Master of Computer Applications (M.C.A.)

(Under faculty of Science)

(Choice Based Credit System)

MCA (Part II)

Sr. No.	Subject Code	Subject Title	Internal Marks	External Marks	CP	Workload /Week TP	
1	MCA31	Computer Network	20	80	44-		
2	MCA32	Java Programming	20	80	44		
3	MCA33	Advance Web Technology	20	80	44-		
4	MCA34	Cyber Security	20	80	44		
5	MCA35	Probability and Combinatorics	20	80	44		
6	MCA3L1	LAB I (Java)		100	4-4		
7	MCA3L2	LABII(Advance Web Technology)		100	4-4		
8	MCA3CC	Corporate Communication	50		22-		
		Total	150	600	30	2208	

The above table is under the heading **Sem-III**.

(Under Faculty of Science) (Introduced
from June 2020 and Onwards)
To be implemented from the academic year 2020-2021
Semester-III

MCA31-Computer Network

Internal Marks -20   External Marks-80   Theory-04 h/week

Course Learning Outcome:
After successful completion of this course, student will be able to

1. Understand the basic concepts of data communication including the key aspects of networking and their interrelationship
2. Understand various protocols such as HTTP, SMTP, POP3, IMAP, FTP, DNS, DHCP and the basic structure of IPv4, IPv6 Address and concept of sub netting with numerical
3. Understand routing concept and working of routing protocols such as RIP, OSPF and BGP
4. Understand various network technologies like LTE, Cloud computing , Grid computing

UNIT I   **(15 hrs)**
Introduction and Physical Layer:
Network - goals and applications, **Network Types, Protocol Protocols and Protocol Hierarchies**,Network Models -OSI Reference Model -Functionality of each layer ,
TCP/IP Reference Model - Introduction to IP, TCP, and UDP, TCP/IP Protocol Suite - Comparison of OSI and TCP/IP model
Physical Layer- Basic Concepts: Bit rate, bit length, base band transmission,Transmission Impairments – attenuation, distortion and noise**,**Data Rate Limits – Nyquist's bit rate formula for noiseless channel and Shannon's law - Problems on above concepts
Performance of the Network: Bandwidth, Throughput, Latency(Delay), Bandwidth –Delay Product, Jitter - Problems on above concepts
Line Coding -Characteristics, Line Coding Schemes – Unipolar, NRZ, RZ, Manchester and Differential Manchester
Transmission Modes-Parallel Transmission,-Serial Transmission – Asynchronous and Synchronous
Transmission Media-Guided Media – Twisted Pair, Coaxial Cable, Fiber Optic Cable, Unguided Media – Radio waves, microwaves, Infrared
Switching -Circuit Switching, Message Switching and Packet Switching

UNIT II   **(15 hrs)**
Data Link Layer
Framing: Character Count, Byte Stuffing, Bit Stuffing and Physical Layer Coding Violations
Error Control -Hamming Code and CRC
Flow Control -Stop and Wait ARQ for noisy channel
Sliding Window Protocols -1-bit sliding window protocols,Go back N, Selective Repeat.
The Medium Access Sub layer

Random Access Protocols: ALOHA – pure and slotted**,**CSMA – 1-persistent, p-persistent and nonpersistent**,**CSMA/CD ,CSMA/CA
Controlled Access -Reservation, Polling and Token Passing
Channelization -FDMA, TDMA and CDMA
VLANS -Membership, Configuration and Advantages

UNIT -III (15 hrs)
The Network Layer :
Design Issues, Store-and-forward packet switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection Oriented Service, Comparison of Virtual Circuit and Datagram
Logical Addressing - IPV4 Addresses – Address Space, Notations, Classful Addressing, Classless Addressing, Network Address Translation(NAT) - IPV6 Addresses – Addressing Structure, Address Space
IPV4 Protocol - Datagram Format, Fragmentation, Checksum, Options
IPV6 Protocol - Advantages, Packet Format, Extension Headers
Transition From IPV4 to IPV6 Dual Stack, Tunneling, Header Translation

UNIT- III (15 hrs)
The Transport Layer
Process-to-Process delivery, UDP, and TCP. Concepts of congestion control: data traffic, congestion and congestion control, congestion Control in TCP.
Application Layer: Web and HTTP, Domain Name System (DNS) and DNS servers, Electronic Mail: Architecture and services, Message
Formats, MIME, message transfer, SMTP, Mail Gateways,
Relays, Configuring Mail Servers, File Transfer Protocol
Advance Network Technologies : 802.4, Wi-Max LTE, Cloud Computing, Grid computing, HSPA, IPTV, FTTH,

REFERENCE BOOKS:
   1. Computer Networks*,* Andrew Tanenbaum*,* Pearson Education
   2. Data Communication and Networking ,Behrouz Forouzan, TATA McGraw Hill.
   3. Data Communication and Networks ,James Irvin, David HarleWiley
   4. Computer Networks protocols, Standards and Interface*,* Black C.,Prentice Hall of India
   5. Computer Communication Networks*,* William Stalling*,* Prentice Hall of India
   6. Delight of Computer Network ,Singh K. K. ,Schitech
   7. Computer Networks ,*Sharma C. R.,* Jaico
   8. Computer Networks and Internets ,Comer D. E. ,Pearson ,5 th *Edition*

MCA (Choice Based Credit System)
(Under Faculty of Science) (Introduced
from June 2020 and Onwards)
To be implemented from the academic year 2020-2021
Semester-III

MCA32-Java Programming

Internal Marks -20   External Marks-80   Theory-04 h/week

Course Learning Outcome:

After successful completion of this course, student will be able to

1. Understand the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.
2. Identify classes, objects, members of a class and the relationships among them needed for a specific problem
3. To demonstrate the ability to understand and use Exception handling and file handling mechanism
4. Arrange the concrete and abstract classes in an appropriate hierarchy.
5. Develop efficient Java applets and applications using OOP concept

UNIT-I   (15hrs)

OOPS in JAVA and Exception handling : History and Evaluation of Java, Introducing classes, Inheritance, Interfaces, Inner classes, Packages. Exception Handling: Exception class hierarchy, Exception Vs Error, try, catch, throw, throws,finally, checked Vs unchecked exceptions, creating custom exception classes.

UNIT-II   (15hrs)

Multi Threading and Networking with Java: Need for multi threading, thread states and priorities, suspending and resuming threads, synchronization between threads. Inter thread communication and dead locks

Networking basics -Sockets, port, Proxy servers, Internet addressing, URL, java.net – networking classes and interfaces, Implementing TCP/IP based Server and Client, Developing small application with sockets

UNIT-III   (15hrs)

Collection Framework, Utility classes and I/O Streams :Introduction to Java Utility classes and collection classes - Date, DateFormat and Gregorian Calendar classes. Using ListlnterFace, ListlIterator and LinkedList classes. Set, Iterator, SortedSet, Map interfaces. HashSet class.Using Vector class, stacks, queues, HashTable. Generating random numbers, Property class,Significance of streams, various types of Input & Output streams, accessing the file through streams, object serialization. Random Access File.

UNIT-I V   **(15hrs)**

Applets and Event Handling in Java: Applet and its life cycle, passing parameters to applets, font, color, image classes.AWT controls, Layout Managers and Menus, Difference between AWT and Swing. Light weight and heavy weight components. Event Handling:-Delegation Event Model, different types of events, event handlers, and adapter classes.Images Fundamentals-Creating, Loading and Displaying, ImageObserver, MediaTracker, MemoryImageSource, PixelGrabber, ImageFilter. Java Foundation Class (JFC), Swing Packages
and Classes,Working with Swing- An Example; Swing Components.

REFERENCE BOOKS:
1. The Complete Reference JAVA by Herbert Schildt,Mcgraw Hill edition
2. Java 8 Programming Black Book
3. Core Java Vol. I (Addison- Wesley) Sun Press ISBN – 981-405-861-0
4. Core Java Vol. II (Addison- Wesley) Sun Press ISBN – 981-4058-50-5
5. Java in a Nutshell, By Benjamin J Evans, David Flanagan, O'Reilly Media
6.Thinking in Java, Bruce Eckel,, Addison – Wesley, ISBN: 9814035750
7.Java 2 Programming Black Book by Steven Holzner, Dream Tech Publication
8.A Programmer's Guide to Java SCJP Certification: A Comprehensive Primer By Khalid Azim Mughal, Rolf Rasmussen
9.Inside Java 2 Virtual Machine by Venners Bill, Mcgraw Hill Education
10.Learning Java by Jonathan Knudsen, Patrick Niemeyer, O'Reilly Media.

MCA (Choice Based Credit System)		
(Under Faculty of Science) (Introduced from June 2020 and Onwards) To be implemented from the academic year 2020-2021 Semester-III		
MCA33-**Advance Web Technology**		
Internal Marks -20	External Marks-80	Theory-04 h/week

Course Learning Outcome:

After completing the course, students are able to demonstrate following course outcomes.

1. Apply the concept of Client Server architecture.

2. Develop GUI based Web application using ASP.Net with C#.

3. Design and develop interactive web applications using master page and theme.

4. Develop asynchronous web application using database programming and Ajax.

UNIT-I (15hrs)

Introduction to .Net Framework and ASP.NET

.Net Framework: Overview of .NET framework, .NET architecture. Common Language Runtime, Common Type System and Common Language Specification, .NET base classes. **Basics of ASP.NET** : Features of ASP.NET , Differences between ASP.NET and Classic ASP, Web Applications and Webpage, Components of Web application, Client Server Architecture, **Fundamentals of C#:** Data Type and syntax Language Fundamentals, Classes, Namespaces, Object Oriented Programming concepts, C# Event Architecture, declarative and dynamic event handling.

UNIT-I I (15hrs)

Application Development through ASP.Net

Building Web Sites: Set up of work environment, start page, the menu system, toolbars, the new project dialog box, graphical designer, code designer. **ASP.Net Web Forms**: Types of ASP.Net Files, Stages in Web Form Processing, ASP.Net Objects. Creating Master and Content Pages, Applying theme to an application. **ASP.Net controls**: HTML Controls, ASP.Net Server Controls and Validation Controls, Working with Properties, Events & Methods of Server Controls, **ASP.Net Configuration**: Global.asax application file, Web.config file.

UNIT-III   (15hrs)

ADO.Net Architecture and Data Access

ADO.Net Components: Connection Object, 5.1.2 Command Object, DataReader, DataSets & Data Adapter, DataView. **Overview of Data Access:** Creating database connections, Connecting to MSSQL Server DataSet & DataTable Features, Using inline SQL Statements, Using Stored Procedures, Executing select commands, Sql Transaction, **Data Bound Controls:** Insert, Update, Delete and DataBinding operation using Data Grid, Data List and Repeater Control.

UNIT-IV   (15hrs)

State Management and Other Controls

State Management: View State, Session State, Application State, QueryString , Cookies. **Rich Controls:** File Uploads, Calendar Control, Page view, Tabbed Page, View, Wizard Control**. Navigation Controls:** Sitemap Path Control, Menu Control, Tree View Control. **Ajax control:** Ajax Framework, ScriptManager, UpdatePanel & Update Progress Bar Control of Ajax.

Introduction to MVC, Benefits of using ASP.NET MVC, Role of Model, View, and Controller, ASP.NET MVC Works, Naming conventions, Creating views, Defining controllers, Defining a data model, Creating strongly-typed views, Creating strongly-typed views

REFERENCE BOOKS:
1. Asp.Net: The Complete Reference, by Matthew MacDonald
2. Microsoft Visual C# 2013 - Microsoft Press, by John Sharp
3. Jesse Liberty, "Programming C#", 4th Edition, O'Reilly Media
4. A Beginners Guide, ASP.NET 3.5 by William B. Senders
5. Professional ASP.NET MVC 5, By Jon Galloway, Brad Wilson, K. Scott Allen, David Matson

Other resources
http://www.tutorialspoint.com/asp.net/index.htmhttp://www.homeandlearn.co
.uk/NET/vbNet.htmlhttps://www.udemy.com/learn-aspnet-from-
scratch/?dtcode=QO5KhFV1R5It
http://stepbystepvideotutorials.comhttp://msdn.microso
ft.com/en-us/beginner/default.aspx

MCA (Choice Based Credit System)
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from June 2020 and Onwards)
To be implemented from the academic year 2020-2021
Semester-III MCA34-

Cyber Security

Internal Marks -20   External Marks-80   Theory-04 h/week

Course Learning Outcome:

After completing the course, students are able to demonstrate following course outcomes.

1. Understand the fundamentals of Cyber crimes and Cyber security
2. Classify and mitigate different cyber security threats.
3. Determine different Internet and Cyber Security Controls.
4. Identify cyber security standards and Legal framework of Cyber security.

UNIT-I   (15hrs)

Introduction to Cyber Crime

Recognizing Computer Crime: Computer as subject, computer as object, computer as targets, Contemporary Crimes. **Passive attacks**: Network Analysis; eavesdropping; Traffic control **Active attacks**: Phishing, Sniffing, spoofing, Denial of service attack. **Malicious Code:** Virus, Worm, Trojan horse, **Perpetrators:** Hackers; Crackers, **Causes of cyber crime:** Lack of security, Inadequate security, Vulnerabilities in network.

UNIT-II   (15hrs)

Cyber Security Controls

Intrusion detection system: Categories of Intrusion Detection System, Types of Intrusion Detection System, Features and limitations. **Intrusion prevention system:** Honeypots, Types of Honeypots, Honeynets. **Encryption:** Key elements of encryption systems, Symmetric key cryptography, Asymmetric key cryptography, Digital signature, Digital certificate. **Firewall System:**   Features,   Types   of   firewall,   Implementation   of   firewalls.

UNIT-III   (15hrs)

Internet Security controls

Internet Security: Secure Socket Layer(SSL), Secure Hypertext Transfer Protocol(S/HTTP), IPSec, Secure Multipurpose Internet Mail Extensions(S/MIME). **Web browser security**: Filtering services in web browser. **E-mail Security:**, Encryption for Secure E-Mail, Secure E- Mail System: PGP (Pretty Good Privacy), S/MIME (Secure Multipurpose Internet Mail Extensions);

UNIT-IV   (15hrs)

Cyber Laws and Security Standards

Cyber security standards: ISO 27001, International Standards maintained for Cyber Security, Information Security Audit. **Cyber Security Management:** Ethical hacking, Penetration testing, Computer forensics **Cyber law:** Digital laws and legislations, National Cyber Security Policy, Information Technology Act, 2000), Amendments in IT Act, Cyber crimes under IPC acts. Legal

issues and challenges in India.

REFERENCE BOOKS:
1. Charlie Kaufman and Radia Perlman, Mike Speciner, "Network Security, Second Edition, Private Communication in Public World", PHI 2002.
2. Tony Bradley, "Essential Computer Security: Everyone's Guide to Email, Internet and

    Wireless security", Syngress Publication 2006
3. Behrouz A. Ferouzan, "Cryptography & Network Security", Tata McGraw Hill, 2007.
4. Information & Network Security for GTU, I. A. Dhotre V. S. Bagad, Technical Publication, Edition 2018
5. Cyber frauds, cyber crimes and law in India, Pavan duggal
6. Digital forensics, DSCI.Nasscom, 2012
7. Cyber crime investigation, DSCI.Nasscom, 2013

Other resources
8. https://sourcedaddy.com/networking/worm.html
9.
    https://www.tutorialspoint.com/information_security_cyber_law/useful_resources.htm

MCA (Choice Based Credit System)		
(Under Faculty of Science) (Introduced from June 2020 and Onwards) To be implemented from the academic year 2020-2021 Semester-III		
MCA35-Probability and Combinatorics		
Internal Marks -20	External Marks-80	Theory-04 h/week

Course Learning Outcome:

At the end of this course, the students are able to achieve the following:

1. To write the programs related to permutations and combinations and solve the problems on these.
2. To understand the concept of probability and solve the related problems.
3. To understand the discrete and continuous probability distributions.
4. To create the hypothesis on various problems and solve them by using appropriate methods.

UNIT-I   (15hrs)

Combinatorial Analysis

Principles of counting, Permutations of n dissimilar objects taken r at a time (with and without repetitions), Properties, Permutation of n objects not all of which are different, Combination of n objects taken r at a time, Properties, Algorithm to compute number of permutations and combinations, examples on Permutations and Combinations. Binomial coefficients and its applications. Multinomial coefficients. Examples. Pigeonhole principle.

UNIT-II   (15hrs)

Probability:

Random experiment, sample space and classification of sample spaces, Classical definition ofprobability, Properties, Empirical definition of probability, Axiomatic definition of probability,Conditional probability, Multiplication law of probability, Baye's theorem, Independence of events, Examples.

UNIT-III   (15hrs)
Probability Distributions
Random variable, Probability mass function, Cumulative distribution function, Mathematical expectation, Variance, Definition and properties of Bernoulli, Binomial, hyper-geometric, geometric, Poisson distribution,Probability density function, Cumulative distribution function of a continuous random variable,Mathematical expectation and variance, Definition and properties of Uniform, Exponential andNormal distributions.

UNIT-IV (15hrs)
Testing of Hypothesis
Basic concepts of hypothesis, Level of significance, Critical region, p-value, One sided and two sided tests, Procedure of testing of hypothesis, Large sample tests for mean and proportion, Exact sample tests, Chi-square test for variance, Goodness of fit, Independence of attributes, t- test for mean, equality of two population means and paired t-test. Numerical examples.

REFERENCE BOOKS:
1. Probability and Statistics with Reliability, Queuing and computer applications: Kishor. S and
2. Trivedi. PHI
3. Introduction to Statistical Methods: J. Medhi
4. Statistical Analysis for Business and Economics: Chou.Cy.A.Lin.
5. A First course in Probability: S. Ross.
6. Modern Elementary Statistics: Freund J.E.
7. Fundamentals of Mathematical Statistics: Gupta S.C. and Kapur.V.K
8. Mathematical Statistics: Kapur.J.N and Saxena.H.C.
9. Probability and Statistics in the Engineering and Computer Science: Milton.J.S and Arnold.
10. J.C.
11. Introduction to the theory of Statistics: Mood.A.M. Gray bill F.A. and Boes.D.C.

MCA (Choice Based Credit System)
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To be implemented from the academic year 2020-2021
Semester-III

MCA3CC -Corporate Communication

Internal Marks -50   Theory-04 h/week

Course Learning Outcome:
- This course intends to develop good communication skills in students for their future jobs andendeavors in the corporate world
- Students can gain a cutting edge over their other counterparts within the country and acrossthe globe.
- Communicate effectively in a professional environment.
- Effectively use latest communication technologies.

UNIT I   **(15 hrs)**

Communication and Leadership: Purpose of Communication; Types of communication, process of communication, Barriers of Communication and its consequences, 7 C's of communication, Oral Communication:Nature, characteristics, body language , Confidence building , Effective communication interviews, conducting interviews and giving interviews. Group Discussion, nature, do's and Don'ts of group discussion, Opening of topic, discussion, summary, observer's comments,Listening,Types of listening, Strategies for Effective Listening, Reading, Types of reading, Group communication, Introduction of Leadership .

UNIT II   **(15 hrs)**

Corporate Communication: Importance and components of corporate communication, professional communicator responsibilities, corporate communication and Public Relation, Role of Social Media in corporate communication, Issues Management and
Public affairs, Recent Trends in Corporate communication.

REFERENCE BOOKS:
1 Lesikar RV & Pettit Jr. JD – Basic Business Communication : Theory & Application (Tata Mc GrowHill, 10th Edition).
2. Bisen Priya – Business Communication (New Age International Publication)
3. Kalkar,Suryavanshi,Sengupta-Business Communication(Orient Blackswan)
4. M.K. Sehgal & V. Khetrapal - Business Communication (Excel Books).
5. P.D. Chaturvedi – Busines Communication (Pearson Education, 3st Edition 2006).
6. Sharma R.C., Mohan Krishna – Business : Correspondence and Report Writing (Tata McGraw Hill,3rd Edition).
7. Rajendra Pal - Business Communication (Sultanchand & Sons Publication)

MCA (Choice Based Credit System)
(Under Faculty of Science) (Introduced
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To be implemented from the academic year 2020-2021
Semester-III MCA3L1-

LAB-III **Java**

Internal Marks -00   External Marks-100   Practical -04 h/week

Programs based on the syllabus MCA32-Java

MCA (Choice Based Credit System)
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from June 2020 and Onwards)
To be implemented from the academic year 2020-2021
Semester-III

MCA2L2-LAB-IV-**Advance Web Technology**

Internal Marks -00   External Marks-100   Practical -04 h/week

Practical should consists of min. 10 to 12 practical assignments based on the syllabus, Emphasis should be given on solving programming problems relating to the concerned topics .

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Sr. No	Subject Code	Subject Title	Internal Marks	External Marks	CP	Workload /Week TP	
Sem-IV							
1	MCA41	Advanced Java	20	80	44-		
2	MCA42	Open Source Languages(PHP)	20	80	44-		
3	MCA43	Artificial Intelligence	20	80	44-		
4	MCA44E	Elective-I i)Image Processing MCA44E.1 ii)Cloud computing MCA44E.2 iii)Data warehousing and Data Mining MCA44E.3 iv)Theory Of Computation & Compiler Construction MCA44E.4	20	80	44-		
5	MCA45E	Elective-II i)Organizational Behavior MCA45E.1 ii)Enterprise Resource Planning MCA43E.2 iii)Management Information System MCA45E.3iv)Human Resource Management MCA45E.4	20	80	44		
6	MCA4L1	LAB III (Advance Java lab)		100	4-4		
7	MCA4L2	LAB IV (PHP Lab)		100	4-4		
8	MCA4MP	Mini Project	50		22-		
		Total	**150**	**600**	**30**	**2208**	

MCA (Choice Based Credit System)		
(Under Faculty of Science) (Introduced from June 2020 and Onwards) To be implemented from the academic year 2020-2021 Semester-IV MCA41-		
Advanced Java		
Internal Marks -20	External Marks-80	Theory-04 h/week

Course Learning Outcome:

1. The student will be able to develop distributed business applications, develop web pages using advanced server-side programming through servlets and Java server pages. Demonstrate approaches for performance and effective coding
2. Develop Java client/server applications.
3. Develop distributed applications using RMI
4. Develop component-based Java software using JavaBeans
5. Develop server side programs in the form of servlet
6. Understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB) ,use Struts frameworks, which gives the opportunity to reuse the codes for quick development and map Java classes and object associations to relational database tables with Hibernate mapping files

UNIT I **(15 hrs)**

Overview of Java programming, Java Servlets: Servlet basics, servlet life cycle , Generic and HTTP servlets, The Servlet API, javax.servlet and javax.servlet.http package, session tracking using session and cookies, web deployment descriptor, web.xml.   Remote Method
Invocation–Introduction, architecture, defining remote objects, creating stubs and skeleton, object serialization, dynamically loaded classes, RMI activation, registering remote objects, marshaled objects.

UNIT II **(15 hrs)**

Java Database Connectivity.JDBCoverview,Architecture, Types of JDBC Drivers, DriverManager class, database connection statements,Resultset, transaction, Metadata and Aggregate functions , callable statements, Connection to various back ends. Java Server Pages (JSP): Introduction to JSP tags and directive, Request String, User Sessions,   Cookies,Session   objects.

UNIT III   (15 hrs)

Java Beans: Basics of designing JavaBeans, Java Bean design patterns, creating and using properties, using events to communicate with other components.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

UNIT IV   (15 hrs)
Struts Framework: An introduction to Struts, building a simple struts application. Action Servlet, Model, view and Controller layers, validator, declarative exception handling, Introduction to struts tag libraries and struts configuration files.   Spring   and Hibernate: Spring API libraries, Designing spring applications. Spring persistence using JPA. Spring web flow, Using spring MVC to build web pages. Integrating and configuring hibernate.
Building a simple application.

REFERENCE BOOKS:

1.Java 2 Complete Reference - (Tata McGraw Hill)
2.Java server pages
3.Java 2EE – Ivan Bayross (PHI)
4.Java 2 Black Book –(DreamTech)
5.Orfali, "The essential Distributed Object Survival Guide".
6.Valesky, "Enterprise Java Beans", Addison Wesley.
7.A Complete Reference Struts (Second Edition) - JamesHomes. Tata McGraw-Hill Edition. 8.
Struts 2 - Black Book. (Second Edition). Kogent Solutions Inc. dreamtech press.

(Under Faculty of Science) (Introduced
from June 2020 and Onwards)
To be implemented from the academic year 2020-2021
Semester-IV

MCA42-Open Source Languages(PHP)

Internal Marks -20   External Marks-80   Theory-04 h/week

Course Learning Outcome:

After successful completion of this course, student will be able to

1. Students can get the knowledge of Basics of PHP language ,Object-oriented PHP and PHP connection with MYSQL.
2. They will create Website and Web Application Development using Open Source Language PHP.
3. They will Learn Laravel Framework and Create CRUD application with Laravel Framework.

UNIT-I   (15hrs)

Introduction of PHP: Embedding PHP with HTML, Enhancing further, PHP Language Basics: Using variable in PHP, understanding Data types, operator and expressions. Making decisions: simple decision with if statements, switch, ternary operator, do..while loop, for statement, break, loop skip iteration, nested loop. Arrays: creating and accessing array elements, looping through arrays, multidimensional array, manipulating array. Function: calling functions, working with variable functions, own functions references, recursive functions. Strings: creating and accessing strings, searching strings, replacing text within strings and formatting strings.

UNIT-II   (15hrs)

Handling HTML forms with PHP: HTML forms work, capture form data with PHP, multi value fields, web forms with PHP, storing PHP variables in forms, create file upload forms, redirecting PHP. Introducing Database and SQL: Deciding how to store data, quick play with MYSQL,connecting to MYSQL from PHP, retrieving data from MYSQL with PHP. PHP CRUD with MYSQL.

UNIT-III   (15hrs)

Cookies – What is Cookie, Cookie Syntax, How to Create, Store, Retrieve and Delete Cookie. PHP File Upload – Create an Upload-File Form, Upload Script and Save Uploaded file, putting restrictions on uploads. Session – What is Session? Creating, Storing and Destroying Sessions.Classes & Object – OO Concepts, Define Class, Class Attributes, An Object, Creating an Object, Object Properties & Methods, Object constructors and destructors, Static Method, Class Inheritance, Abstract Class, Implement Inheritance.

UNIT-IV   (15hrs)

PHP Framework(Laravel): Introduction of Framework, Features of Framework, installation, Application Structure, configuration, Routing, Middleware,Namespaces, Controllers, Requests, Cookie, Response, Views , Blade Templates,Redirections, Working with Database, Forms
.Laravel CRUD.

REFERENCE BOOKS:

1. Matt Doyle, Beginning PHP 5.3,Wiley India Edition,2012 .

2.PHP6 and MySQL, Steve Suehring, Tim Converse and Joyce Park, Wiley India 2010, Second Edition
3.VikramVaswani, PHP: A Beginners guide,TataMcgraw Hill,2009.
4.Core PHP Programming" by Atkinson Leon, Suraski Zeev, Pearson Publication
5. Larry Ullman, PHP 6 and MySQL 5,Pearson Education,2008.
6. Laravel: Up & Running: A Framework for Building Modern PHP Apps by Matt Stauffer
   OREILLY.

MCA (Choice Based Credit System)		
(Under Faculty of Science) (Introduced from June 2020 and Onwards) To be implemented from the academic year 2020-2021 Semester-IV		
MCA43-**Artificial Intelligence**		
Internal Marks -20	External Marks-80	Theory-04 h/week

Course Learning Outcome:

After completing the course, students are able to demonstrate following course outcomes.

1. Apply problem solving by intelligent search approach.
2. Represent knowledge using AI knowledge representation techniques.
3. Design Machine Learning solution to real life problems.
4. Derive solutions for problems with uncertainty using Fuzzy theory.
5. Define a NLP problem and find a suitable solution to it.

UNIT-I (15hrs)

Introduction of AI and Problem Solving: Artificial Intelligence, AI Problems, AI Techniques, The Level of the Model, Criteria For Success. Defining the Problem as a State Space Search, Problem Characteristics , Production Systems,**Search and Game Playing**: Breadth first search, depth first search, hill climbing, heuristic search, Best first search, A* algorithm, AO* algorithm, Minmax & game trees, refining minmax, Alpha – Beta pruning, constraint satisfaction

UNIT-II (15hrs)

Knowledge Representation
Introduction, Propositional Logic, Syntax and Semantics, Interpretations, Properties, Predicate
Calculus, WFF, Free and Bound Variables, Normal Forms, Inference Techniques, Resolution, Unification, Modes Pones, Frames, Frame Representation Language, Conceptual Dependency, CD Theory, Script, Semantic Net, Conceptual Graph, Rule Based Representation, Forward and Backward Reasoning

UNIT-III (15hrs)

Neural Networks: Introduction, Basic Concepts of Neural Networks, Model of an Artificial Neuron, Activation Functions, Feedforward Network, Recurrent Network, Learning Methods, deep learning and deep neural network.Fuzzy Set Theory, Fuzzy Membership, Fuzzy Operations, Fuzzy Logic Systems.

UNIT-IV   **(15hrs)**
Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing.
Genetic Algorithm: Genetic Algorithm (GA), Genetic Representations, (Encoding) Initialization and Selection, Different Operators of GA, Analysis of Selection Operations, the Hypothesis of Building Blocks, Schema Theorem and Convergence of Genetic Algorithm,

REFERENCE BOOKS:

1. Elaine Rich and Kelvin Knight, **Artificial Intelligence**, Tata McGraw Hill, 2002.
2. Nils J Nilson, **Artificial Intelligence: A New Synthesis**, Morgan Kaufmann Publishers , Inc., San Francisco, California, 2000.
3. R. Akerkar, **Introduction to Artificial Intelligence**, Prentice-Hall of India, 2005
4. Winston P.H, "Artificial Intelligence", Addision Wesley (1993)
5. B. Yegnanarayana, **Artificial Neural Networks**, Prentice-Hall of India, 2006
6. Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications, S. Rajasekaran, G. A. VijayalakshmiPai, Prentice-Hall of India, 2003
7. Artificial Intelligence: A Modern Approach, 2nd edition, by Russell and Norvig, Prentice Hall

(Under Faculty of Science) (Introduced
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Semester-IV

MCA44E.1 –Elective-I- Image Processing

Internal Marks -20   External Marks-80   Theory-04 h/week

Course Learning Outcome:

After completing the course, students are able to demonstrate following course outcomes.

1. To understand the image fundamentals.
2. To understand the mathematical transforms necessary for image processing and to study
3. the image enhancement techniques.
4. To understand the image degradation/restoration model and different noise models.
5. To understand the uses of pseudo colors and to study the image compression models.
6. To understand Morphological Image Processing and the image segmentation.

UNIT – I   **(15 Hours)**

Digital Image Fundamentals: What is Digital Image Processing, Fields that use digital image processing, fundamental Steps inDigital Image Processing, Components of an Image processing system, Elements of VisualPerception, Image Sensing and Acquisition, Image Sampling and Quantization, Some BasicRelationships between Pixels, Linear and Nonlinear Operations.

UNIT – II   **(15 Hours)**
Image   Enhancement   in   Spatial   domain: Some   Basic   Gray   Level   Trans–formations,Histogram Processing, Enhancement Using Arithmetic/Logic Operations.Image Enhancement In Frequency Domain: Introduction to the Fourier transform,smoothing frequency domain filters, sharpening frequency domain filters.

UNIT – III   **(15 Hours)**
Image Restoration: Model of image degradation/restoration process, noise models,Restoration in the Presence of Noise Only– Spatial Filtering, Periodic Noise Reduction byFrequency Domain Filtering, Linear Position– Invariant Degradations, inverse filtering,minimum mean square error (Weiner)   Filtering

UNIT – IV   **(15 Hours)**
Color Image Processing: Color fundamentals, color models, pseudo color Image processing,basics of full color image processing, color transformations.Image Compression: Fundamentals, Image Compression Models, Elements of InformationTheory

REFERENCE BOOKS:

1. *"*Digital Image Processing", Rafael C. Gonzalez and Richard E. Woods Pearson
2. Education, 2009, 3rd edition.
3. "Fundamentals of Digital Image Processing", Anil K. Jain, Pearson Edition, 2001.
4. "Digital Image Processing", S. Jayaraman and others.
5. "Digital Image Processing with MATLAB and LABVIEW", Vipula Singh, Elsevier India.
6. "Digital Image Processing with MATLAB", Ganzalez R.C., Tata McGraw Hill.
7. "Image Processing Analysis and Machine vision", Sonka Milan, Cengage Learning.
8. "Digital Image Processing", William K. Pratt, Wiley India Pvt. Ltd.
9. "Digital Image Processing and Analysis", Chanda B., Majumder D. Dutta, PHI Learning.
10. "Fundamental of Digital Image Processing", Jain A.K., PHI Learning.
11. "Digital Image Processing", Jayaraman S., Esakkirajan S., Veerakumar T., Tata McGraw Hill.
12. "Digital Image Processing", Annadurai, Pearson Education

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Semester-IV

MCA44E.2 –Elective-I- Cloud computing

Internal Marks -20   External Marks-80   Theory-04 h/week

Course Learning Outcome:

On completion of the course, students will be able to-

1. Acquire knowledge of cloud computing and its usage.
2. Understand components and operations of cloud computing system.
3. Enhance the skills for data management, storage and operations in cloud computing system.
4. Study recent trends in cloud computing.

UNIT – I   **(15 Hours)**
Introduction to cloud computing
Evolution of cloud computing, key characteristics of cloud computing, need of cloud computing, Components of cloud computing, cloud computing architecture, client server architecture, grid computing environment, types of cloud, major players in cloud computing, benefits and challenges of cloud computing.

UNIT – II   **(15 Hours)**
Virtualization
Virtualization architecture and its needs, benefits and challenges, types of virtualization, virtualization of CPU, Memory and I/O devices, server virtualization, virtualization design requirements, virtualization structure, open source virtualization technology, draw backs of virtualization. Hypervisor, load balancing, Google cloud, VMware, Amazone EC2.

UNIT – III   **(15 Hours)**
Cloud computing services & security
Cloud services-IaaS, SaaS,PaaS,DaaS,MaaS, CaaS, DBaas, cloud models- public, private, hybrid and community clouds. Open cloud implementation and administration (Eucalyptus), cloud development techniques, cloud based storage, cloud backup, Cloud security - disaster recovery, data integration, data transformation, data migration, challenges with data security.

UNIT – IV   **(15 Hours)**
Recent trends in cloud computing
Cloud standards, service oriented architecture (SOA) for cloud application, mobile computing its application, architecture and working. MangoDB, MapReduce implementations for the Cloud.

REFERENCE BOOKS:
1. Kailash Jauaswal, Jagannath Kallakurchi, Donald J. Houde, Dr. Deven Shah, "Cloud Computing", Black Book, Dreamtech , 2014
2. Barrie Sosinsky, "Cloud Computing Bible, " Wiley India Pvt. Ltd. 2012
3. Prasant Kumar Pattnaik et.al., Fundamentals of Cloud Computing, Vikas Publication House Pvt. Ltd.,first Edition 2015
4. Dr. U.S. Pandey, Dr. Kavita Choudhary, "Cloud Compting", S. chand, 2014
5. Imad M. Abbadi, "cloud Management Security", Wiley,2019
6. Rajkumar Buyya,James Broberg, Andrzej Goscinski, "cloud Computing Principles and Paradigms", Wiley,2015
7. Dr. Kumar Saurabh,"cloud Computing", second Edition, wiley,2012

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MCA44E.3 –Elective-I- **Data Warehousing and Data Mining**

Internal Marks -20	External Marks-80	Theory-04 h/week

Course Learning Outcome:

After completing the course, students are able to demonstrate following course outcomes.

1. Analyze data warehouse characteristics and plan warehouse data and Illustrate trends towards data warehousing and data mining.
2. Understand the importance of data mining in emerging world and business value of data warehousing and data mining.
3. Understand data mining principles and techniques: Introduce DM as a cutting edge business intelligence method and acquaint the students with the DM techniques for building competitive advantage through proactive analysis, predictive modelling, and identifying new trends and behaviors.
4. Describing and demonstrating basic data mining algorithms, methods, and tools
5. Identifying various applications of data mining in different domains

Unit I **(15 hrs)**
Introduction: Data Warehouse and OLAP Technology: Data warehouse concept, Amultidimensional data model, data warehouse architecture, From data warehousing to data mining. **Data Preprocessing:** Descriptive data summarization, data cleaning, data integration and transformation, data reduction

Unit II **(15 hrs)**
Introduction: Data mining concepts, Data mining functionalities, classification of data mining systems, Integration of data mining system with a database or data warehouse system, major issues in data mining. **Mining frequent patterns, Associations and Correlations:** Basic concepts and road map, efficient and scalable frequent itemset mining methods,

Unit III **(15 hrs)**
Classification and Prediction: Concept of classification and prediction, issues regarding classification and prediction, classification by decision tree induction, Bayesian classification, rule-based classification, classification by backpropagation, support vector machines, lazy learners, other classification methods.

Unit IV   **(15 hrs)**
Cluster analysis : Concept of cluster analysis**,** types of data in cluster analysis, a categories of major clustering methods, partitioning methods, hierarchical methods, data mining applications.Web Mining: Introduction, Web content Mining, Web structure Mining, Web Usage Mining.

REFERENCE BOOKS:
1. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson education.
2. Data Mining concepts and techniques --- Jiawei Han and Micheline Kamber , Elsevier
3. Data Mining: Introductory and Advanced Topics - Margaret H. Dunham, Pearson education
4. Data Mining: Practical Machine Learning Tools and Techniques, Ian H. Witten, Eibe
    Frank
5. Data Warehousing in real world – Sam Anahory, dennis murray
6. Data Mining Methods --- Rajan Chattamvelli
7. Data Mining Techniques – Gordon S. Linoff and Michael J. A. Berry

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MCA44E.4 –Elective-I- Theory of Computation and Compiler Construction

Internal Marks -20   External Marks-80   Theory-04 h/week

Course Learning Outcome:

After successful completion of this course, student will be able to
1. Understand basics of theory of computation
2. To use the knowledge of automata in the design of compiler
3. To use the knowledge of data structures in compiler design.
4. To understand the working of compiler phases in detail.

UNIT I   **(15 hrs)**
Introduction to compilation and lexical analysis: Compiler basics, issues in compilation, the analysis-synthesis model, phases of compilation, grouping up the phases, execution of a program, compiler construction tools, role of lexical analysis, input buffering, specification of tokens, recognition of tokens – regular expression, nondeterministic finite automata (NFA), deterministic finite automata (DFA), conversion from regular expression to NFA, conversion from NFA to DFA, minimization of DFA, creating lexical analyser with Lex .

UNIT II   **(15 hrs)**
Syntax analysis: Role of syntax analyser, error detection and recovery, context free grammar (CFG), normalization and CNF, top-down parsing – introduction, recursive descent parsing, problems in recursive procedures, predictive parsing, error handling in predictive parsing, bottom-up parsing – actions of shift reduce parser, construction of parse tree, operator precedence parsing, components of operator precedence parsers, parsing action, LR parsing, simple LR parser, YAAC.

UNIT III   **(15 hrs)**
Intermediate code generation and syntax directed definitions: Need for intermediate code generation, intermediate forms, implementation of three address code, translation into intermediate forms, methods of translation into intermediate forms, syntax directed translation – introduction, syntax directed translation for declaration, assignment, Boolean and control flow statements, syntax directed translation for procedure calls.

UNIT IV   **(15 hrs)**
Code optimization and code generation: Introduction, Flow graphs, principle sources of optimization, optimization of basic blocks, issues in code generation, the target machine, runtime storage management, next, use information, code generation algorithm, peep hole optimization.

REFERENCE BOOKS:
1) Introduction to Automata theory, Languages and Computation, J.E.Hopcraft, R.Motwani, and Ullman. 2nd edition, Pearson Education Asia.
2) Introduction to languages and the theory of computation, J Martin, 3rd Edition, Tata McGraw Hill
3) Elements and Theory of Computation, C Papadimitrou and C. L. Lewis, PHI
4) Theory of Computer Science, K.L.P.Mishra, N. Chandrashekharan , PHI.
5) Introduction to Computer Theory, Daniel I.A. Cohen, Second Edition, John Wiley.
6) Compilers-Principles, Techniques and Tools, Aho A.V., Sethi R. and Ullman J.D., Addison Wesley.
7) The Theory of Parsing, Translation and Compiling- Volume I: Parsing, Aho A. V. and Ullman J. D., Prentice Hall
8) Introduction to Automata Theory, Languages and Computation,Hopcroft J. E. and Ullman J. D., Addison-Wesley.
9) Compiler Design , Sadasivam, G. Sudha, Scitech Publications (India) Pvt Limited.

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Semester-IV

MCA45E.1 –Elective-II- **Organizational Behavior**

Internal Marks -20   External Marks-80   Theory-04 h/week

Course Learning Outcome:

After successful completion of this course, student will be able to
1. To understand basics of organization.
2. To understand concepts of Personality, learning, emotions and motivation
3. To understand Group behavior, team building, communication and leadership.
4. To understand Organizational culture, change and development. **UNIT I**
(15 hrs) Introduction to organization and organizational behavior (OB): Meaning of organizational design and structure, basic elements of organization structure, types of organization design, Definition of OB, key elements of OB, need for studying OB, contributing disciplines to OB, the challenges faced by management, OB process, models of OB.

UNIT II   **(15 hrs)**
Personality, learning, emotions and motivation: Concept of personality, determinants of personality, theories of personality, meaning of learning, determinants of learning, learning theories, meaning of emotion, types of emotions, theories of emotion, meaning of motivation, theories of motivation,

UNIT III   **(15 hrs)**
Group behavior, team building, communication and leadership: definition and characteristics of group, theories of group formation, types of groups, meaning of team, types of teams, team building process, interpersonal communication, organizational communication, tips for effective communication, meaning of leadership, theories of leaderships.

UNIT IV   **(15 hrs)**
Organizational culture, change and development: definition, types of cultures, functions of culture, organizational change, resistance to change, managing resistance to change, organizational development (OD) – meaning of OD, characteristics of OD, objectives of OD, OD models

REFERENCE BOOKS:

1) Stephan P. Robbins – Organisational Behaviour, Prentice Hall Publication
2) Fred Luthans – Organisational Behaviour, McGrow Hill Publication.
3) Keith Davis – Organisational Behaviour, McGrow Hill Publication
4) Laurie J. Mullincs – Management & Organisational Behaviour, Pearson Education.
5) Newstorm and Keith Davis – Human Resource Management, McGrow Hill Publication
6) Organization Behavior- Jit Chandan.

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Semester-IV

MCA45E.2 –Elective-II- **Enterprise Resource Planning**

Internal Marks -20 External Marks-80 Theory-04 h/week

Course Learning Outcome:
1. To know concepts of ERP and it's need for industry.
2. to understand ERP evolution, need and significance.
3. to study the ERP implementation life cycle and ERP market.

UNIT I   **(15 hrs)**
Enterprise Resource Planning-Introduction, Disadvantages of non-ERP systems , What Is ERP?, Need of ERP, Advantage of ERP, Risks of ERP , Growth of ERP
ERP Modules – Finance , Production Planning, Control and Management, Sales and Distribution , Human Resource Management, Inventory Control System, Quality Management, Plant Maintenance

UNIT II   **(15 hrs)**
ERP Implementation : ERP Implementation (Transition) strategies, ERP Implementation Life Cycle, Implementation Methodologies, Evaluation and selection of ERP package , ERP Project Team: Vendors, Employees, Consultants, Training & Education, Project management & Monitoring, Post Implementation Activities , Operation & maintenance of ERP system, Measuring the Performance of ERP System, Success & failure factors of an ERP Implementation

UNIT III   **(15 hrs)**
ERP Market and Vendors : ERP Marketplace and Marketplace Dynamics, Comparison of
Current ERP Packages and Vendors, like; SAP, Oracle, PeopleSoft, BAAN etc.
ERP Case Studies
ERP systems implemented in – for example :TISCO, SKF Automotive Bearings Co. Ltd, Qualcomm CDMA, California

UNIT IV   **(15 hrs)**
ERP and related technologies : -Business Process Re-Engineering (BPR), Information Systems -Management Information, System (MIS), Decision Support System (DSS), Executive Support System (ESS), Data Warehousing, Data Mining , On-Line Analytical Processing (OLAP), Supply Chain Management, Customer Relationship Management
Post Implementation review of ERP packages – in Manufacturing, Services and Others Organizations,
Customization of ERP for different types of Industries.

REFERENCE BOOKS:

Sr. No.	Title	Author/s	Publication	Edition
1	ERP Demystified	Alexis Leon,	Tata McGraw-Hill Education	
2	ERP Ware: ERP Implementation Framework :	V.K. Garg &N.K. Venkita Krishnan, : V.K. Garg	PHI	
3	ERP Concepts & Planning : V.K. Garg &N.K. Venkita Krishna, PHI, 2nd Ed.	&N.K. Venkita Krishna,	PHI,	2nd Ed.
4	Business Process Reengineering	Jayaraman M.S.	(TMG) (HB SchoolPress)	
5	Best Practices in Reengineering	Carr D.K. Johnanson H.J.	(MGH)	

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MCA45E.2 –Elective-II- **Management Information System**

Internal Marks -20	External Marks-80	Theory-04 h/week

Course Learning Outcome:
  1. To learn computer based IS for capturing, storing, analyzing, processing and supporting for decision making at various level in organization.
  2. To study various information system security issues and policies.
  3. To learn various applications of information system in organization

Unit I-   **(15 hrs)**
Introduction to Management Information System-Definition, Concept, Meaning of Management, Information and system, functions of management, Information Hierarchy, classification of Information, characteristics of information, need and sources of information,
System-Components of System, Concept of System, Types of System

Unit II-   **(15 hrs)**
Components of computer based information system: functions of information system, Information system and management level of organization, Business processes and Information
System, Strategic Advantages of Information System, role of Management information system in organization, MIS Planning, Design and Development

Unit III-   **(15 hrs)**
Types of Information System- Transaction Processing Systems- Introduction, need and significance, and characteristics, Management Information Systems- Introduction, need, characteristics and significance, Decision Support Systems- Introduction, need elements, characteristics and significance , Executive Information Systems- Introduction, need and significance of ESS, Office Automation System- Introduction, need and significance

Unit IV   **(15 hrs)**
Information Systems Functional Areas- Finance, Marketing, Inventory control, Production, Human Resource Management. Security and Ethical Issues- Ethical and Social Issues in
Information Systems ,Technology and Ethical issues, Information System Audit –Need of Information System AuditCase studies related to information requirement for above areas

REFERENCE BOOKS:

1. Management Information Systems: Managing the Digital Firm Kenneth C. Laudon (Pearson).
2. Management of Information systems – Gordon B. Davis &MargrethH.Olson.
3. Management of Information systems Jawadekar W.S.
4. Information systems management in practice – Ralph H. Sprague Jr. & Barbara C. McNurlin.
5. Management of information systems – James A. O'Brien.
6. Information system concepts for management – 4th edition Lucas Management of information systems – 2nd edition – Kroenke David.

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Semester-IV

MCA45E.2 –Elective-II- **Human Resource and Management**

Internal Marks -20 External Marks-80 Theory-04 h/week

Course Learning Outcome:
1. Understand recruitment process, job evaluation.
2. Acquire knowledge of team & stress management.
3. Enhance skills of IT in Human Resource Information System (HRIS).

Unit-I **15 Hrs**

Human Resource Management –Introduction, Definition, Scope, Role, Objectives, Importance, HRM versus Personnel Management,Job analysis-uses, process, methods, description, specification, role analysis. HRM in Indian

Unit-II **15 Hrs**

Job evaluation-concept, success factors, methods, limitations. Recruitment-objective, factors affecting, sources of recruitment. Selection- essential, process, placement.Training-need, learning principles, applicability, environment, areas, types, methods, evaluation methods.Industrial relations-objectives, approaches, significance. Industrial disputes- forms, causes, preventive and settlement machinery.

Unit-III **15 Hrs**

Performance Appraisal-meaning, need, methods of performance appraisal, problems of performance appraisal.Training and Development- difference between trainingand development, methods of training &development. Wage and Salary administration-factors affecting wage/ salary, objective of wage and salary administration, employee Benefits,principle of employee benefit programme, employee Service.

Unit-IV **15 Hrs**

Introduction of Human Resources Information Systems (HRIS)-meaning, concept, objective, attributes, need. HRISmodel, subsystem of HRIS, Pre-implementation stage of HRIS, implementation of HRIS,benefits of HRIS, limitations of HRIS,recent trends in HRIS. Job stress, counseling and mentoring.Strategic HRM –meaning strategic HR tools – strategy map HR scoreboard, digital dashboards.

REFERENCE BOOKS:

1. V S P Rao, "Human Resource Management", Second Edition, Excel Books 2005.
2. Dipak Kumar Bhattacharyya,Human Resource Management.
3. Garry DesslerHuman Resource Management.
4. Edwin Flippo, Personnel & Human Resource Management.
5. S. Seetaraman& B. Venkateswara Prasad, Personnel Management.
6. P.SubbaRao, Human Resource Management.
7. C.Appa.Rao, Strategic Human resource management

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Semester-IV
MCA4L1-LAB-III- **Advanced Java**

Internal Marks -00   External Marks-100   Practical -04 h/week

Programs based on the syllabus MCA42-Advanced Java

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Semester-III MCA4L2-LAB-
IV-**PHP(Lab)**

Internal Marks -00   External Marks-100   Practical -04 h/week

Practical should consists of min. 10 to 12 practical assignments based on the syllabus, Emphasis should be given on solving programming problems relating to the concerned topics .

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Semester-III MCA4MP-LAB-
Mini Project

Internal Marks -50   External Marks-00

Mini Project

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