NOTIFICATION

No. 112 /2019 Date : 31/08/2019

Subject :- Implementation of new syllabi of Semester I & II of Master in Computer Application (Three Year Degree Course.... Semester Pattern) as per Credit Grade System in the Faculty of Science & Technology from the session 2019-2020 and onwards in phase wise manner .

It is notified for general information of all concerned that the authorities of the University have accepted to implement the new syllabi as per AICTE Guidelines of Semester I & II of Master in Computer Application (Three Year Degree Course.... Semester Pattern ..Credit Grade System) Course from the academic session 2019-2020 and onwards in phase wise manner as per **Appendix – A** :

Sd/-
(Dr.T.R.Deshmukh)
Registrar
Sant Gadge Baba Amravati University

Appendix – A

SYLLABUS OF MASTER IN COMPUTER APPLICATION SEMESTER I

Course Code **MCA19101/PGDCS19101**

Course Name **Computer Organization and Architecture**

Credits **4**

Course Outcomes

1. Understanding of digital system, its organization and architecture.
2. Apply knowledge of digital electronics logic gate to combinational and sequential circuits.
3. Knowledge of the basics of computer hardware and how software interacts with computer hardware.
4. Apply concepts of assembly language in solving problems.
5. Illustrate the concept of processing I/O organization and examine different ways of communicating with I/O devices and standard I/O interfaces.

Units	Contents	Total Hrs
I	**Introduction to Boolean Algebra Number systems and Boolean Algebra**: Number systems, binary codes, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Expression simplification using Boolean theorem and K-map.	10
II	**Introduction to Digital Electronics Logic gates:** Basic Gates, Universal Gate, the exclusive OR gate, Equivalence Gates.Combinational circuits: Adders, Subtractors, Binary Parallel Adder, Decimal Adder, Decoders, Multiplexers. Sequential Circuits: Flip ï Flops, Triggering of Flip- Flops.	9
III	**Basic Structure of Computers:** Basic organization of von Neumann machine, Instruction execution in von Neumann machines, Evolution of Computer Types, Functional and structural organization of computers, Functional Units, Basic Operational Concepts, Bus Structures, Performance ï Processor Clock, Multiprocessing and Multicomputer.	10
IV	**Machine Instructions and Programs :**Memory Location and Addresses, Memory Operations, Instruction sets, Instruction formats and Instruction Sequencing, Addressing modes, Introduction to Assembly language, Basic Input and Output Operations, subroutines in Assembly language.	9
V	**Input / Output Organization:** Accessing I/O Devices (I/O fundamentals: handshaking, buffering, programmed I/O), Interrupts, interrupt driven I/O, Exceptions, Direct Memory Access, Buses (protocols, arbitration), Interface Circuits, Standard I/O Interfaces ï PCI Bus, SCSI Bus, USB.	9
VI	**Storage systems and their technology, Memory Hierarchy:**Introduction to Importance of temporal and spatial locality, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Latency, cycle time, bandwidth and interleaving, Cache Memories ï Mapping Functions, Replacement Algorithms, Performance Considerations, Virtual Memories (page table, TLB), Fault handling and reliability, Secondary Storage. Control Unit Data Path & Control path design, Microprogramming vs. Hardwired control, RISC vs. CISC	9

Text Books:
1. Digital Logic and Computer Design Morris Mano, Pearson Education
2. Carl Hamacher, Z Varnesic and S Zaky, ñ Computer Organizationò, Tata McGraw-Hill, 5th Edition, ISBN: 13 9781259005275.

Reference Books:
1. Stallings, William Computer organization and architecture designing for performance. Pearson Education India, 2000.
2. M. Morris, R. Mano Logic Fundamentals and Computer Design, Prentice Hall of India, 4 th Edition, 2007.
3. David A. Patterson and John L. Hannessy Computer Organization and Design: The Hardware and Software Interface, Morgan Kaufmann, Elsevier, 4th Edition, 2012.
4. John Hayes, Computer Architecture and Organization, Tata McGraw Hill, 5 th Edition, 1996.2002.

Course Code **MCA19102/PGDCS19102**

Course Name **Object Oriented Programming with C++**

Credits **04**

Course Outcomes
- Understanding of Object oriented programming and advanced C++ concepts.
- Use C++ Concepts for solving real life problems.
- Develop problem solving skills using object oriented techniques.

Units	Contents	Total Hrs
I	Objects & Classes in C++ : Declaring & using classes, Constructors, Objects as functions arguments, Copy Constructor, Static class data. Arrays of objects, C++ String class.	9
II	Operator overloading : Overloading unary & binary operators. Data conversion .Pit falls of operator overloading. Pointers & arrays. Pointers & functions. new & delete operators. Pointers for objects.	9
III	Inheritance in C++ : Derived class & base class, Derived class constructors, Function overloading, class hierarchies, Public and private inheritance, Multiple inheritance. Containership : classes within classes.	9
IV	Virtual functions concepts, Abstracts classes & pure virtual functions. Virtual base classes, Friend functions, Static functions, Assignment and copy initialization, the this pointer. Dynamic type information.	9
V	Streams & Files in C++: Stream classes, stream errors, disk file I /O with streams, File pointers, Error handling in file I/O. File I/O with members functions, overloading the extractions & insertion operators, Memory as a stream object, command- line arguments. Multi-file programs.	10
VI	Function Template, Class templates, Exception syntax, Multiple exceptions, exception with arguments. Introduction to the Standard Template Library. Algorithms, Sequential Containers, Iterates, Specialized iterates, Associative containers. Function objects.	10

Text Book : Robert Lafore Object - Oriented Programming in C++ (Galgotia) .

Reference Books :
1. Herbert Schildt C++: Complete Reference (TMH).
2. Bjarne Stroustrupe C++ Programming Language (Addison-Wesley).
3. Venugopal Mastering C++. (TMH).
4. Lipmann C++ Primer (Addison-Wesley).
5. Savitch: Problem Solving using C++ (AddisonWesley) Low- Priced Edition.

Course Code **MCA19103/PGDCS19103**
Course Name **Mathematical Foundation**
Credits **4**
Course Outcomes

Units	Contents	Total Hrs
I	Computer Arithmetic, Floating point representation of numbers, Arithmetic operations with floating point numbers, Errors in numbers and their computations, Errors Analysis, Iterative Methods: Bisection, False position, Newton-Raphson methods, Secant method.	10
II	Matrices and linear system of equation: Matrix operations, transpose of matrix, inverse of matrix, rank of a matrix, consistency of a linear system of equation, Solution of linear system: Matrix Inversion method, Gaussian elimination Method, Method of Factorization, Ill-conditioned linear system, The Gauss Seidel iterative method.	9
III	Interpolation: Introduction, Errors in polynomial interpolation, Finite differences, Difference Tables, Newtonôs Formulae for interpolation, Lagrange Interpolation, Truncation Error in Interpolation, Spline Interpolation,	9
IV	Least squares approximation of function: Linear Regression, Polynomial Regression, Fitting exponential and trigonometric functions, Taylor series representation, Chebyshev series.	9
V	Numerical Differentiation: The Cubic Spline Method, Numerical Integration: Trapezoidal rule, Simpsonôs 1/3 Rule, Simpsonôs 3/8 Rule, Eulerôs Method, Runge-Kutta method, Predictor-corrector methods, Laplaceôs equation: Jacobiôs method, Gauss Seidal Method.	10
VI	Solution of Integral Equation: Types of Integral equations, Numerical methods for Fredholm Equations.Singular Kernels, Method of Invariant Imbedding.	9

Text Books:

1. Narsingh Deo ,ñGraph theory with applications to engineering and computer scienceò
2. V. Rajaraman, ñComputer Oriented Numerical Methodsò, PHI
3. S. S. Sastry, ñIntroductory Methods of Numerical Analysisò, PHI

Reference Books:

1. Steven C. Chapra, Raymond P. Canale, ñNumerical Methods for Engineersò, Tata McGraw Hill.
2. M.Goyal, ñComputer Based Numerical & Statistical Techniquesò, ISP.

Course Code **MCA19104/PGDCS19104**

Course Name **System Analysis Design**

Credits **4**

Course Outcomes

- U**nderstand** different phases of Systems Development life cycle.
- U**nderstand** how projects are initiated and selected, **define** a business problem and **determine** the feasibility of a proposed project.
- A**pply** information gathering methods effectively to elicit human information requirement.
- U**nderstand** prototyping and **develop** logical DFDôs that illustrate the proposed system.
- C**reate** data dictionary and **choose** an appropriate decision analysis method for analyzing structured decision and creating process specification.
- D**esign** input-output for user interface and database for storing data.

Units	Contents	Total Hrs
I	**Introduction:** Types of systems, Integrating Technologies for systems, Role of system analyst, Review of System DLC, Organization as systems, Levels of management, Organizational culture, Project fundamentals.	9
II	**Project Management:** Project Initiation, Feasibility study, Ascertaining hardware/software needs, Identifying & forecasting cost/benefit & comparing cost/benefit, Activity planning & control, Managing analysis & design activities, Writing and presenting the systems proposals.	10
III	**Information Gathering:** Sampling and investigating hard data, Interviewing, Planning & conducting interview & reporting, Joint application design, Using questionnaires, Planning, designing and administering the questionnaire, Observation of a decision-makers behavior and office environment.	9
IV	**Prototyping and DFD's:** Prototyping, User reactions, Approaches to prototyping & developing prototype, Data flow approach to requirements, Developing DFDs, Logical & Physical DFDs,Examples of DFDs.	10
V	**Unit V:Data dictionary and Overview of process specifications:**Data dictionary concept , Data repository, Creating & using data dictionary, Overview of process specifications, Structured English, Decision tables/trees, Decision support system & decision making concepts relevant to DSS, Semi structured decisions, Multiple-criteria decision-making.	9

VI	**Designing Effective Input-Output and Databases:** Output Design Objectives, Designing printed output, Screen output, Input Design objectives, Form Design, Screen Design for input, Designing Databases: Data Concepts, Normalization, Guidelines for Master File / Database Relation Design, Making Use of the Database. **Text Book:** Kenneth E.Kendall& Julie E.Kendall:ñSystem Analysis and Designò (Pearson Edn.) 8/e **Reference Books:** 1. Yeates ñSystem Analysis & Designò (Macmillan) 2. J.Fitgerald& A.Fitgerald, ñFundamentals of System Analysis & Designò (John-Wiley) 3/e	9

Course Code **MCA19104/PGDCS19104**

Course Name **Management Information System**

Credits **4**

Course Outcomes

- **Understand the leadership role of Management Information Systems in achieving business competitive advantage through informed decision making.**
- **Analyze and synthesize business information and systems to facilitate evaluation of strategic alternatives.**
- **Effectively communicate strategic alternatives to facilitate decision making. Evaluate the role of information systems in today's competitive business environment.**
- **Assess the relationship between the digital firm, electronic commerce, electronic business and internet technology.**

Units	Contents	Total Hrs
I	MIS concepts, definition, Role, Impact of MIS, MIS and computers, MIS and academics, MIS support to Management,Role and importance of management. MIS and process of management MIS in organization structure and strategic management business.	9
II	Basics of MIS : Decision making, Decision methods,behavioral concepts, organizational decision making, MIS and decision making concepts, Information; concepts and classification, Methods of data and information collection : value of information, organization and information. Humanas an information processor. Development of MIS and choice of IT.	10
III	Applications of MIS : Applications in manufacturing sector,applications in service sector, Introduction to service, sector,Creating a destructive services, MIS applications in service industries and role of MIS in source industries. DSS:Concepts and philosophy, deterministic systems and knowledge based expert systems. MIS and role of DSS. MIS in Enterprise Management System.	9
IV	Technology in MIS : Data processing, Transaction processing, Application processing, Information System processing, TQM of IS. DBMS: Object Oriented Technologies, client Server Arch. And MIS.	9
V	MIS and Networks: Network Topology, LAN, Data Communication, ATM Technology, Business Process Reengineering: Introduction BP, Process Model of organization, Value stream model, Delays in BP, Relevance ofIT, MIS and BPR.	9
VI	MIS and Data warehouse: Architecture, Design and Justification of data warehouse, organization. Management and implementation of data -warehousing, E-Business: Models, WWW, E-payment, security in E-business, MIS and E-business. **Text Book:** W. S. Jawadekar : Management Information System (II Edition), (TMH) . **Reference Books:** 1. Kenneth C. Landon & J. P. Landon.: Management Information System, 8th Ed. Pearson Education. 2. Voichdan, Homer, Information Systems for operation & Mgmt. 3. A. K.Gupta and J.K. Sharma: Management of Systems (Macmillan)	10

Course Code **MCA19104/PGDCS19104**

Course Name **Accounting and Financial Management**

Credits **4**

Course Outcomes

- **Understanding of importance of Book-keeping.**
- **Knowledge of different methods and practices of book-keeping.**
- **Knowledge of types of accounting.**
- **Understanding of financial management.**
- **Knowledge of different methods and practices in financial management.**

Units	Contents	Total Hrs
I	Accounting: meaning, objectives and functions, classification. Role of accountants in society, Book-keeping cycle, Important terms, Types of accounts, Cashbook, ledger and trial Balance.	9
II	Recent trends in the development of accounting, International accounting standards, Accounting theory, Approaches to accounting theory, classification of accounting theory, relation between accounting theory and accounting practice. Concepts: Capital and Income. Approaches for measurement of Income, Expenses, Revenue.	10
III	Nature and Scope of Financial Management, Time value of money, Financial statements, Financial statement analysis, Fund flow statement, Cash flow statement, Budgeting for profit planning and control.	9
IV	Fund Management: Sources of finance, Working capital management, Dividend and Bonus, Financial markets and marketing of securities.	9
V	Cost Accounting: Methods of Costing, Type, Material purchase control, Inventory control, material issue control, Labor cost, process costing, operating/service costing, Cost Control and cost reduction.	9
VI	Recent developments in financial management: Capital Asset Pricing Model (CAPM), Capital Market Line (CML), Security Market Line (SML). International Financial Management: Introduction, Types of Foreign Capital, International Finance, International Financial Management: Merits, Functioning of Multi-National and Trans-National Companies.	10

Text Books:

1. S. K.R. Paul, óFinancial Accountingô New central book agency Pvt. Ltd. Kolkata
2. S. K. Gupta and R. K. Sharma, óFinancial Management: Theory and Practiceô, Kalyani Publishers, Ludhiyana.
3. R.S.N. Pillai, V. Bhagavathi, óCost Accountingô, S. Chand and Co. Ltd., New Delhi

Reference Books:

1. JawaharLal, óManagement Accountingô, Himalaya Publishing Houseô, Mumbai.
2. M. N. Arora, óCost and Management Accounting-Theory, Problem & Solutions, Himalaya Publishing House.

Course Code **MCA19106/PGDCS19106**

Course Name **Lab 1 – Based on C++**

Credits **01**

Course Outcomes **Skill of application of OOP concept for solving problems.**

Units	Contents	Total Hrs
I	The sample list of program is given below. This list can be used as guide line for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.	30

1. Write a C++ program to calculate prime number using default, copy and parameterized constructor of class.
2. Write a C++ program to demonstrate working at destructor.
3. Write a C++ program for addition of two complex numbers using object as a function argument.
4. Write a C++ program to demonstrate static class data.
5. Write a C++ program to read and display details of 10 students using array of objects.
6. Write a C++ program to demonstrate various function of string object using C++ string class.
7. Write a C++ program for overloading the unary and binary operator.
8. Write a C++ program to demonstrate to use a pointer & array of pointer

9. Write a C++ program to demonstrate new & delete operator.
10. Write a C++ program to show use of pointer to object.
11. Write a C++ program to show working of derive class constructor..
12. Write a C++ program to find out the payroll system using single inheritance.
13. Write a C++ program for calculating students total marks and percentage using multilevel inheritance.
14. Write a C++ program for multiplication of two numbers using multiple inheritances.
15. Write a C++ program for hybrid inheritance.
16. Write a C++ program to demonstrate the working of virtual base class.
17. Write a C++ program to overload the insertion and extraction operator in a stream.
18. Write a C++ program to perform I/O operation on a file.
19. Write a C++ program to count number of words, character and lines in file.
20. Write a C++ program using exception handling to manage divide by zero error.
21. Write a C++ program using exception handling with single and multiple catch blocks.
22. Write a C++ program to using command line argument for supplying or rename the file name.
23. Write a C++ program to find greatest of three number using templates.
24. Write a C++ program to interchange the value of 2 variables using class template.

Reference Books:

1. Robert Lafore Object-Oriented Programming in C++ (Galgotia).
2. Herbert Schildt C++: Complete Reference (TMH).
3. Bjarne Stroustrupe C++ Programming Language (Addison-Wesley).
4. Venugopal Mastering C++ (TMH).
5. Lipmann C++ Primer (Addison-Wesley).
6. Savitch: Problem Solving using C++ (AddisonWesley) Low- Priced Edition.

Course Code **MCA19107/PGDCS19107**
Course Name **Lab 2 – Based on Mathematical Foundation**
Credits **01**
Course Outcomes **Skill of solving mathematical problems using numerical and statistical methods.**

Units	Contents	Total Hrs
I	The sample list of program is given below. This list can be used as guide line for problem statements but the scope of the laboratory should not be limited to the same.Aim of the list is to inform about minimum expected outcomes. 1) Write a program to find the roots of nonlinear equations using Bisection method. 2) Write a program to find numerical solution of ordinary differential equations by Runge-kutta methc 3) Write a program to solve the system of linear equations using Gauss -seidal iteration method. 4) Write a program to solve the system of linear equations using gauss - elimination method. 5) Write a program to find the roots of non-linear equation using Newton-Raphson methods,. 6) Write a program for numerical integration using trapezoidal rule. 7) Write a program to find numerical solution of ordinary differential equations by Eulerôs method. 8) Write a program to implement curve fitting by least ï square approximations. 9) Write a program to find the roots of nonlinear equations using False position Method. 10) Write a program to find the roots of nonlinear equations using Secant method. 11) Write a program to integrate numerically using simpsonôs rules. 12) Write a program to solve the system of linear equations using Gauss - Jorden method. 13) Write a program to find the numerical solution of wave equation. 14) Write a program to integrate numerically using Taylor Series method.	30

Course Code **MCA19108/PGDCS19108**
Course Name **Lab. 3 – Based on Web Technology**
Credits **3**
Course Outcomes

- Gain conceptual as well as practical knowledge of web-development Languages and web-designing tools.
- Develop skills of basic web-development.
- Able to use web design tools and to design and develop web-pages professionally.

Units	Contents	Total Hrs
I	Web Essentials: The internet, Basic Internet Protocols, The World Wide Web, HTTP Request Massage, HTTP Response Massage, Web Clients, Web Servers, Markup Languages: XHTML 1.0, Basics of XHTML, Fundamentals HTML Elements, Relative URLs, Lists, Tables, Frames, Forms, Defining XHTMLôs abstract syntax: XML, Creating HTML Documents.	10

II	**Styling Pages (CSS):** Introduction to CSS; types of CSS (CSS-1, CSS-2, CSS-3), applying CSS (inline, embedded, external). CSS Properties: Text properties, font-properties, border properties. Selectors, universal, element selector, class selector, ID Selector, decedent selector, pseudo selector. Box Model: border properties, padding properties, margin properties. List properties, background properties, table properties.	10
III	XML Document Structure, parsers and well-formed XML Documents, Defining DTD, XML Namespaces. XML Schema: Schema v/s DTD, Simple API for XML (SAX), eXtensible Style sheet Language Transformation (XSLT) Custom Markup Language: Introduction, Mathematical Markup Language (MathML), Chemical Markup Language (CML), Wireless Markup Language (WML), Geography Markup Language (GML), Scalable Vector Graphics (SVG), Bean Markup Language (BML), Extensible 3D Language (X3D).	10

Text Books:

1. Programming with world wide web by Robert Sebesta on Pearson
2. Beginning with HTML, XHTML, CSS and Javascript by John Duckett, Wiley-Wrox

Reference Books:

1. XML How to Program by Deitel and Deitel, Pearson.
2. Web technologies by Jeffrey C. Jackson (Pearson)
3. Internet and World Wide Web How to program, P.J. Deitel& H.M. Deitel Pearson
4. Internet Protocols by Subrata Goswami (Springer India)
5. Dietel and Dietel: WWW: How to Program, (LPE)

M.C.A. SEMESTER - II

Course Code **MCA19109/PGDCS19109**

Course Name **Data Structures**

Credits **4**

Course Outcomes

- Knowledge of basic data structures and algorithms.
- Understand concepts of searching and sorting techniques
- Understand concepts of stacks, queues, lists, trees and graphs.
- Able to write algorithms for solving problems with the help of fundamental data structures

Units	Contents	Total Hrs
I	Data structures basics, Mathematical /algorithmic notations & functions, Complexity of algorithms, Sub-algorithms. String processing: storing strings, character data type, string operations, word processing, and pattern matching algorithms.	10
II	Linear arrays and their representation in memory, traversing linear arrays, inserting & deleting operations, Bubble sort, Linear search and Binary search algorithms. Multi-dimensional arrays, Pointer arrays.Record structures and their memory representation.Matrices and sparse matrices.	9
III	Linked lists and their representation in memory, traversing a linked list, searching a linked list.Memory allocation & garbage collection.Insertion deletion operations on linked lists.Header linked lists, Two- way linked lists.	9
IV	Stacks and their array representation. Arithmetic expressions: Polish notation. Quick sort, application of stacks. Implementation of recursive procedures by stacks, Queues. Deques. Priority queues.	10
V	Trees, Binary trees & and their representation in memory, Traversing binary trees. Traversal algorithms using stacks, Header nodes : threads. Heap and heapsort.Path length & Huffmanôs algorithm.General trees.	9

VI	Graph theory, sequential representations of graphs, Warshallsô algorithm, Linked representation, operations & traversing the graphs. Posets& Topological sorting. Insertion Sort, Selection Sort. Radix sort. **Text Book :** Seymour Lipschutz: ñData Structures with Cò, Schaumôs Outline Series.	9

Reference Books:

1. Forouzan, Gilberg: Data Structures and Algorithms, CENGAGE Learning.
2. ReemaThareja: Data Structures using C, Oxford University Press, 2011.
3. Arpita Gopal: Magnifying Data structures, PHI (EEE), 2010.
4. Ellis Horowitz, SartajSahni: Fundamentals of Data Structures, CBS Publications.

Course Code **MCA19110/PGDCS19110**

Course Name **Operating System**

Credits **04**

Course Outcomes

- Analyze & Classify different types of operating system
- Understand the working of Operating system
- Understand the Memory Management policies.
- Concepts of input/output, storage and file management
- Understand various protection and security mechanisms

Units	Contents	Total Hrs
I	Introduction :Operating System (OS) definition, OS Evolution, OS Components and Services. Process Concept, Process Scheduling, Operations on Processes, Cooperating Processes, Interprocess Communication, Threads Overview, Multi-threading Models, Threading Issues, Java Threads.	09
II	CPU Scheduling Concepts, Scheduling Criteria and Algorithms. Process Synchronization: The Critical-Section Problem, Synchronization Hardware, Semaphores, Monitors. Deadlocks: Definition & Characterization, Deadlocks Prevention, Avoidance, Detection and Recovery from Deadlock.	10
III	Memory Management Background, Swapping, Contiguous Memory Allocation Schemes, Paging, Segmentation. Virtual Memory Management: Background, Demand Paging scheme, Process Creation, Page Replacement Policies, Allocation of Frames, Thrashing.	10
IV	Memory Management Background, Swapping, Contiguous Memory Allocation Schemes, Paging, Segmentation. Virtual Memory Management: Background, Demand Paging scheme, Process Creation, Page Replacement Policies, Allocation of Frames, Thrashing.	9
V	I/O Systems :Overview, I/O Hardware, Application I/O Interface, and Kernel I/O Subsystem. Transforming I/O to Hardware Operations. Disk Scheduling, Disk Management, Swap ï Space Management, RAID Structure.	9
VI	File protection & security: Goals of Protection, Principles of Protection, Revocation of Access Rights, Security Problem, Program Threats, Classiýcations, User Authentication, Implementing Security Defenses, Firewalling to Protect Systems	9

Text Books : Avi Silberschatz , P.B.Galvin, G. Gagne : ñOperating System Conceptò (Sixth Edition) John Wiley & Sons Publication.

Reference Books:

1 A .S.Tanenbaum,ñModern Operating Systemsò Pearson ducation.
2. William Stallings,òOperating Systemsò Prentice-Hall.
3. D.M.Dhamdhere ,ñOperating Systems òTata McGraw-Hill.
4. M.Milankovic,ñOperating Systems òMcGraw-Hill.
5. Achutt Godbole, ñOperating Systemsò Tata McGraw-Hill.

Course Code **MCA19111/PGDCS19111**

Course Name **Database Management System**

Credits **4**

Course Outcomes

Units	Contents	Total Hrs
I	**Database system architecture:**, : Introduction : Database System Applications, Purpose of Database Systems, View of Data, Data Abstraction, Instances and Schemas, Data models. Data Storage and Querying, Database Architecture, Database Users and Administrators.Entity- Relationship Model, Basic Concepts, Constraints, Keys, Entity Relationship Diagram, Reduction to Relational Schema.Extended E-R Features.	10
II	**Relational query languages**: Introduction to Relational Model, Relational -Algebra, Fundamental Operations, Additional Relational Algebra Operations, Extended Relational Algebra Operations. SQL: Overview of SQL, SQL Data Definition, Basic structure, Additional Basic operation, Set Operations, Null Values,Aggregate Functions, Nested Sub-queries, Views.	9
III	**Relational database design:** Integrity constrains, Triggers, Features of good Relational Designs, Normalization, Atomic Domains and First Normal Form, Decomposition using Functional Dependency, Normal forms, Introduction to Query Processing & Optimization.	9
IV	**Transaction processing :** Transaction Concept, ACID Properties, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Recoverable and Cascade-less Schedules.	9
V	**Concurrency Control:** Lock-Based Protocols, Time stamp Based Protocols, Multiple Granularity, Deadlock Handling, Recovery System: Failure Classification, Storage, Recovery and Atomicity, Log-Based Recovery.	9
VI	**Advanced topics :**Data warehousing and data mining. Decision Support System, Data warehousing, Data Mining, Spatial and Temporal Data, Motivation, Time in Databases, Spatial and Geographic Data, Multimedia Databases.	10

Text Book :

ñDatabase System Conceptsò, 6th Edition by Abraham Silberschatz, Henry F.Korth, S. Sudarshan, McGraw-Hill.

Reference Books:

1. J. D. Ullman,ñPrinciples of Database and Knowledge ï Base Systemsò, Vol 1, Computer Science Press.
2. R. Elmasri and S. Navathe,ñFundamentals of Database Systemsò, 5th Edition, Pearson Education
3. Serge Abiteboul, Richard Hull, VictorVianu, ñFoundations of Databasesò, Reprint by Addison-Wesley.

Course Code **MCA19112/PGDCS19112**

Course Name **E-Commerce**

Credits **4**

Course Outcomes

- **Gain a comprehensive understanding of the E-Commerce landscape, current and emergingbusiness models, and the technology and infrastructure underpinnings of the business.**
- **Leverage the E-Commerce platforms to enhance current business or incubate new businesses.**
- **Gain an understanding on how innovative use of the E-Commerce can help developing competitive advantage.**
- **Develop an understanding on how internet can help business grow.**
- **Gain an understanding on the importance of security, privacy, and ethical issues as they relate to E-Commerce.**

Units	Contents	Total Hrs
I	E-Commerce: The difference between E-commerce and E-business, Why study E-commerce? Eight unique features of E-Commerce Technology, Types of E-Commerce, Growth of the Internet and the Web, Origins and Growth of E-commerce, E-Commerce - A brief History.	10
II	E-commerce Business Models and Concepts : E-Commerce business Model-eight Key elements of a Business Model, Major Business-to-Consumer (B2C) Business Models, Major Business to - Business (B2B) Business Models : Business Models emerging in E-Commerce areas, How the Internet and the WEB change Business; Strategy, Structure and Process.	10
III	E-Commerce Infrastructure : The Internet: Technology Background, The Internet Today, Internet II; The future infrastructure, The World Wide Web, The Internet and the Web Features.	9
IV	Building an E-Commerce Web Site : Building and E-Commerce Wet Site- A strategic approach, Choosing Server Software, Choosing the Hardware for an E-Commerce site, Other E-Commerce Site Tools.	9
V	Online Security and payment systems : The E-Commerce Security Environment, Security threads in the E-commerce environment, Technology solutions, Management Policies, business procedures and public laws, payment systems.	9
VI	E-Commerce Marketing Concepts: Consumer online; The Internet Audience and Consumer behavior, Basic Marketing Concepts, Internet Marketing Technologies, B2C and B2CE=Commerce marketing and Branding strategies.	9

Text Book : Keneth C. Laudon, Carol GurcioTraveòe-commerce, business, technology, Societyò (Pearson)

Reference Books:

1. Dave Chaffley ñE-Business and E-commerce managementò(3rd Edition) Pearson.
2. Kalkakofa Whirttoton, ñFrontiers of E-Commerceò Pearson.

Course Code **MCA19112/PGDCS19112**

Course Name **Operation Research**

Credits **4**

Course Outcomes

- Model a real-world problem as a mathematical programming model.
- Understand the theoretical workings of the simple method for linear programming and perform iterations of it by hand.
- Understand the relationship between a linear program and its dual, including strong duality.
- Solve specialized linear programming problems like: Transportation and Assignment Problems.
- Solve network models like the shortest path, minimum spanning tree and maximum flow problems.

Units	Contents	Total Hrs
I	Introduction, Classification of Problems in OR, Mathematical Modeling in OR, Dynamic Programming, Investment problem, Equipment Replacement, Stage coach Problem.	9
II	Linear Programming: Introduction, Linear Programming Applications & Model Formulation, Graphical Method, Simplex Method, Big M Method, Two Phase Method, Duality in Linear Programming.	9
III	Transportation & Assignment problem: Introduction, Mathematical Model, Transportation Algorithm, Methods for finding initial solutions, Test for Optimality, Variations in Transportation Problem, Maximization Transportation Problem.Assignment Problem: Introduction, Mathematical Model, Solution Methods of Assignment Problem, Variations of Assignment Problems.	10
IV	Sequencing Problem: Introduction, Two Machine Sequencing Problem,, N-Job Three Machine Sequencing Problem, Integer Programming: Introduction, Implicit Enumeration, Cutting-Plane Algorithm, Branch-and-Bound Techniques.	9
V	Basic Probability Statistical Concepts, Regression Analysis, Decision Theory: Minimax Decision Procedure, Bayes Decision Procedure with & without data, Regret Function versus Loss Function.	9
VI	Introduction to Game Theory: Minimax-Maximin Pure Strategies, Mixed Strategies and Expected Payoff, Solution of 2 x 2 Games, Relevant Rows and Columns, Dominance, Solutions, Brownôs Algorithm. Introduction to PERT Network, ET, TE, TL, SE, Critical Path, Probability of Completing Events on Schedule.	10

Text Books:

1. B.E. Gilett , Introduction to Operations Research A Computer Oriented Algorithmic Approach TMH Edition
2. J.K. Sharma ñ Operations Research Theory & Applicationsò (5/e) Macmillan

Reference Books:

1. Er. Prem Kumar Gupta & Dr. D. S. Hira, Operations Research, S. Chand & Company Pvt Ltd, 1st edition
2. V. K. Kapoor, Operations Research, Sultan Chand & Sons, New Delhi.
3. S.S. Rao Optimization Theory & Application, Wiley
4. Tata Hamdy, ñ Operations Research- An Introductionò (5/e), PHI.
5. Taha H. A. ñOperation Researchò Macmillan.

Course Code **MCA19112/PGDCS19112**

Course Name **Software Project Management**

Credits **4**

Course Outcomes

1) Able to recognize evolving role of software project management.
2) Understand and estimatecost for software project.
3) Identify&analyze aspect in s/w to manage time, process & recourses effectively with quality concept.
4) Estimate software productivity using metrics and indicator & identify important issues for planning a project
5) Judge different testing techniques used to test software.
6) Evaluate the role of user and software teams.

Units	Contents	Total Hrs
I	**Introduction to Software Project Management:** Define Project Management, Significance of Software Project Management, and Issues in Project Management Practices. Stages in Software Project: Request For Proposal (RFP), Feasibility Study, Planning, Project Execution, Project Life Cycles Models. Stakeholders of a Project: Role of Project Manager, and Other Key Members and Parties (stake holders) Involved in Project.	10

II	**Project Planning:** Steps In Project Plan Development, Project Plan Execution Activities, Human Resource Planning, Staff Acquisition And Team Development, Work Breakdown Structure (WBS). Risk Management: Identification of Risks Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Risk Closure	9
III	**Project Scheduling:** Time Management, Project Network Diagrams - Critical Path Analysis (CPA), Program Evaluation & Review Techniques (PERT). Project Cost Estimation: Cost Estimation Principles, Types of Estimation Techniques and Metrics - COCOMO, Function Point, Delphi Technique.	9
IV	**Software Quality Management & Control Quality Assurance & Standards** :The SEI Capability Maturity Model CMM; Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, Quality assurance & Validation plan (SQA Activities , reviews, walkthroughs, inspection, testing) Automation to improve Quality in testing Defect Management	9
V	**Software testing:** Test case design, White box testing, Basis path, control structure-Black box testing and for specialized environments, Strategic approach to S/W testing, Unit testing, integration testing, validation testing, system testing. Debugging with life cycle.	10
VI	**Software Team Management:** Team Structure & Staff development plan Characteristics of Performance management High performance Directive and collaborative styles Team Communication Group Behavior Managing customer expectations	9

Text Books:

1. Bob Hughes and Mike Cotterell, ñSoftware Project Managementò,Third Edition, Tata McGraw-Hill.
2. McGraw-Hill, Waman S. Javadekar, ñSoftware engineering principles and practiceò.

Reference Books:

1. Pressman Roger.S, ñSoftware Engineering, A Practitionerôs Approachò, TMH.
2. Pankaj Jalote, ñSoftware Project Management in Practiceò, Pearson Edn., 2002.
3. Robert K. Wysocki, ñEffective software project managementò,Willy India edition.

Course Code	**MCA19114/PGDCS19114**
Course Name	**Lab 4 – Based on Data Structures**
Credits	**01**
Course Outcomes	**Skill of application of different data structures for solving problems.**

Units	**Contents**	**Total Hrs**
	The sample list of program is given below. This list can be used as guide line for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.	30

1. Write a menu driven program to implement Searching Algorithm
   i) Linear Search ii)Binary Search
2. Write a menu driven program to implement Sorting Algorithm
   i) Bubble Sort ii)Selection Sort iii)Insertion Sort
3. Write a menu driven program to perform
   i) Addition of Matrix ii)Multiplication of Matrix iii)Transpose of Matrix
4. Write a program to implement Linear Linked List(Insertion & Searching operation)
5. Write a program to implement Stack (PUSH,POP,DISPLAY Operations)
6. Write a program to implement Queue (Insertion, Deletion)
7. Write a program to implement Tree Traversal Algorithm (Inorder, Preorder, Postorder)
8. Write a program to implement Graph using Adjacency Matrix.

Course Code	**MCA19115/PGDCS19115**
Course Name	**Lab 5 – Based on DBMS**
Credits	**01**
Course Outcomes	**Skill of effective use of database management system.**

Units	Contents	Total Hrs
I	The following list can be used as guideline for creating problem statements but the scope of the laboratory should not be limited to this list. Aim of the list is to inform about minimum expected outcomes. 1. Queries for creating new database, new user, granting and revoking privileges. 2. Queries demonstrating five important DLL Commands 3. Queries demonstrating five important DML Commands 4. Select query uses different clauses. 5. Create and use triggers. 6. Create and use Views.	30

Course Code	**MCA19116/PGDCS19116**
Course Name	**Lab 6- Based on Linux and Windows**
Credits	**03**
Course Outcomes	Able to understand the Basics of Windows & Linux working Ability to learn the creation of Windows with various components Able to performthe shell scripting programs . Able tocreate file handling utilities by using Linux shell environment.

Units	Contents	Total Hrs
I	Windows Programming: WinForms from Scratch, Windows Forms in Visual Studio . NET, Forms: Showing Forms, Dialog function, scroll bars, text in windows, Form Lifetime, Form Size and Location, Form Adornments, Form Transparency, Form Menus, Child Controls, Layout.	10
II	Multiple Document Interface,Visual Inheritance, Dialogs: Standard Dialogs, Styles, Drawing Basics: Drawing to the Screen, Colors, Shapes, Images, Printing : Print Documents, Print Controllers, Basic Print Events, Controls : Standard Controls, Custom Controls, User Controls	10
III	Linux : Startup, user Accounts, linux logging in logging out, Command line, simple commands, file system and related commands, shell, pipes and redirection, sh, tcsh, networking with Linux, file system administration	10

Reference Books:

1. Forms Programming in C#, by Chris Sells, Publisher: Addison-Wesley Professional
2. Programming Windows 5e (Microsoft Programming Series) , by CharlePetzold
3. Win32 programming- Brout Rector, Joseph Newcomer ï Addison Wesley
4. Linux Command Line and Shell Scripting Bible 3rd Edition, by Richard Blum, Christine Bresnahan
5. Linux administration handbook, Evi Nemeth, Garth Snyder, Trout R Hein- PHI
6. Integrating Linux & windows ï Mike McCuve ï Pearson Education
7. Linux system Administration Handbook, Mark F Komarinski, Cary Collelt ï Addison Wesley
8. The Complete Reference Linux, Richard Peterson- Tata McGraw Hill

PRACTICAL LIST

The sample list of program is given below. This list can be used as guide line for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Creating Mainframe Window, show window, update Window, Destroy Window.
2. Creating Dialog Box
3. Use of Message Box
4. Erasing Background, getting Hot key.
5. Use of Horizontal and vertical Scroll bar
6. Use of Button, mouse handling.
7. Working with Images
8. menu creation with different styles
9. Pop up Windows, child window, different styles of windows
10. Control functions
11. File handling

Linux programming :

1) Study of Unix/Linux general purpose utility command list obtained from (man, who,cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod,chown, finger, pwd, cal, logout, shutdown) commands.
2) Study of vi editor.(http://www.tutorialspoint.com/unix/pdf/unix-vi-editor.pdf)
3) Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
4) Study of Unix/Linux file system (tree structure).
5) Study of .bashrc, /etc/bashrc and Environment variables.

1. (Shell scripts)

I. Write a shell script program to display list of user currently logged in.
II. Write a shell script program to display ñHELLO WORLDò.
III. Write a shell script program to develop a scientific calculator.
IV. Write a shell Script program to check whether the given number is even or odd.
V. Shell script Program to search whether element is present is in the list or not.

2. Shell script programming

I.Shell script program to check whether given file is a directory or not.
II. Shell script program to count number of files in a Directory.
III. Shell script program to copy contents of one file to another.
IV. Create directory, write contents on that and Copy to a suitable location in your home directory.
V. Use a pipeline and command substitution to set the length of a line in file to a variable.
VI. Write a program using sed command to print duplicated lines of Input.

3. Shell script programming

I. (a) Write a grep/egrep script to find the number of words character, words and lines in a file.
(b) Write an awk script to develop a Fibonacci series.

4. **Shell script programming**

I. Write a shell script program to display the process attributes.
II. Write a shell script to change the priority of processes.
III. Write a shell script to change the ownership of processes.

5. Shell script programming

I. Write a shell script program to check variable attributes of file and processes.
II. Write a shell script program to check and list attributes of processes.
III. Shell Script program to implement read, write, and execute permissions.
IV. Shell Script program for changing process priority.

6**. programming**

I. Write a C program to emulate the Unix ls-l command
II. Implement in C the following Unix commands using system calls A) cat B)mv

References:

1. Forms Programming in C#, by Chris Sells, Publisher: Addison-Wesley Professional
2. Programming Windows 5e (Microsoft Programming Series) , by Charle Petzold .
3. Win32 programming- Brout Rector, Joseph Newcomer ï Addison Wesley.
4. Linux Command Line and Shell Scripting Bible 3rd Edition, by Richard Blum, Christine Bresnahan.
5. Linux administration handbook, Evi Nemeth, Garth Snyder, Trout R Hein- PHI.
6. Integrating Linux & windows ï Mike McCuve ï Pearson Education.
7. Linux system Administration Handbook, Mark F Komarinski, Cary Collelt ï Addison Wesley.
8. The Complete Reference Linux, Richard Peterson- Tata McGraw Hill.

****