P.E.S COLLEGE OF ENGINEERING, MANDYA - 571401
(An Autonomous Institution Under VTU Belgaum)
SCHEME OF TEACHING AND EXAMINATION (2009)
III SEMESTER MCA (Master of Computer Applications)

Sl. No	Course Code	Course Title	Credit L : T : P	Total	Examination Marks		
					CIE	SEE	Total
1	P08MCA301	Systems Programming	3:1:1	5	50	50	100
2	P08MCA302	Computer Networks	4:1:0	5	50	50	100
3	P08MCA303	Object Oriented programming with C++	3:1:1	5	50	50	100
4	P08MCA304	Database Management Systems	3:1:1	5	50	50	100
5	P08MCA305	Operating Systems	4:1:0	5	50	50	100
		Total		25	250	250	500

*** L: Lecture T: Tutorial P: Practical**

III Semester Master of Computer Applications

Systems Programming

Course Code : P08MCA301 **Credit : 3:1:1=5**
Total Hours : 39 **CIE:50 SEE:50**

1. Machine Architecture **5 Hrs**
Introduction, System Software and Machine Architecture, Simplified Instructional Computer (SIC) - SIC Machine Architecture, SIC/XE Machine Architecture, SIC Programming Examples.

2. Assemblers -1 **4 Hrs**
Basic Assembler Function - A Simple SIC Assembler, Assembler Algorithm and Data Structures, Machine Dependent Assembler Features - Instruction Formats & Addressing Modes, Program Relocation.

3. Assemblers -2 **4 Hrs**
Machine Independent Assembler Features – Literals, Symbol-Definition Statements, Expression, Program Blocks, Control Sections and Programming Linking, Assembler Design Operations - One-Pass Assembler, Multi-Pass Assembler, Implementation Examples - MASM Assembler.

4. Loaders And Linkers **6 Hrs**
Basic Loader Functions - Design of an Absolute Loader, A Simple Bootstrap Loader, Machine-Dependent Loader Features – Relocation, Program Linking, Algorithm and

Data Structures for a Linking Loader ; Machine-Independent Loader Features - Automatic Library Search, Loader Options, Loader Design Options - Linkage Editor, Dynamic Linkage, Bootstrap Loaders, Implementation Examples - MS-DOS Linker, Sun OS Linker.

5. Editors And Debugging Systems **5 Hrs**

Text Editors - Overview of Editing Process, User Interface, Editor Structure, Interactive Debugging Systems - Debugging Functions and Capabilities, Relationship With Other Parts of The System, User-Interface Criteria.

6. Macro Processor **7 Hrs**

Basic Macro Processor Functions - Macro Definitions and Expansion, Macro Processor Algorithm and Data Structures, Machine-Independent Macro Processor Features - Concatenation of Macro Parameters, Generation of Unique Labels, Conditional Macro Expansion, Keyword Macro Parameters, Macro Processor Design Options – Recursive Macro Expansion, General-Purpose Macro Processors, Macro Processing Within Language Translators, Implementation Examples - MASM Macro Processor, ANSI C Macro Processor.

7. Lex and Yacc – 1 **4 Hrs**

Lex and Yacc - The Simplest Lex Program, Recognizing Words With LEX, Symbol Tables, Grammars, Parser-Lexer Communication, The Parts of Speech Lexer, A YACC Parser, The Rules Section, Running LEX and YACC, LEX and Hand-Written Lexers, Using LEX - Regular Expression, Examples of Regular Expressions, A Word Counting Program, Parsing a Command Line.

8. Lex And Yacc - 2 **4 Hrs**

Using YACC – Grammars, Recursive Rules, Shift/Reduce Parsing, What YACC Cannot Parse, A YACC Parser - The Definition Section, The Rules Section, Symbol Values and Actions, The LEXER, Compiling and Running a Simple Parser, Arithmetic Expressions and Ambiguity, Variables and Typed Tokens.

Text Books:

1. Leland. L. Beck: System Software, 3rd Edition, Addison-Wesley, 1997. **(**Chapters1 (except 1.5.2), 2 (except 2.5.3), 3, 4, 5 (except 5.5), 7.2, 7.3)
2. John. R. Levine, Tony Mason and Doug Brown: Lex and Yacc, O'Reilly, SPD, 1999. (Chapters 1, 2 (Page 27-42), 3 (Page 51-65))

Reference Books:

1. D. M. Dhamdhere: System Programming and Operating Systems 2nd Edition, Tata McGraw - Hill, 1999.

Computer Networks

Course Code : P08MCA302 **Credit : 4:1:0=5**
Total Hours : 52 **CIE:50 SEE:50**

1. Foundation **8 Hrs**
Building a Network; Applications; Requirements; Network Architecture; Implementing Network software; Performance.

2. Direct Link Networks **12 Hrs**
Physically connecting hosts; Hardware building blocks; Encoding; Framing; Error detection; Reliable transmission; Ethernet (802.3); Ring; (802.5, FDDI, 802.17); Wireless (802.15.1, 802.11, 802.16, Cell Phone Technologies).

3. Packet Switching **7 Hrs**
Switching and forwarding; Bridges and LAN Switches.

4. Internetworking **12 Hrs**
Simple internetworking (IP); Routing; Global Internet.

5. End –to-End Protocols; Resource Allocation Issues **7 Hrs**
Simple demultiplexer (UDP) ; Reliable byte stream (TCP); Issues in resource allocation.

6. Applications **6 Hrs**
Traditional applications; Web services; Multimedia applications.

Text Books:
1. Larry L. Peterson and Bruce S. David: Computer Networks – A Systems Approach 4th Edition, Elsevier, 2007.(Chapters 1, 2, 3.1, 3.2, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 9.1, 9.2, 9.3)

References:
1. Behrouz A. Forouzan: Data Communications and Networking, 4th Edition, Tata Mc Graw-Hill, 2006.
2. William Stallings: Data and Computer Communication, 8th Edition, Pearson Education, 2007.
3. Alberto Leon-Garcia and Indra Widjaja: Communication Networks – Fundamental Concepts and Key architectures,2nd Edition Tata McGraw-Hill, 2004.

Object Oriented Programming with C++

Course Code : P08MCA303 **Credit : 3:1:1=5**
Total Hours : 39 **CIE:50 SEE:50**

1. Overview of OOP **2 Hrs**
Object Oriented paradigm, Structured vs. Object Oriented Paradigm. Elements of Object Oriented Programming, Object, Classes, Encapsulation & data abstraction, Inheritance, Polymorphism etc.

2. C++ Overview **4 Hrs**
Introduction, different data types, operators, expressions, qualifiers, arrays and strings.

3. Modular Programming with Functions **6 Hrs**
Function Components, argument passing, inline functions, function overriding, function overloading, function templates, recursive functions.

4. Classes & Objects **17 Hrs**
Introduction, Class Specification, Class Objects, access members, defining member functions, data hiding, constructors, destructors, parameterized constructors, static data members, functions, scope resolution operator, Passing objects as arguments, returning objects, friend functions & classes, arrays of objects, Dynamic objects – Pointers to objects, Class members, Operator overloading using friend functions such as ++, --, [ ] etc.

5. Inheritance Virtual functions & Polymorphism & I/O Stream Library **10 Hrs**
Base Class, Inheritance & protected members, protected base class inheritance, inheriting multiple base classes, Constructors, Destructors & Inheritance Passing parameters to base Class Constructors, Granting access, Virtual base classes Virtual function – Calling a Virtual function through a base class reference, Virtual attribute is inherited, Virtual functions are hierarchical, pure virtual functions, abstract classes, using Virtual functions, Early & late binding. IO Stream Library, output operator <<, input >>, additional i/o operators, overloading the output operator <<, overloading the io operator >>, file input & output.

Text Books:
1. H. Schild: C++ The Complete Reference, 4th Edition, Tata McGraw Hill, 2007.
2. K R Venugopal, Rajkumar, T.,Ravi Shankar: Mastering C++, Tata McGraw Hill,1997.
Reference Book:
1.Stanley B.Lippmann, Josee Lajore: C++Primer, 4th Edition, Addison Wesley, 2005.

Database Management Systems

Course Code : P08MCA304 **Credit : 3:1:1=5**
Total Hours : 39 **CIE:50 SEE:50**

1. Introduction **5 Hrs**

Introduction; An example; Characteristics of Database approach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; A brief history of database applications; when not to use a DBMS. Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of Database Management systems.

2. Entity-Relationship Model **5 Hrs**

Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two.

3. Relational Model and Relational Algebra **6 Hrs**

Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping.

4. SQL **8 Hrs**

SQL Data Definition and Data Types; Specifying basic constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries.
Insert, Delete and Update statements in SQL; Specifying constraints as assertion and Trigger; Views (Virtual Tables) in SQL; Additional features of SQL; Database programming issues and techniques; Embedded SQL, Dynamic SQL; Database stored procedures and SQL / PSM.

5. Database Design **9 Hrs**

Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form. Properties of Relational Decompositions; Algorithms for Relational Database Schema Design; Multivalued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form; Inclusion Dependencies; Other Dependencies and Normal Forms.

6. Transaction Management **6 Hrs**

The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock- Based Concurrency Control; Performance of locking; Transaction support in SQL; Introduction to crash recovery; 2PL, Serializability and Recoverability; Lock Management; Introduction to ARIES; The log; Other recovery-related structures; The write-ahead log protocol; Checkpointing; Recovering from a System Crash; Media Recovery; Other approaches and interaction with concurrency control.

Text Books:

1. Elmasri and Navathe: Fundamentals of Database Systems, 5th Edition,Addison-Wesley, 2007.
   (Chapters 1, 2, 3 except 3.8, 5, 6.1 to 6.5, 7.1, 8, 9.1, 9.2 except SQLJ, 9.4, 10, 11)
2. Raghu Ramakrishnan and Johannes Gehrke: Database Management Systems, 3rd Edition, McGraw-Hill, 2003. (Chapters 16, 17.1, 17.2, 18)

Reference Books:

1. Silberschatz, Korth and Sudharshan: Data base System Concepts, 5th Edition, Mc-GrawHill, 2006.
2. C.J. Date, A. Kannan, S. Swamynatham: A Introduction to Database Systems,8th Edition, Pearson education, 2006.

Operating Systems

Course Code : P08MCA305 **Credit : 4:1:0=5**
Total Hours : 52 **CIE:50 SEE:50**

1. Introduction to Operating Systems, System structures **6 Hrs**

What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and security; Distributed system; Special-purpose systems; Computing environments.Operating System Services; User - Operating System interface; System calls; Types of system calls; System programs; Operating System design and implementation; Operating System structure; Virtual machines; Operating System generation; System boot.

2. Process Management **7 Hrs**

Process concept; Process scheduling; Operations on processes; Inter-process communication.

Multi-Threaded Programming: Overview; Multithreading models; Thread Libraries; Threading issues.

Process Scheduling: Basic concepts; Scheduling criteria; Scheduling algorithms; Multiple-Processor scheduling; Thread scheduling.

3. Process Synchronization **7 Hrs**

Synchronization: The Critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors.

4. Deadlocks **6 Hrs**

Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.

5. Memory Management **7 Hrs**

Memory Management Strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation.

Virtual Memory Management: Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing.

6. File System, Implementation of File System **7 Hrs**

File System: File concept; Access methods; Directory structure; File system mounting; File sharing; Protection.

Implementing File System: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management.

7. Secondary Storage Structures, Protection **6 Hrs**

Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management.

Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix , Implementation of access matrix, Access control, Revocation of access rights, Capability-Based systems.

8. Case Study: The Linux Operating System **6 Hrs**

Linux history; Design principles; Kernel modules; Process management; Scheduling; Memory management; File systems, Input and output; Inter-process communication.

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin , Greg Gagne: Operating System Principles, 7th edition, Wiley-India, 2006.
   (Chapters: 1, 2, 3.1 to 3.4 , 4.1 to 4.4, 5.1 to 5.5, 6.1 to 6.7, 7, 8.1 to 8.6, 9.1 to 9.6, 10, 11.1 to 11.5, 12.1 to 12.6, 17.1 to 17.8, 21.1 to 21.9)

Reference Books:

1. D.M Dhamdhere: Operating systems - A concept based Approach, 2nd Edition, Tata McGraw- Hill, 2002.
2. P.C.P. Bhatt: Operating Systems, 2nd Edition, PHI, 2006.
3. Harvey M Deital: Operating systems, 3rd Edition, Addison Wesley, 1990.