Gujarat Vidyapith

Department of Computer Sc.

(Faculty of Management and Technology)

# Teaching & Evaluation Scheme

## Name of Program : Master in Computer Application

## Effective from June-2020

## MCA Semester-II

| Sr.No. | Subject Code | Elective | Name of the Subject | Teaching Hours / Week | | | | Evaluation Scheme / Semester | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Theory | | | | | Practical (Marks) | | | Total |
| | | | | Th | Tu | Pr | Credit Total | Internal Exam | | University Exam | | Theory Total | Internal Practical/Viva Exam* | University Practical Exam | Practical Total | |
| | | | | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 1 | MCA-201 | Elective-I | OPERATING SYSTEM (ચાલક પધ્ધતિની તંત્રરચના) | 3 | | 4 | 3+2 | 40 | 2 | 60 | 2½ | 100 | 40 | 60 | 100 | 200 |
| | | Elective-II | SQL FOR DATA SCIENCE (SQL ફોર ડેટા સાયન્સ) | | | | | | | | | | | | | |
| 2 | MCA-202 | | WEB TECHNOLOGY (વેબ ટેકનોલૉજી) | 3 | | 4 | 3+2 | 40 | 2 | 60 | 2½ | 100 | 40 | 60 | 100 | 200 |
| 3 | MCA-203 | | COMPUTER NETWORK (કૉમ્પ્યુટર આંતરજોડાણ વ્યવસ્થા) | 4 | | | 4 | 40 | 2 | 60 | 2½ | 100 | | | | 100 |
| 4 | MCA-204 | Elective-I | Mathematical & Statistical computing using Python (પાયથોન વડે ગાણિતિક અને આંકડાકીય ગણતરી) | 3 | | 2 | 3+2 | 40 | 2 | 60 | 2½ | 100 | 40 | 60 | 100 | 200 |
| | | Elective-II | Mobile Application Development (મોબાઈલ એપ્લિકેશન ડેવલપમેન્ટ) | | | | | | | | | | | | | |
| 5 | MCA-205 | | Software Engineering (સૉફ્ટવેર ઇજનેરી) | 3 | 1 | | 3+1 | 40 | 2 | 60 | 2½ | 100 | | | | 100 |
| 6 | MCA-206 | | Software Application Development Project (Mini Project) | | | | 9 | 40 (Project Viva) | | 60 (Project Viva) | | 100 | | | | 100 |
| 6 | COMPL-102 | | MANNUAL WORK (UDHYOG) (ઉદ્યોગ) | | | | 2 | | | | | | | | | |
| 7 | | | COMMUNITY LIVING (સમૂહજીવન) | | | | Grade | | | | | Grade | | | | Grade |

નોંધ: ૧. જે વિષયમાં પ્રાયોગિક છે તે દરેક વિષયનાં સૈદ્ધાંતિક તથા પ્રાયોગિક બન્ને પ્રશ્નપત્રમાં પાસ થવું ફરજીયાત છે.

૨. સતત મૂલ્યાંકન એ આંતરીક મૂલ્યાકનનો એક ભાગ છે.

**Department of Computer Science**
**Faculty of Management and Technology**
**Gujarat Vidyapith, Ahmedabad – 14**

**MCA SEMESTER - II**
**MCA – 201 : SQL for Data Science (Elective-II)**
SQL ફોર ડેટા સાયન્સ
**(Effective from JUNE – 2020-21)**

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|---|---|
| **Credits:** | Theory - 3 + Practical - 2 |
| **Objective:** | • To give a primer in the fundamentals of SQL and working with data so that student can begin analyzing it for data science purposes<br>• Student will begin to ask the right questions and come up with good answers to deliver valuable insights for organization<br>• To enable student to gradually write both simple and complex queries to select data from tables<br>• Student will start to work with different types of data like strings and numbers and discuss methods to filter and pare down results |
| **Prerequisite:** | • Student should have basic knowledge of DBMS concepts |
| **Learning Outcome:** | The students will:<br>• Create new tables and be able to move data into them<br>• Learn common operators and how to combine the data<br>• Use case statements and concepts like data governance and profiling<br>• Interpret the structure, meaning and relationships in source data and use SQL as a professional to organize data for targeted analysis purposes<br>• Identify a subset of data needed from a column or set of columns and write a SQL query to limit to those results<br>• Use SQL commands to filter, sort and summarize data<br>• Manipulate strings, dates & numeric data using functions to integrate data from different sources into fields with the correct format for analysis |

**UNIT - I** **CREDIT-0.5**

## Understanding the Data Model with SQL & NoSQL

- Understand data and types of Data, The Evolution of Data Models, Relational (SQL & NOSQL) vs. Transactional Models, Understanding the Information Schema Table of SQL, NoSQL: History, Feature, Types of NoSQL Database, Advantages and Disadvantages of

NoSQL. Retrieving, updating & deleting data in database, applying comments and using wildcards in SQL

**UNIT -II** **CREDIT-01**

## Filtering, Sorting for Data Preparation and Calculating Data with SQL & NoSQL

- SQL Filtering, Slicing Data, Data Sorting and Mathematical Calculation Operations, Data Grouping and apply Aggregate Functions using SQL concepts, Query Optimization

**UNIT - III** **CREDIT-01**

## Cleaning and Transforming Data with SQL

- Cleaning Data in SQL, Different data types and messy values, Undesired type, Type mismatch & COALESCE, Cleaning and setting numeric values for analysis, Messy Strings, Cleaning String Values, String formulation of messy date & time values for analysis, Removing duplicate data,
- Transforming data

**UNIT - IV** **CREDIT-0.5**

## Modifying and Analyzing Data with SQL

- Data visualization using SQL, Pivot, Query Execution Plan, Views, Data visualization tools, Database or Table Data Exporting into SQL/CSV & Importing from SQL/CSV, Data Governance and Profiling

**LABORATORY WORK - PRACTICAL** **CREDIT-02**

**LAB – SQL**

**List of Experiments:**

- Implementation of SQL Queries on tables of various size and type to retrieve data.

**Text Book(s):-**

1. SQL Queries for Mere Mortals, Fourth Edition, A Hands-On Guide to Data Manipulation in SQL by John L. Viescas, Addison- Wesley, Pearson Education, Inc.

**Reference Book(s):-**


1. Data Analysis Using SQL and Excel by Gordon S. Linoff published by John Wiley & Sons, Inc., second edition, ISBN: 978-1-119-02143-8
2. SQL for Data Analytics by Upom Malik, Matt Goldwasser and Benjamin Johnston published by Packt Publishing Limited 2019 edition, ISBN-978-1-78980-735-6.
3. Solving Business Problems Using SQL: A Definitive Guide for Beginners Who Want to Be Proficient in Database Design and Writing SQL. Published by Hafizur Rahman, 2019 edition. ISBN: 9781795478298.


**List of Software / Learning Websites**

- MYSQL Workbench

**Department of Computer Science**
**Gujarat Vidyapith, Ahmedabad – 14**

**MCA - SEMESTER - II**
**MCA – 202 : Web Technology**
**વેબ ટેકનોલોજી**

**(Effective from JUNE – 2020-2021)**

| | |
|---|---|
| **Credits:** | Theory- 3 + Practical -2 |
| Rationale: | • This course introduces client-side and server-side web scripting and dynamic web application development. Students develop various web applications and gain knowledge of current and emerging technologies and practices. Students will examine core aspects of web technologies and web applications and will develop usable websites. Independent research on an assigned topic is also required. |
| **Objective:** | • To explain different components of dynamic web application (DOM, CSS, DHTML-client-side and Script and server-side scripting, XML).<br>• Design and develop websites using fundamental web languages, technologies, and tools.<br>• Distinguish between server-side and client-side web technologies.<br>• Acquire knowledge and skills for creation of server-side dynamic web application and practical aspects of web application development using java server-side programming language (Servlet, JSP (Java Server Pages), JavaBeans, JDBC, and XML). This course concepts learn via theory and hands-on sessions. |
| **Course Outcome:** | At the completion of the course, students should be able to:<br>• Identify the appropriate programming environment for developing dynamic client-side and server-side web applications.<br>• Plan, develop, and implement interactive client-side and server-side web applications and deploy it on web server.<br>• Describe the architecture of client-side and server-side web applications.<br>• Identify the tools needed to create dynamic web applications for Java Server programming using Servlet/JSP to generate the web pages.<br>• Develop a dynamic webpage using Java server-side programming.<br>• Write a server-side java application called Servlet to catch form data sent from client, process it, and store it on database.<br>• Write a server-side java application called JSP to catch form data sent from client and store it on database.<br>• Write a well-formed / valid XML document. |
| **Prerequisite:** | Student should have basic knowledge of HTML, CSS Java Script, Fundamental of Java Programming, SQL, JDBC and Database concepts. |

**UNIT - I** **CREDIT- 1**

**Web Concepts, DHTML and Java Editions:**

Overview of the Internet, Web as a platform and its components. Form processing at the client side. DHTML and its components. Dynamic page using DOM, CSS, and Java Script.

Introduction to Request – Response Architecture, Web application and HTTP Protocol, Tomcat application server and its structure, Java Web Application Architecture, Understanding HTTP Status Codes, HTTP Request ad Response Headers, Overview of Java Editions.

**Servlet API and Overview:**

Servlet Model: Servlet: What and Why? Servlet Life Cycle, HTTP Methods Structure and Deployment descriptor, Comparison with existing technologies, Servlet Interface, Servlet Context and Servlet Config interface, Generic Servlet, Http Servlet, Steps to create a Java web application in Tomcat, Handling Client Request- Reading Request Headers, reading request data in Servlet and Generate dynamic content/response. Request Redirection and Dispatching, Servlet- catch form data sent from client, process it, and store it on database. JDBC (Java Database Connectivity) and how it can be used within servlet.

**UNIT -II** **CREDIT- 1**

**Session Tracking and Management:**
Session Tracking: What and Why? Understanding Session Timeout and Session Tracking - Hidden Form Field, URL Rewriting, Cookies, HTTP Session

Handling Cookies: Create Cookie, remember user data, Deleting Cookies, Sending and Receiving Cookies, Differentiating Session Cookies from Persistent Cookies, Using Cookies to Remember User Preferences.
Session Tracking and Management: Session Tracking using HTTP Session APIs, Encoding URLs, Sent to the Client and accumulating a List of User Data.

**Java Server Pages (JSP):**

The Problem with Servlets, Overview of JSP, Advantages of JSP, JSP Comment, Life Cycle of JSP page, JSP API, JSP Expression, JSP Scriptlet, JSP Declaration, JSP Directives, JSP Standard Action, JSP implicit Objects, JSP Directive, JSP Scripting elements, JSP Action Elements: jsp:forward, jsp:include, jsp:useBean, jsp:setProperty & jsp:getProperty, Java Bean and JSP Communication, Exception Handling, JSP Session and Cookies Handling, JSP Session Tracking, JSP- catch form data sent from client, process it, and store it on database.

**UNIT - III** **CREDIT- 1**

**MVC Application Design with Servlet/JSP:**
Introduction to MVC, Advantages and Disadvantages of MVC Architecture JSP Application Design with MVC, MVC pattern Layer: Model, View and Controller. Role of Servlet and JSP in MVC.

**Extensible Markup Language (XML):**

XML Introduction and Overview, XML, Understanding the purpose and difference of HTML and XML, History and application of XML, XML Syntax, XML Document Structure and Building Blocks of XML Documents, XML Parsers, Well-formed and valid XML Documents, XML Namespace, Understating DOM, Types of Elements

Document Type Definition (DTD): Introduction to DTD, Purpose of DTD, Create Internal and External DTD, referencing a DTD in an XML Document, defining building blocks of XML documents - Elements, Attributes, Entities, PCDATA, CTADA, Declaring Elements, Attributes and Entity.

XML Schema: Introduction to XML Schema, Purpose of XML Schema, Advantages of XML Schema, Comparison with DTD, Understanding Why XML Schema is better than DTD, Create XML Schema Document (.XSD), Referencing a Schema in an XML Document, defining building blocks of XML documents using Schema, XML Schema Date Types, Understating use of Restriction, Occurrence, and Indicators with examples.

**LABORATORY WORK - PRACTICAL** **2 CREDIT**

**LAB – MCA-202 Web Technology**

**List of Experiments:-**

Practical list should be prepared based on the content of the subject with following guidelines in mind.

- Entire syllabus should be covered.
- Practical list should be designed with real life examples.
- List should be prepared to cover individual concepts and integration of different concepts on real life problems.

**Text Book(s):-**

- "Java Servlet Programming", by Jason Hunter, William Crawford, O'Reily Publication
- "Head First Servlets and JSP" by Bryan Basham, Kathy Sierra, Bert Bates, O'Reily Publication
- "Professional XML", by Mark Birbeck, Wrox Publication

**Reference Book(s):-**

- "Core Servlets and Java Server Pages" Volume – 2", Pearson Education

- "Java Server Programming", A Press Publication
- "Pro JSP 2" by Simon Brown, Sam Dalton, Daniel Jepp, David Johnson, Sing Li, and Matt Raible, Apress Publication
- "Web Technologies Black Book", Dreamtech Press, Edition 2010
- "Web Enabled Commercial Application Development Using HTML, DHTML, PERL, Java Script", by Ivan Bayross, BPB Publications, Revised Edition


**List of Software / Learning Websites**

- **Apache Tomcat**
  http://tomcat.apache.org
- JDBC Database Access
  https://docs.oracle.com/javase/tutorial/jdbc/
- **Servlet Technologies**
  http://www.oracle.com/technetwork/java/index-jsp-135475.html
- Java Server Pages
  http://www.oracle.com/technetwork/java/javaee/jsp/index.html
- **The Java EE Tutorial**
  https://docs.oracle.com/javaee/6/tutorial/doc/bnafd.html
- **MySQL**
  https://dev.mysql.com/doc/

**Teaching Belief/Philosophy and Practices**

- Generate and sustain student interest.
- Maintain a balance on teaching and learning.
- Provide complete educational experience beyond classrooms and courses.

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**MCA SEMESTER - II**
**MCA–203 : Computer Network**
**કમ્પ્યૂટર આંતરજોડાણવ્યવસ્થા**
**(Effective from JUNE – 2020-21)**

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|---|---|
| **Credits:** | 4 |
| **Objective:** | • At the end of the course students should be able to work with computer network and manage the primary activities in communication of data across different geographical areas.<br>• This has to be achieved by understanding networking protocols, standards and networking models, network configuration, understand the functionality of various layers in network protocol and network security. |
| **Prerequisite:** | • Basic knowledge of telecommunication and data communication system |
| **Learning Outcome:** | • After completion of this course the students will be able to explain the functions of each layer in the OSI model and TCP/IP model.<br>• They can use and apply the fundamentals of data communication and networking to identify the requirements to establish computer network and can identify connecting devices utilized in computer network.<br>• They can implement the concepts of IPv4 and IPv6 protocols and their characteristics and functionalities.<br>• They can evaluate and implement routing algorithms and can implement transport and application layer protocols along with concepts of network security. |

**UNIT-I** **CREDIT-I**

- **Introduction to Data Communication and Networking**
  - Need of Data Communication and Applications
  - Network Models
  - TCP/IP and OSI Layering Models
- **Physical Layer**
  - Transmission Media
  - Wired and Wireless Physical Layer
- **Data Link Layer – Error Detection and Correction**
  - Introduction and Duties of Data Link Layer
  - Types of Errors
  - Redundancy
  - Detection Versus Correction
  - Forward Error Correction Versus Retransmission
  - Error Detection
  - Error Correction
  - Block Coding

- Linear Block Codes
- Cyclic Codes

**UNIT-II** **CREDIT-I**

- **Data Link Layer – Data Link Control**
  - Data Link Control and Protocols
    - Flow and Error Control
      - Flow Control
      - Error Control
      - Flow and Error Control Mechanism
  - Noiseless Channels
  - Noisy Channels
  - Bluetooth
    - Architecture
    - Applications
    - Profiles
    - Pairing Process
- **Network Layer**
  - Introduction
  - Duties of Network Layer
    - Routing
    - Accounting
    - Global Machine Level addressing
  - Connection Oriented and Connectionless Forwarding
  - Forwarding Examples
  - Routing Algorithms
    - Distance Vector Routing
    - Link State Routing
    - Border Gateway Protocol
  - Congestion
    - Congestion Control
  - IPv4 Addresses
    - Address Space
    - Notations
    - Classful Addressing
    - Classless Addressing
  - Subnetting and Supernetting
  - IPv6 Addresses
    - Structure
    - Address Space
  - ICMP

**UNIT-III** **CREDIT-I**

- **Transport Layer**
  - Introduction
  - Duties of Transport Layer
    - Multiplexing, Demultiplexing and Port Numbers
    - Service to other Layers
    - Transport Layer of the Internet

- Process Level Addressing
- End to End Solutions

- Connection Management at the Transport Layer
  - Delayed Duplicates
  - Connection Establishment
  - Connection Release
- Congestion Control
  - Detecting Congestion
  - Reacting to Congestion
  - Fast Recovery
  - Flow Control
- Communication Primitives

**UNIT-IV** **CREDIT-I**

- **Application Layer**
  - Introduction
  - Domain Name System
    - Domain Name Space
    - Registration Process
    - Name Servers
    - Resource Records
  - Mailing System
    - SMTP
    - POP3 and IMAP
    - Webmail
  - SNMP
  - Network Protocol Analyzer
    - Wireshark
    - Applications
    - Features
- **Network Security**
  - Introduction
  - Cryptography
  - Digital Signatures
  - Public Key Management
  - Authentication Protocol
    - Authentication based on Shared Secret Key
  - Information Security

**Text Book:-**

- Title: Computer Networks by Bhushan Trivedi
  Publication: Oxford University Press

**Reference Books:-**

- Title: Data Communications and Networking by Forouzan
  Publication: McGraw Hill
- Title: Computer Networks by Tanenbaum
  Publication: Prentice Hall of India

# Department of Computer Science
# Gujarat Vidyapith, Ahmedabad – 14

## MCA - SEMESTER - II

## MCA –205 : Software Engineering

## (Effective from JUNE - 2020)

| | |
|---|---|
| **Credits:** | Theory - 3 + Tutorial -1 |
| **Objectives:** | • Understand software development life cycles and various development models<br>• Gain knowledge regarding design paradigms<br>• Understand project management and quality management<br>• Understand fundamental concepts of software testing methods and issues related to software testing<br>• Identify various risks associated with software project |
| **Prerequisite:** | • Basic concepts of System Analysis and Design & UML |
| **Learning Outcome:** | • Apply appropriate development model for software project.<br>• Prepare SRS (Software Requirement Specification) document.<br>• Apply the concept of Software Design.<br>• Will be able to apply and ensure quality of software product.<br>• Apply various testing techniques. |

**UNIT -1 Software Analysis and Design** **CREDIT -1**

**Introduction to Software Engineering**

- The Evolving Role of Software,
- Software Engineering: A Layered Technology

**Software Process Models**

- The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Models, Component-Based Development Model, Agility and Agile Process model, Extreme Programming,

**Requirements analysis and Specification**

- Requirement Modeling, Requirement Specification (SRS), Requirement Analysis, Requirement Engineering, Requirement analysis for WebApps, Navigation Modeling

**Software Design**

- Design Concepts and principals. Architectural Design, Component Level Design, User Interface Design, Web Application Design.

## UNIT-2 Software Testing and Quality Management CREDIT-1

### SOFTWARE TESTING STRATEGIES

- Testing Strategies, Testing Techniques, Conventional testing, Testing for Specialized Environments ,Testing for Object-Oriented applications, Testing for Web applications, Debugging

### QUALITY MANAGEMENT

- Quality concepts, Software Quality Assurance, The Quality Standards, SQA plan, Review Techniques, software configuration management

## UNIT-3 Project Management CREDIT-1.0

- Software Project management, Product, Process and Project Metrics, Software project estimation, Software Risk analysis and Management, RMMM plan

## Tutorial 1:

Consider any project to be developed in any technology as a Project Manager. Construct Software Requirement Specification (SRS) document for the project.

## Tutorial 2:

Software Project management Tool

**Books**:-


1. Software Engineering – A Practitioner's Approach
   Publication. McGraw-Hill International Edition
   Author. Roger S. Pressman (Seventh Edition)


**Reference Books**:-


2. Software Engineering - Publication. Printice_Hall India,
   Author. Ian Summarville
3. Software Engineering - Author. Pankaj Jalote


********** END MCA – Paper No 40 **********

# Department of Computer Science
# Gujarat Vidyapith, Ahmedabad – 14

## MCA - SEMESTER - II
## MCA –206 : Software Application Development Project (Mini Project)
## સોફ્ટવેર એપ્લીકેશન ડેવેલપમેન્ટ પ્રોજેક્ટ (મિનિ પ્રોજેક્ટ)

**(Effective from JUNE - 2020)**

| | |
|---|---|
| **Credits:** | 9 |
| **Objectives:** | • Student will be able to understand real life problem and analyzed it, describe the key process of software design and development.<br>• Select the appropriate technology for a given development. (more or less self-study kind of a subject) |
| **Prerequisite:** | • Knowledge of Software Engineering, Any Programing language. |

Student participation will be encouraged through the case studies and presentation, individual as well as group based. The case will consist of problem identification analysis and requirement gathering, based on that they have to design and developed software project (implementation if possible). Student could propose to study a different project of their interest, provided that it is of a complexity similar to those proposed by the instructor. Students are free to work on any development platform and programming language. (Encouragement for work on Open source)

********** END MCA – 206 **********