistics	4		40	60	4
2	MSC-302	Artificial Intelligence	4		40	60	4
3	MSC-303	Relational Data Base Management System	4		40	60	4
4	MSC-304	Elective III	4		40	60	4
5	MSC-305	Elective IV	4		40	60	4
6	MSC-306	RDBMS LAB		1		100	1
7	MSC-307	LAB based on Elective III / IV		1		100	1
		Total	20	02	200	500	22

Semester 4

M.Sc. (CS)IVth Semester			
S.No.	**Subject Code**	**Subject**	**Total Marks**
1.	M.Sc. (CS)401	Major Project (Viva Voce)	500
Total			500

ELECTIVES

Sl.No	Paper Code	(1)	(2)	(3)
1	MSC-204 (Eletive-I)	Computer Networks	System Analysis and Design	Introduction to Micro Processor
2	MSC-205 (Elective-II)	Object Oriented Software Engineering	Multimedia	Linux Operating System and Shell Programming
3	MSC-304 (Elective-III)	Advanced JAVA Programming	System Software	Neural Network
4	MSC-305 (Elective-IV)	Web Technology	Pattern Recognition	Compiler Design

*** The syllabus is subjected to change as per the requirement.**

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MSC -302

Artificial Intelligence

1. **Introduction:** Definitions and approaches, Foundation of A.I. , Challenges in AI, Area and Applications of A.I., Intelligent Agents: meaning, types, environments, examples.

2. **Problem Solving:** Problem solving as state space search, production system, writing production system and solution for a Water jug problem; some AI classical problems (statements only) cannibal missionaries, tower of Hanoi, tic tac toe, 8-puzzle, Search techniques: Breadth First, and Depth-first, Best-First Search, Hill-climbing, Heuristics, A* algorithm, local and global maxima(minima),

3. **Knowledge Representation and Reasoning**: Predicate and prepositional logic, conversion of sentences to wffs of predicate logic, Resolution, clause form, Skolem functions, Unification, Resolution in Propositional and predicate logic, Semantic Nets.

4. **Pattern Recognition:** Meaning of pattern, Pattern Recognition, Classification, Supervised & Unsupervised Learning of classifiers, K-NN, K-MEANS algorithms.

5. **Expert Systems:** Introduction, Advantages, components and participants in an expert system, Application

Readings:

1. Artificial Intelligence: E. Rich and K. Knight, Tata McGraw Hill.
2. Artificial Intelligence: A New Synthesis By Nilsson, Morgan Kaufmann.
3. Pattern Classification 2nd Edition By R.O. Duda, Hart, Stork (2001) ,John wiley, New York.
4. Pattern Recognition : Technique and Applications By Shinghal (2006) ,Oxford University Press,NewDelhi.

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MSC - 303

Relational Data Base Management System

1. **Overview of Database Management** :Data, Information and knowledge, Increasing use of data as a corporate resource, data processing verses data management, file oriented approach verses database oriented approach to data management; data independence, database administration roles, DBMS architecture, different kinds of DBMS users, importance of data dictionary, contents of data dictionary, types of database languages. Data models: network, hierarchical, relational. Introduction to distributed databases.

2. **Relational Model :** Entity - Relationship model as a tool for conceptual design-entities attributes and relationships. ER diagrams; Concept of keys: candidate key, primary key, alternate key, foreign key; Strong and weak entities, Case studies of ER modeling Generalization; specialization and aggregation. Converting an ER model into relational Schema. Extended ER features.

3. **Structured Query Language :**Relational Algebra: select, project, cross product different types of joins (inner join, outer joins, self join); set operations, Tuple relational calculus, Domain relational calculus, Simple and complex queries using relational algebra, stand alone and embedded query languages, Introduction to SQL constructs (SELECT…FROM, WHERE… GROUP BY… HAVING… ORDERBY….), INSERT, DELETE, UPDATE, VIEW definition and use, Temporary tables, Nested queries, and correlated nested queries, Integrity constraints: Not null, unique, check, primary key, foreign key, references, Triggers. Embedded SQL and Application Programming Interfaces.

4. **Relational Database Design :**Normalization concept in logical model; Pitfalls in database design, update anomalies: Functional dependencies, Join dependencies, Normal forms (1NF, 2NF, 3NF). Boyce Codd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF. Issues in physical design; Concepts of indexes, File organization for relational tables, De-normalization.

5. **Introduction to Query Processing and Protecting the Database & Data Organizations :** Parsing, translation, optimization, evaluation and overview of Query Processing. Protecting the Data Base - Integrity, Security and Recovery. Domain Constraints, Referential Integrity, Assertion, Triggers, Security & Authorization in SQL.

Readings:

1. Database system concept By H. Korth and A. Silberschatz, TMH.
2. Data Base Management System By Alexies & Mathews , Vikas publication.
3. Data Base Management System By C. J. Date ,Narosha Pub.
4. Data Base Management System By James Matin .
5. Principles of Database System By Ullman.
6. An Introduction to database systems By Bipin Desai, 2011 ed.,Galgotia Publication.
7. Database Management System By A. K. Majumdar & P.Bhattacharya, TMH

MSC-304 ELECTIVE-III (1)

Advanced Java Programming

1. **Basics of Core JAVA:** class, interface, exception handling.**Collections :** Collection Interfaces, Concrete Collections, The Collections Framework **Multithreading :** Creating thread and running it, Multiple Thread acting on single object,Synchronization, Thread communication, Thread group, Thread priorities, Daemon Thread, Life Cycle of Thread.

2. **Networking:**Internet Addressing, InetAddress, Factory Methods, Instance Methods, TCP/IP Client Sockets, URL, URL Connection, TCP/IP Server Sockets, Datagrams.**Java Database Connectivity (JDBC):** Merging Data from Multiple Tables: Joining, Manipulating, Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures.

3. **Servlets:** Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, HandlingHTTP get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with HttpSession

4. **Java Server Pages (JSP):** Introduction, JavaServer Pages Overview, A First JavaServer Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries, **Enterprise Java Bean:** Preparing a Class to be a JavaBean, Creating a JavaBean, JavaBean Properties,Types of beans, Stateful Session bean, Stateless Session bean, Entity bean

5. **Remote Method Invocation:** Defining the Remote Interface, Implementing the Remote Interface, Compiling and Executing the Server and the Client, **Struts:** Basics of Struts,Struts : What and Why? ,Model1 vs Model2 ,Struts2 Features, Steps to create Struts application ,Understanding Action class ,Understanding struts.xml file

Readings:

1. "Advanced Java 2 Platform HOW TO PROGRAM" by H. M.Deitel, P. J. Deitel, S. E. Santry – Prentice Hall
2. "Beginning Java™ EE 6 Platform with GlassFish 3 From Novice to Professional" by Antonio Goncalves – Apress publication

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MSC-305 ELECTIVE-IV (1)

Web Technology

1 **Internet Concept**: Fundamental of Web ,History of Web, Web development overview, Domain Name System (DNS),DHCP,and SMTP and other servers ,Internet service provider (ISP), Concept of IP Address, Internet Protocol, TCP/IP Architecture ,Web Browser and Web Server.

2. **HTML and DHTML:-** HTML Tag, Rules of HTML, Text Formatting and Style, List, Adding Graphics to Html Document, Tables and Layout , Linking Documents, Frame, Forms, Project in HTML, Introduction to DHTML, CSS, Class and DIV, External Style Sheet.

3. **Scripting Languages:** Java Script (JS) in Web Page, Advantage of Java Script, JS object model and hierarchy ,Handling event, Operators and syntax of JS, JS Function, Client side JS Vs Server side JS ,JS security, Introduction to VB Script, Operator and Syntax of VB Script, Dialog Boxes, Control and Loop, Function in VBS.

4. **XML:**Introduction to XML, XML in Action, Commercial Benefits of XML, Gaining Competitive advantage with XML, Programming in XML, XML Schema ,XSLT ,DOM structure model ,XML quires and transformation.

5. **Active Server Page (ASP):** Introduction ,Internet Information System (IIS),ASP object ,Server object, File system object, session ,Accessing data base with an ASP page ,ODBC – ADO connection object, common methods and properties, ADO record set object .Introduction to ASP.Net.

Readings:

1. The complete Reference By Thomos A. Powell ,TMH publication
2. Web Technology :A Developers Perspective ,N.P.Gopalan ,J.Akilandeswani,PHI Publication.
3. Java Script :The definite Guide By Flangam , O"Reilly
4. Java Script :Developers Resource by Kamran Husain and Jason Levitt PTR-PHI publication.
5."Mastering VB Script" BPB Publication.
6. World Wide Web design with HTML by Xavier Tata McGraw Hill Publication .
7. XML By Example, Sean Mc Grath Pentice Hall Publication.
8. Web Technology : A Developments Perspective , N.P. Gopalan, J. Akilandeswari, PHI Publication

MSC -305 ELECTIVE –IV (2)

Pattern Recognition

1. **Pattern Concept:** Meaning of pattern, examples of patterns, importance of study of patterns in machine learning, meaning of labels, attributes, features, dimensions in patters with examples, pattern recognition and classification, meaning of machine learning

2. **Pattern Recognition and classification:** Meaning and importance in machine learning, supervised and unsupervised learning with meaning and examples, classifiers, k-nn classification and k-means clustering, implementation and applications

3. **Decision Trees:** Meaning of tree and hence decision tree, building a decision tree, decision tree induction,classification using a decision tree, classification using ID3

4. **Evolutionary Computing:** Meaning of evolutionary computing, various operators used in evolutionary computing, genetic algorithms and their applications, Particle Swarm Optimization and their applications, Multi-objective Genetic Algorithms with examples

5. **Ensemble of classifiers:** Meaning and importance of ensembles, boosting and AdaBoost algorithm, bagging and random forest, weak and strong learning, ensembles of classifiers with voting

Readings:

1. Pattern Classification: Duda, R.O, Peter Hart, David Stork, 2010, Wiley India
2. Data Mining: Concept and Techniques, Morgan and Kaufmann, 2001
3. Pattern Recognition: Rajjan Shinghal, Oxford University Press New Delhi, 2006
4. Ensemble Methods, Foundations and Algorithms, Zhi-Hua Zhou, A CRC Press, Chapman and Hall Book,2010
5. Pattern Recognition, Robi Polikar, Wiley Encyclopedia of Biomedical Engineering, 2006 John Wiley &Sons, Inc

MAJOR PROJECT

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