# Shri Vaishnav Vidhyapeeth Vishvavidhyalaya, Indore

## Institute of Computer Applications

**Name of Program : M.Sc. (CS)**

| COURSE CODE | CATEGORY | COURSE NAME | L | T | P | CREDITS | TEACHING & EVALUATION SCHEME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | THEORY | | | PRACTICAL | |
| | | | | | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* |
| MSCCS301 | Compulsory | Computer Networks | 3 | 1 | 0 | 4 | 60 | 20 | 20 | 0 | 0 |

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A – Quiz/Assignment/Attendance, MST - Mid Sem Test.

***Teacher Assessment** shall be based on following components: Quiz/Assignment/Project/Participation in class (Given that no component shall be exceed 10 Marks)

**Course Educational Objectives (CEOs):**

- To develop an understanding of modern network architectures.
- To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
- To clarify network terminology.
- To provide knowledge about **TCP/IP**.
- To expose students to emerging technologies and their potential impact.

**Course Outcomes (COs) (COs): students will be able to**

- Knowing and Applying pieces of hardware and software to make networks more efficient, secure, easier to use, able to transmit several simultaneous messages, and able to interconnect with other networks.
- Differentiating the various types of network configurations and applying them to meet the changing and challenging networking needs of organizations.
- Defining and analyzing the circuits available for voice and data networks, their transmission speeds (bandwidth), and how they are packaged for commercial use.
- Defining the different protocols, software, and network architectures. Local area networks, their topologies, protocols and applications.
- Analyzing why networks need security and control, what errors might occur, and how to control network errors.

**Unit I:**

**Computer Network :** Introduction, Layered Architecture - ISO-OSI Model, Transmission Fundamentals - Communication Media - Conductive Metal, Optical Fiber links, Wireless Communication - Radio links, Satellite Links. Topologies. Communication Services & Devices, Telephone System., Integrated Service Digital Network , Cellular Phone., Digital to Analog Conversion - Frequency Modulation , Amplitude, Modulation ,Phase Modulation , Analog to Digital Conversion - Pulse Amplitude Modulation, Pulse Code Modulation , Differential Pulse Code Modulation, Modem & Modem Types.

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Multiplexing- Frequency Division Multiplexing (FDM). Time Division Multiplexing (TDM), Statistical Time Division Multiplexing (STDM).

**UNIT II:**

Stop-Go-Access Protocol, Carrier sense multiple access with collision detection (CSMA/CD). Framing – Flow and error control, Data Security and Integrity: Parity Checking Code, Cyclic redundancy checks , Hemming Code, Protocols for Noise less and Noise Channels, Concepts, Basic flow control, Sliding window protocol-Go-Back-N protocol and selective repeat protocol, Wired LAN, IEEE standard: Ethernet – Standard, Fast Ethernet and Giga Bit Ethernet.

**Unit III:**

Connecting devices - Backbone networks - Virtual LANS, Virtual circuit networks: Architecture and Layers of Frame Relay.
802.5 IEEE standard, Token Bus : 802.4 IEEE standard, FDDI Protocol, DQDB Protocol, Inter-Networking, Repeater, Hubs, Bridges, Switches, Routers, Gateways.

**Unit IV:**

Introduction to Wide Area Network, Network Routing, Routing Tables, Types of routing, Dijkstra's Algorithm, Open shortest path first, Flooding, Broadcasting, Multicasting, Congestion & Dead Lock.
Internet Protocols, Overview of TCP/IP, Transport protocols, Elements of Transport Protocol, Transmission control protocol (TCP), User data-gram protocol (UDP).

**Unit V:**

Cryptography – Symmetric key and Public Key algorithms - Digital signature –Management of Public keys – Communication Security – Authentication Protocols. Virtual Terminal Protocol, firewalls, Fire wall policies and rules, Common Problem with Packet Filtering. Overview of DNS- E-mail – FTP – WWW – HTTP – Multimedia. IP Management Protocol, SNMP: Agents and Managers.

**Suggested Readings:**

1. A.S.Tanenbaum, "Computer Network", 4th addition, PHI
2. Forouzan "Data Communication and Networking 3ed", TMH
3. J.F.Hayes, "Moduling and Analysis of Computer Communication Networks", Plenum Press
4. D.E.Comer, "Internetworking with TCP/IP", Volume Ist&IInd, PHI
5. Willium Stalling, "Data & Computer communications", Maxwell Macmillan International Ed.
6. D.Bertsekas and R.Gallager, "Data Networks", 2nd Ed. ,PHI.
7. G.E. Keiser ,"Local Area Networks ", McGraw Hill, International Ed.

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|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | THEORY | | | PRACTICAL | |
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| MSCCS302 | Compulsory | Software Engineering | 3 | 1 | 0 | 4 | 60 | 20 | 20 | 0 | 0 |

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**Course Education Objectives (CEOs):**

- To provide knowledge about system development.
- To impart knowledge about software process models.
- To provide detailed knowledge about software design.
- To acquaint students with software quality and testing.
- To provide study of MIS.

**Course Outcomes (COs):**Students will be having:

- An ability to understand system design and its constraints.
- An ability to apply knowledge of software engineering.
- An ability to design a system, a component or process to meet desired needs.
- An ability to identify, formulate and solve engineering Problems
- An ability to measure and to understand quality issues.
- An ability to understand MIS and DSS.

**UNIT -I**

Introduction to Software Engineering: Software engineering problem, Software engineering approach, Software characteristics and Applications. The system concept, characteristics of system, elements of system, The System Development Life Cycle, The Role of System Analyst.

**UNIT -II**

Software Processes: Software processes and its components, characteristics of software processes, Software development processes: Linear Sequential model, Prototyping model, RAD model, Iterative Enhancement model, Spiral model, Component based development. Introduction to Agile model.

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**UNIT-III**

Software Project Planning: Project planning objectives, Decomposition Techniques, Empirical estimation models, The Make/Buy Decision, Risk analysis. Software Design: Design Principles, Cohesion & Coupling.

**UNIT-IV**

Software Quality Assurance: Quality Concepts, The Quality Movement, Software Quality Assurance, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Statistical Software Quality Assurance, Software Reliability, Software Testing Techniques: Testing fundamentals, Testing Strategies: A strategic approach of software testing strategic issues, unit testing, integration testing, validation testing, system testing.

**UNIT-V**

MIS & DSS: Introduction to MIS, long range planning, development and implementation of an MIS, Applications of MIS in manufacturing sector and in service sector. Decision Support System concepts, types of DSS.

**Suggested Readings:**

1. R. S. Pressman, "Software Engineering – A practitioner's approach", 6th ed., McGraw Hill Int.
2. Pankaj Jalote "Software Engineering" Narosa Publications.
3. Ian Sommerville : Software Engineering 6/e (Addison-Wesley)
4. Richard Fairley : Software Engineering Concepts (TMH)
5. Elis Awad, "System Analysis & Design", Galgotia publications
6. W.S. Jawadekar: Management Information Systems, TMH Publication, India

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|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | THEORY | | | PRACTICAL | |
| | | | | | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* |
| MSCCS304 | COMPULSORY | Data Base Management System | 3 | 1 | 4 | 6 | 60 | 20 | 20 | 30 | 20 |

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**Course Educational Objectives (CEOs):**

- To provide students with basic concepts in information system and the benefits of these systems
- To provide the knowledge of systems definition, systems requirements and information needed by the decision maker
- To understand the role, requirement and operations that an analyst needed to analyze, design, and implement the systems
- To identify several methods to enhance and develop information systems and to manage the information system recourses
- To explain several ethical issues in information system
- To provide the knowledge of business data modeling for the designing of efficient information systems
- To explain the various issues related with Data Security.

**Course Outcomes (COs):** After completing this course the student will be able to:

- To differentiate between data, information, and knowledge
- Create, maintain and manipulate a relational database using SQL
- Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing an information system
- Describe the characteristics of database transactions and how they affect database integrity and consistency.
- Understand the difference between database and data warehouse, transaction processing system and functional area information system
- To design the efficient database system using normalization
- Define the information systems and differentiate information systems Identify the threats to information security and to protect information recourses
- Analyze the basic concepts and architecture associated with DBMS
- To analyze any environment to determine their tables to construct database
- Information systems that support organization, management, Decision making
- To plan, acquire, and maintain information systems.

**UNIT-I**

**Introduction:** Introduction to Databases, Purpose of Database System- Database System, Database system Vs file system, Database System concepts and architecture, Advantage of DBMS approach, data independence, schema and subschema and instances, primary concepts of data models, Database languages, Database administrator and users, data dictionary.

**ER model:** basic concepts, notation for ER diagram, design issues, mapping constraint, Concepts of keys: super, candidate, primary, alternate, foreign, weak and strong entity sets, specialization and generalization, aggregation, inheritance, design of ER schema, reduction of ER schema to tables, reduction of ER diagrams to tables, extended ER model, relationships of higher degree.

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**UNIT-II**

**Relational Algebra:** Relational data Model and Language: concepts, domains, relations, kind of relations, relational database, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, The structure, relational algebra with extended operations, modifications of Database.

**Relational Calculus**: idea of relational calculus, tuple and domain calculus, Domain relational Calculus, calculus vs algebra, computational capabilities.

**UNIT-III**

**SQL:** Introduction, basic structure of SQL, Characteristics and Advantage of SQL set operations, aggregate functions, null values, SQL data types and literals. SQL operators, Types of SQL commands. nested sub queries, derived relations, views, modification of Database, join relations,

**Views:** Introduction to views, data independence, security, updates on views, comparison between tables and views.

**Queries and sub queries.** Aggregate functions. Insert, update and delete operations. Joins, Unions, Intersection, Minus, Cursors, Triggers in SQL.

**UNIT-IV**

**Transaction, concurrency and Recovery:** basic concepts, ACID properties, Transaction states, Implementation of atomicity and durability, concurrent executions, basic idea of serializability, concurrency control, deadlock, failure classification, storage structure types, stable storage implementation, data access, recovery and atomicity- log based recovery, deferred Database modification, immediate Database modification, checkpoints.

**UNIT-V**

**Storage structure and file organizations:** overview of physical storage media, magnetic disks performance and optimization, basic idea of RAID, file organization, Sequential, Pointer, Indexed, Direct organization of Records in Files – Indexing and Hashing, ordered indices, Static and Dynamic hashing, basic idea of B-tree and B+-tree organization

**DATABASE SECURITY:** Data Classification-Threats and risks – Database access Control – Types of Privileges –Cryptography

**Text and Reference Books:**

1. A Silberschatz, H.F Korth, Sudersan "Database System Concepts" –, MGH Publication.
2. C.J. Date "An introduction to Database Systems" –6th ed.
3. Elmasri & Navathe "Fundamentals of Database systems" – III ed.
4. B.C. Desai. "An introduction to Database systems" , BPB
5. Raghurama Krishnan "Database Systems" , TMH

**List of Experiments:**

1. To study Basic SQL commands (create database, create table, use, drop, insert) and execute the following queries using these commands:
   - Create a database named ' Employee'.

- Use the database 'Employee' and create a table 'Emp' with attributes 'ename', ecity', 'salary', 'enumber','eaddress','depttname'.
- Create another table 'Company' with attributes 'cname', ccity','empnumber' in the database 'Employee'.

2 To study the viewing commands (select , update) and execute the following queries using these commands:

- Find the names of all employees who live in Delhi.
- Increase the salary of all employees by Rs. 5,000.
- Find the company names where the number of employees is greater than 10,000.
- Change the Company City to Gurgaon where the Company name is 'TCS'.

3. To study the commands to modify the structure of table (alter, delete) and execute the following queries using these commands:

- Add an attribute named ' Designation' to the table 'Emp'.
- Modify the table 'Emp', Change the datatype of 'salary' attribute to float.
- Drop the attribute 'depttname' from the table 'emp'.
- Delete the entries from the table ' Company' where the number of employees are less than 500.

4. To use (and, or, in , not in, between , not between , like , not like) in compound conditions and execute the following queries using them:

- Find the names of all employees who live in ' Gurgaon' and whose salary is between Rs. 20,000 and Rs. 30,000.
- Find the names of all employees whose names begin with either letter 'A' or 'B'.
- Find the company names where the company city is 'Delhi' and the number of employees is not between 5000 and 10,000.
- Find the names of all companies that do not end with letter 'A'.

5. Using aggregate functions execute the following queries:

- Find the sum and average of salaries of all employees in computer science department.
- Find the number of all employees who live in Delhi.
- Find the maximum and the minimum salary in the HR department.

6. To execute the following queries using study the grouping commands (group by, order by)

List all employee names in descending order.

- Find number of employees in each department where number of employees is greater than 5.
- List all the department names where average salary of a department is Rs.10,000.

7. To write SQL queries

Alter table 'Emp' and make 'enumber' as the primary key.

- Alter table 'Company' and add the foreign key constraint.

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- Add a check constraint in the table 'Emp' such that salary has the value between 0 and Rs.1,00,000.
- Alter table 'Company' and add unique constraint to column cname.
- Add a default constraint to column ccity of table company with the value 'Delhi'.
- Rename the name of database to 'Employee1'.
- Rename the name of table 'Emp' to 'Emp1'.
- Change the name of the attribute 'ename' to 'empname'.

8. To execute following queries using appropriate

Retrieve the complete record of an employee and its company from both the table using joins.

- List all the employees working in the company 'TCS'.

9. To study the various set operations and execute the following queries using these commands:

- List the enumber of all employees who live in Delhi and whose company is in Gurgaon or if both conditions are true.
- List the enumber of all employees who live in Delhi but whose company is not in Gurgaon.

10. To study the various scalar functions and string functions ( power, square, substring, reverse, upper, lower, concatenation) and execute the following queries using these commands:

- Reverse the names of all employees.
- Change the names of company cities to uppercase.
- Concatenate name and city of the employee.

11. To study the commands for views and execute the following queries using these commands:

- Create a view having ename and ecity.
- In the above view change the ecity to 'Delhi' where ename is 'John'.
- Create a view having attributes from both the tables.
- Update the above view and increase the salary of all employees of IT department by Rs.1000.

12. To study the commands involving indexes and execute the following queries:

- Create an index with attribute ename on the table employee.
- Create a composite index with attributes cname and ccity on table company.
- Drop all indexes created on table company.

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|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | THEORY | | | PRACTICAL | |
| | | | | | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* |
| MSCCS305 | Compulsory | Advanced Java | 3 | 1 | 4 | 6 | 60 | 20 | 20 | 30 | 20 |

**Course Education Objectives (CEOs):**

This course covers the implementation of advanced program designs with the tools available in the Java programming language. After a detailed review of the fundamentals, advanced topics will include the Graphical User Interface (GUI) for applications, 2D graphics, multimedia, multithreading and client-server models for networking and database connectivity. If time and interest permits, the class may introduce the Java tools for generics and collections.

**Course Outcomes (COs):**

Students will build on their understanding of Object-Oriented Design (OOD) and Programming (OOP) in Java and learn to write robust, Graphical User Interface (GUI) applications and applets. Students will gain a practical familiarity with 2D graphics, multimedia, programming for concurrency, networking and database connectivity. Students may investigate programming for Web Services, if time and interest permits.

**UNIT – I**

**Java Networking:** Network Basics and Socket overview, TCP/IP client sockets, URL, TCP/IP server sockets, Datagrams, java.net package Socket, Server Socket, Inet Address, URL, URL Connection.

**JDBC Programming:** The JDBC Connectivity Model, Database Programming: Connecting to the Database, Creating a SQL Query, Getting the Results, Updating Database Data, Error Checking and the SQL Exception Class, The SQL Warning Class, The Statement Interface, Prepared Statement, Callable Statement The Result Set Interface, Updatable Result Sets, JDBC Types, Executing SQL Queries, Result Set Meta Data, Executing SQL Updates, Transaction Management.

**UNIT - II**

**Servlet API and Overview:** Servlet Model: Overview of Servlet, Servlet Life Cycle, HTTP Methods Structure and Deployment descriptor Servlet Context and Servlet Config interface, Attributes in Servelt, Request Dispatcher interface The Filter API: Filter, Filter Chain, Filter Config Cookies and Session Management: Understanding state and session, Understanding Session Timeout and Session Tracking, URL Rewriting

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**UNIT – III**

**Java Server Pages:** JSP Overview: The Problem with Servlets, Life Cycle of JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, JSP Directives, JSP Action, JSP Implicit Objects JSP Form Processing, JSP Session and Cookies Handling, JSP Session Tracking JSP Database Access, JSP Standard Tag Libraries, JSP Custom Tag, JSP Expression Language, JSP Exception Handling, JSP XML Processing.

**UNIT – IV**

**Java Server Faces2.0:** Introduction to JSF, JSF request processing Life cycle, JSF Expression Language, JSF Standard Component, JSF Facelets Tag, JSF Convertor Tag, JSF Validation Tag, JSF Event Handling and Database Access, JSF Libraries: PrimeFaces

**UNIT – V**

**Hibernate4.0:** Overview of Hibernate, Hibernate Architecture, Hibernate Mapping Types, Hibernate O/R Mapping, Hibernate Annotation, Hibernate Query Language.

**Java Web Frameworks: Spring MVC:** Overview of Spring, Spring Architecture, bean life cycle, XML Configuration on Spring, Aspect – oriented Spring, Managing Database, Managing Transaction

**Suggested Readings:**

1. Patrick Naughton and Herbertz Schildt, "Java-2: The Complete Reference", TMH, 5th edition, 2002.
2. Bill Venners, "Inside Java Virtual Machine", TMH, 2nd edition.
3. Rick Darnell, "HTML 4 unleashed", Techmedia Publication, 2000
4. Shelley Powers, "Dynamic Web Publishing", 2nd edition, Techmedia, 1998.
5. Paul Dietel and Harvey Deitel, "Java How to Program", PHI, 8th edition, 2010.
6. E. Balagurusamy, "Programming with Java: A Primer", TMH, 1998.
7. Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley.
8. Decker and Hirshfield, "Programming Java: A Introduction to Programming Using JAVA", Vikas Publication, 2000.
9. N.P. Gopalan and J. Akilandeswari, "Web Technology- A Developer's Perspective", PHI, 2nd edition
10. Eric Jendrock, Jennifer Ball, Debbei Carson, "The Java EE5 Tutorial", Pearson, 3rd edition, 2007.
11. Daniel Liang, "Introduction to Java Programming", Pearson, 7th edition, 2010.

**List of Experiments:**

1. Write a Java program to present a set of choices for a user to select stationary products and display the price of product after selection from the list.
2. Write a Java program to demonstrate typical editable table, describing employee details for a software company.

3. Write a Java program using split pane to demonstrate a screen divided in two parts, one part contains the names of planets and other displays the image of planet. When user selects the planet name from left screen appropriate image of planet displayed in right screen.
4. Develop simple servlet question answer application.
5. Develop srevlet application of basic calculator.
6. Develop a JSP application to accept registration details from user and store it into the database table.
7. Develop a JSP application to authenticate user login as per the registration details. If login is successful then forward the user to Index Page otherwise show login failure message.
8. Develop a web application to add items to the inventory using JSF.
9. Develop a room reservation system application using enterprise java beans.
10. Develop a hibernate application to store feedback of a website visitor in MySQL Database.
11. Develop a simple struts application to demonstrate 3 page website of teaching classes which passes values from every page to another.
12. Develop a simple struts application to demonstrate a simple e-mail validator.
13. Develop a simple “Hello World” web service in Java.