



Syllabus of III semester MCA programme, w.e.f. 2017-18 (according new regulations w.e.f. 2016-17)

III SEMSTER MCA w.e.f.2017-18								
Course	Subject Name	Teaching Hrs per week	Practical Hrs/week	Examination				Credits
				Duration (Hrs.)	Marks			
					Theory/ Practical	IA	Total	
17MCACS 3.1	Operating System Concepts	4	--	3	80	20	100	4
17MCACS 3.2	Programming in Java	4	--	3	80	20	100	4
17MCACS 3.3	Database Management System	4	--	3	80	20	100	4
17MCACS 3.4	Computer Networks and Security	4	--	3	80	20	100	4
17MCAOE 3.5	MIS	4	--	3	80	20	100	4
17MCAPL 3.6	Programming Lab. –I: Java Lab.	--	6	3	80	20	100	3
17MCAPL 3.7	Programming Lab. –II: DBMS and Network Lab.	--	6	3	80	20	100	3
Total		20	12				700	26

CS: Core Course/Subject CE: Core Elective Course OE: Open Elective



17MCACS 3.1	Operating System Concepts	
Credits: 4	Teaching: 4Hrs/week	Max. Marks: 80 IA: 20

UNIT I 10Hrs

Introduction: Operating System functions, Characteristics, System Components, OS Services, System Calls, System Programs, System Structure, Virtual Machines.

Process: Process concepts, Process scheduling, Operation on processes, IPC, Communication in client-server system, **Threads:** Overview, Multithreading models, Threading issues, Pthreads

UNIT II 12Hrs

CPU Scheduling: Basic concepts, Scheduling criteria, scheduling algorithms, Multiple processor scheduling, Real time scheduling, **Process Synchronization:** Critical section problems, Synchronization hardware, Semaphore, Classic problems of synchronization, Critical regions, Monitors, Atomic transaction, **Deadlocks:** system model, Deadlock characterization, Methods of handling deadlocks, Deadlock prevention, deadlock avoidance, Deadlock detection, Recovery from deadlock

UNIT III 10Hrs

Memory Management: Swapping, contiguous memory allocation, Paging, Segmentation, Segmentation with paging. **Virtual Memory:** Background, Demand Paging, Process Creation, Page replacement, Allocation of frames, Thrashing.

Process Management and Synchronization: The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.

UNIT IV 10Hrs

File System Interface and Implementation: File Concept, Access Methods, Directory Structure, File Protection. **I/O Systems:** Overview, I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming i/o to Hardware Operations, Streams, Performance. **Mass Storage Structure:** Disk structure, Disk Scheduling, Disk Management, Swap-space Management.

UNIT V 10Hrs

Protection: Goals of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Evocation of Access rights, Capability-Based system, Language-Based Protection.

Security: The Security Problem, User Authentication, Program Threats, System Threats.

1. Silberschatz, Galvin, Gagne, Operating System Concepts, 9th Ed, Wiley-India, 2012.
2. Andrew Tanenbaum, Introduction to Operating System, 3rd edn, Pearson Education.
3. 2. Williams Stallings, Operating Systems: Internals and Design Principles, 5thedn. Pearson Education
4. Dhamdhare, Operating Systems, Tata McGraw Hill
5. Milan Milenkovic, Operating Systems, Tata McGraw Hill



17MScCSCS 3.2	Programming in Java	
Credits: 4	Teaching: 4Hrs/week	Max. Marks: 80 IA: 20

UNIT I 10Hrs
OOP concepts Review - Data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, classes and objects, Procedural and object oriented programming paradigms.

Java programming - History of Java, comments, data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow block scope, conditional statements, loops, break and continue statements, simple java stand-alone programs, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, building strings, exploring string class.

UNIT II 10Hrs
Inheritance - Inheritance hierarchies super and sub classes, Member access rules, super keyword, preventing inheritance: final classes and methods, the Object class and its methods.

Polymorphism - dynamic binding, method overriding, abstract classes and methods.

Interfaces - Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interfaces.

Inner classes - uses of inner classes, local inner classes, anonymous inner classes, static inner classes, examples.

Packages - Defining, Creating and Accessing a Package, importing packages.

UNIT III 10Hrs

Exception handling - Dealing with errors, benefits of execution handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, re throwing exceptions, exception specification, built in exceptions, creating own exception sub classes.

Multithreading – Thread concept, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, procedure consumer pattern.

UNIT IV 10Hrs

Collection Framework in Java - Introduction to Java Collections, Overview of Java Collection framework, Generics, Commonly used Collection classes Array List, Vector, Hash table, Stack, Enumeration, Iterator, String Tokenizer, Random, Scanner, calendar and Properties

Files - streams - byte streams, character streams, text input/output, binary input/output, random access file operations, File management using File class.

UNIT-V 12Hrs

GUI Programming with Java - The AWT class hierarchy, Introduction to Swing, Swing vs, AWT, Hierarchy for Swing components, Containers - JFrame, JApplet, JDialog, JPanel, Overview of some swing components JButton, JLabel, JTextField, JTextArea, simple swing applications, Layout management - Layout manager types - border, grid and flow



Event handling - Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, Examples: handling a button click, handling mouse events, Adapter classes.

Applets - Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, passing parameters to applets, applet security issues.

References:

1. Herbet Schidt and Dale Srien, Java Fundamentals - A comprehensive Introduction, TMH.
2. P.J. Deitel and H.M. Deitel, Java for Programmers, Pearson education
3. P.J. Deitel and H.M. Deitel, Java: How to Program, PHI.
4. S. Malhotra and S. Choudhary, Programming in Java, Oxford Univ. Press.

17MCACS 3.3	Database Management System	
Credits: 4	Teaching: 4Hrs/week	Max. Marks: 80 IA: 20

UNIT I 10Hrs
 DBMS Concepts, Advantages of database systems, Schemas and instances, Data Dependency, Data Dictionary, and Meta Data. Data models, Types of Data models, The Entity-Relationship (ER) Model, Generalization, Specialization and Aggregation, Extended Entity-Relationship (EER) Model.

UNIT II 10Hrs
 Relational Data model: Domains, Tuples, Attributes, Keys, Relational database, Schemas, Integrity constraints, Relational algebra and relational calculus.

UNIT III 12Hrs
 Database Design: Introduction to normalization, Normal forms (1NF, 2NF, 3NF, BCNF), Functional dependency, Decomposition, Dependency preservation and lossless join, multi-valued dependencies. Structured Query Language: DDL, DML, SQL Functions, integrity constraints, various joins, subquery, index, View, Sequence, and Clusters.

UNIT IV 10Hrs
 Transaction Processing and Concurrency Control: Transaction System, Serializability of schedules, conflict & view serializable schedule, Recovery from transaction failures, Log based recovery. Checkpoints dead lock handling, Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control, validation based protocol, multiple granularity.

UNIT V 10Hrs
 Database Security: Database Security Issues, Security mechanism, Database Users and Schemas, Privileges. Advance Concepts: Introduction to Distributed databases, data mining, data warehousing, Basic Concepts of Object Oriented Database System.

References

1. A Silberschatz, H Korth, S Sudarshan, Database System and Concepts, fifth Edition McGrawHill.
2. Elmasri and Novathe, Fundamentals of Database Systems, Pearson Education



3. Rob, Coronel, Database Systems: Design, Implementation, and Management, 11th Edition, Cengage Learning.
4. Ramakrishnan, Database Management System, McGraw-Hill.
5. Gray Jim and Reuter Address, Transaction Processing: Concepts and Techniques, Moragan Kauffman Publishers.

17MCACS 3.4	Computer Networks and Security	
Credits: 4	Teaching: 4Hrs/week	Max. Marks: 80
		IA: 20

UNIT I 10Hrs
 Introduction: Networks, types of connections – Topologies, Protocols and Standards – OSI Model, TCP/IP Protocol Suite, Functions of Data Link Layer.
 Wireless WANs: Cellular Telephone and Satellite Networks. SONET, Virtual-Circuit Networks: Frame Relay and ATM.

UNIT II 12Hrs
 Network Layer: Logical addressing – IPV4, IPV6, Address mapping–ARP, RARP, BOOTP and DHCP, ICMP, Delivery, Forwarding, Unicast and Multicast Routing protocols.

UNIT III 10Hrs
 Transport Layer: Process to Process Delivery, User Datagram Protocol, Transmission Control Protocol, SCTP, Congestion Control with Examples, QoS.

UNIT IV 10Hrs
 Application Layer: Domain Name Space, DDNS, Remote Logging, Electronic Mail, and File Transfer, WWW, HTTP

UNIT V: 10Hrs
 Network Management: SNMP, Network Security- Security Services, Security in the Internet: IPsec, SSUFLS, PGP, VPN, and Firewalls

References:

1. Behrouza A Forouzan, Data Communication & Networking, Tata McGraw Hill.
2. Andrew S. Tanenbaum, Computer Networks, 5th Ed, Pearson Education
3. William Stallings, Data and Computer Communications, 7th Edition, PHI.
4. W. Stalling, Wireless Communication and Networks, Pearson Education.
5. Brijendra Singh, Data Communication and Computer Networks, PHI.
6. <http://highered.mheducation.com/sites/0072967757/index.html>



17MScCSOE 3.5	a. Management Information Systems	
Credits: 4	Teaching: 4Hrs/week	Max. Marks: 80 IA: 20

UNIT I 10Hrs
Management Information System(MIS)- concept, Definition and role of MIS, E-business enterprise, strategic management of business, information security challenges in e-enterprises, impact of information technology on society.

UNIT II 10Hrs
Decision making-concepts and process, MIS and decision making. Information- concepts, classification value and methods of data and information collection, MIS and the information and knowledge.

UNIT III 10Hrs
Systems concept- types of systems, classes of systems, general model of MIS, systems analysis, systems development model-SSAD, MIS and systems analysis, Object oriented analysis, Object oriented, OOSAD development life cycle.

UNIT IV 10Hrs
Development of MIS, Decision Support systems and knowledge management, knowledge based expert systems, MIS and benefits of DSS, Enterprise resource planning systems-models and benefits .

UNIT V 12Hrs
Information Technology- data, transaction, and application processing; database concepts, RDBMS, client-server architecture, Data Warehouse-concept and architecture, business intelligence, data warehouse and MIS, models of e-business, electronic payment systems, security, MIS in web environment. Case studies.

References:

1. W. S. Jawadekar, Management Information Systems, 4th edition, McGraw Hill.
2. James O' Obrien and George M. Marakas, Management Information Systems, 10th edition, McGraw Hill edition.
3. Jaiswal and Mittal, Management Information Systems, Oxford University Press.
4. Turban and Aronson, Decision Support systems and intelligent systems, Pearson Education.



17MScCSCS 3.6	Prog. Lab.: Java Lab.	
Credits: 3	Lab. Duration: 6Hrs/week	Max. Marks: 80 IA: 20

Students are encouraged to use Linux-Open Source OS for executing java –programs using javac compiler available in Linux.

Suggested Assignments

1. Write a program that asks a user to enter an integer n and then determines whether n is prime or not. Your program can perform this by dividing n by all integers from 2 to n-1 and by checking whether the remainder is 0.
2. Write a Java program to find GCD and LCM of two numbers (GCD is calculated using Euclidean Algorithm. LCM is found using factorization method.).
3. Write a program that computes $C(n, k)$, i.e. the number of k-element subsets of a set with n elements. Remember that $C(n, k) = n! / (k! (n-k)!)$. Your program should ask the user to enter n and k, and compute and print $C(n, k)$.
4. Write a Java program implement basic queue operations.
5. Write a Java program to count the frequency of words, characters in the given line of text.
6. Write a Java program that creates an object and initializes its data members using constructor. Use constructor overloading concept.
7. Write a Java Program to implement inheritance and demonstrate use of method overriding(example: Bank account/Employee)
8. Write a program to demonstrate use of user defined package by importing the package and access the member variable of classes contained in the package..
9. Write a program to demonstrate use of interfaces for two different classes. Interface should also include constants along with function prototypes.
10. Write a java program to implement exception handling using multiple catch statements. Also include code to identify the significance of finally block in handling exceptions.
11. Write a program to implement the concept of Exception Handling by creating user defined exceptions
12. Illustrate creation of thread by extending Thread class/ implementing runnable interface
13. Write a Java program that creates three threads. First thread displays “Good Morning” every one second, the second thread displays “Hello” every five seconds and the third thread displays “Welcome” every ten seconds.
14. Illustrate thread join concept.
15. Write a java program to implement mouse events like mouse pressed, mouse released and mouse moved by means of adapter classes.
16. Write a java program that creates a user interface to perform integer divisions. The user enters two numbers in the textfields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an ArithmeticException Display the exception in a message dialog box
17. Write a Java program to illustrate basic calculator using grid layout manager.
18. Develop an applet that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named “Compute” is clicked.
19. Write a java program to create student report using applet, read the input using text boxes and display the o/p using buttons.
20. Build a Java application for playing the tic-tac-toe game. Description of the game is available on http://en.wikipedia.org/wiki/Tic_tac_toe You are required to implement this game with two classes, TicTacToeGame and TicTacToeTester.



17MScCSCS 3.7	Prog. Lab.: DBMS and Network Lab.	
Credits: 3	Lab. Duration: 6Hrs/week	Max. Marks: 80 IA: 20

Suggested Networking Lab. Assignments

1. Write a networking program in Java to implement a TCP server that provides services for a TCP Client.
2. Write a networking program to implement socket programming using User datagram Protocol in Java.
3. Implement an FTP server using socket programming.
4. Implement a chat server using socket programming.
5. Implement an ECHO server using socket programming.
6. Implement Address Resolution Protocol using socket programming.
7. Implement Ping server and Ping client using socket programming.
8. Implement Single Window Protocol.
9. Implement Remote Command Execution using network programming.
10. Using Remote Method Invocation distribute the processing to three nodes.
11. Implement a program to retrieve the data for the specified URL.
12. Write a Java program to check whether the given DNS is found in the internet or not.
13. Write a network program using HTTP to print the document for the given URL.

Use network simulator NS2/NS3 to implement:

14. Implementation of STAR topology
15. Implementation of Link state routing algorithm
16. Monitoring traffic for the given topology
17. Analysis of CSMA and Ethernet protocols
18. Network Routing: Shortest path routing, AODV.
19. Analysis of congestion control (TCP and UDP).
20. Transfer of files from PC to PC using Windows/ UNIX socket processing

Suggested DBMS Lab. Assignments

1. Insurance database
 PERSON(**driver_id**:string , name:string , address:string)
 CAR(**regno**:string , model:string , year:int)
 ACCIDENT(**report_number**:int , aced_date:date , location:string)
 OWNS(**driver_id**:string , **regno**:string)
 PARTICIPATED(**driver_id**:string , **regno**:string , **report_number**:int,
 damage_amount:int)
 - 1) Create the above tables by properly specifying the primary keys and foreign keys.
 - 2) Enter at least five tuples for each relation.
 - 3) Demonstrate updating of data value, insertion of new record.
 - 4) Write queries
 - a. Find the total number of people who owned cars that were involved in accidents in a specific year.
 - b. Find the number of accidents in which cars belonging to a specific model were involved.
 - c. List the details of the cars not involved in accident for a specific year.
2. Order processing database application in a company.
 CUSTOMER(**custno**:int , cname:string , city:string)



ORDER(**orderno**:int , odate:date , custno:int , ord_amt:int)
ORDER_ITEM(**orderno**:int , **itemno**:int , quantity:int)
ITEM(**itemno**:int , unitprice:int)
SHIPMENT(**orderno**:int , **warehouseno**:int , ship_date:date)
WAREHOUSE(**warehouseno**:int , city:string)

- 1) Create the above tables by properly specifying the primary keys and foreign keys.
- 2) Enter at least five tuples for each relation.
- 3) Produce a listing: custname , No_of_orders , Avg_order_amount , where the middle column is the total number of orders by the customer and the last column is the average order amount for that customer.
- 4) List the orderno for orders that were shipped from all the warehouses that the company has in a specific city.
- 5) Demonstrate the deletion of an item from the ITEM table and demonstrate a method of handling the rows in the ORDER_ITEM table that contains this particular item.

3. Book dealer information database.

AUTHOR(**author_id**:int , name:string , city:string , country:string)
PUBLISHER(**publisher_id**:int , name:string , city:string , country:string)
CATALOG(**book_id**:int , title:string , author_id:int , publisher_id:int , category_id:int , year:int , price:int)
CATEGORY(**category_id**:int , description:string)
ORDER_DETAILS(**order_no**:int , **book_id**:int , quantity:int)

- 1) Create the above tables by properly specifying the primary keys and foreign keys.
- 2) Enter at least five tuples for each relation.
- 3) Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog and the year of publication is after 2000.
- 4) Find the author of the book that has maximum sales.
- 5) Demonstrate how you increase the price of books published by a specific publisher by 10%



Semester End Examination Question Paper Pattern

Max Marks: 80

Duration - 3 Hours.

Theory Question Paper Pattern

- ❖ There shall be eight questions of 16 marks each.
- ❖ Each question may have sub questions (a),(b) / (a),(b),(c)
- ❖ There shall be a minimum of one question from each unit
- ❖ There shall be not more than 2 questions from any unit.
- ❖ The student has to answer any five full questions for scoring full marks

Internal Assessment Scheme

Internal Assessment– 20 Marks:

IA Test : 14 marks
 Attendance : 03 marks
 Seminar/assignment : 03 marks

Two tests shall be conducted, one during the mid of the semester and another at the end of the semester of 1hour duration each.

First IA Marks : 14
 Second IA Marks : 14

Average of the two tests shall be taken as final marks.

Attendance Marks allocation scheme

Attendance (in percentage)	90 and above	80 and above but below 90	75 and above but below 80	below 75
Marks	3	2	1	no Marks*

*not eligible for appearing semester end examination (as per Regulation 7.7)

Note: Guidelines notified by the University from time-to-time shall be followed for IA.