CH CHARAN SINGH UNIVERISTY
MEERUT

Evaluation Scheme & Syllabus for

MCA First Year

On

Choice Based Credit System

(Effective from the Session: 2016-17)

(Session 2017-2018)

Ch Charan singh University, Meerut
Study and Evaluation Scheme
MCA
(Master of Computer Applications)
(Effective From Session 2016-17)

Year–I Semester-I

Sl.No.	SubjectCode	Subject Name	Periods			Evaluation Scheme					Credit
			L	T	P	SessionExams			ESE	Subject Total	
						CT	TA	Total			
1	MCA 111	Professional Communication	3	1	0	20	10	30	70	100	04
2	MCA 112	Computer Concepts & Principals of Programming	3	1	0	20	10	30	70	100	04
3	MCA 113	Accounting & Financial Management	3	1	0	20	10	30	70	100	04
4	MCA 114	Discrete Mathematics	3	1	0	20	10	30	70	100	04
5	MCA 115	Computer Organization & Architecture	3	1	0	20	10	30	70	100	04
Practical											
6	MCA 151	Professional Communication Lab	0	0	3	30	20	50	50	100	02
7	MCA 152	Programming Lab	0	0	3	30	20	50	50	100	02
		Total	15	4	5					700	24

Year–I Semester -II

Sl.No.	Subject Code	Subject Name	Periods			Evaluation Scheme					Credit
			L	T	P	Session Exams			ESE	Subject Total	
						CT	TA	Total			
1	MCA 211	Computer Based Numerical & Statistical Techniques	3	1	0	20	10	30	70	100	04
2	MCA 212	Data Structures	3	1	0	20	10	30	70	100	04
3	MCA 213	Introduction toAutomataTheory & Languages	3	1	0	20	10	30	70	100	04
4	MCA 214	Innovation& Entrepreneurship	3	1	0	20	10	30	70	100	04
5	MCA 215	Human Values &Professional Ethics	3	0	0	20	10	30	70	100	03
Practical											
6	MCA 251	Computer BasedNumerical &Statistical TechniquesLab	0	0	3	30	20	50	50	100	02
7	MCA 252	Data Structure Lab	0	0	6	30	20	50	50	100	03
		Total	14	4	6					700	24

Session :- 2017-2018

Department of Computer Application

Program Outcome for all program offered by the Institution:-
Program Outcome (PO) - MCA

- Apply knowledge of Computing fundamentals, Computing specialization, Mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements for employability.
- Identify, formulate, research literature, and solve complex Computing problems reaching substantiated conclusions using fundamental principles of Mathematics, Computing sciences, and relevant domain disciplines for advance higher studies. .
- Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
- Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
- Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
- Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice for enhancing skills.
- Recognize the need, and have the ability, to engage in independent learning for continual development as a Computing professional .
- Demonstrate knowledge and understanding of computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
- Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
- Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
- Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

Specific Programme Outcomes (SPO) - MCA
- To prepare graduates who will create systems through software development to solve problems in Industry domain areas.
- To Prepare Graduates who will contribute to societal growth through research in their chosen field.
- To prepare graduates who will perform both as an individual and in a team through good analytical, design and implementation skills.
- To prepare graduates who will be lifelong learners through continuous professional development.

Professional Communication   (M C A– 111)

Course Outcomes

1. Exhibit adequate verbal and non-verbal communication skills .
2. Demonstrate effective discussion, presentation and writing skills.
3. Increase confidence in their ability to read, comprehend, organize, and retain written information. Improve reading fluency.
4. Write coherent speech outlines that demonstrate their ability to use organizational formats with a specific purpose; Deliver effective
5. speeches that are consistent with and appropriate for the audience and purpose.
6. Develop proper listening skills; articulate and enunciate words and sentences clearly and efficiently.
7. Show confidence and clarity in public speaking projects; be schooledin preparation and research skills for oral presentations.

Unit-1:
 Fundamentals of Communication Technical Communication: features: Distinction between General andTechnicalcommunication;Languageasatoolofcommunication;Levelsofcommunication:Interpersonal, Organizational, Mass communications; The flow of Communication: Downward, Upward,LateralofHorizontal(Peergroup):Importanceoftechnicalcommunication;BarrierstoCommunication .

Unit-II:
 Constituents of Technical Written Communication Words and Phrases: Word formation. Synonyms andAntonyms; Homophones; Select vocabulary of about 500-1000 New words; Correct Usage: all Parts ofSpeech;Modals; Concord;Articles; Infinitives; RequisitesofSentenceConstruction: Paragraph

Development: Techniques andMethods- Inductive, Deductive,Spatial, Linear, Chronologicaletc; TheArt of Condensation-various steps.

Unit-III
 BusinessCommunicationPrinciples,Sales&Creditletters;ClaimandAdjustmentLetters;Jobapplication and Resumes. Reports: Types; Significance; Structure, Style & Writing of Reports. TechnicalProposal;Parts;Types;WritingofProposal;Significance,Negotiation&BusinessPresentationskills

Unit-IV
 Presentation Strategies and Listening Skills. Defining Purpose; Audience & Local; Organizing Contents;Preparing Outline; Audio-visual Aids; Nuances of Delivery; Body Language; Dimensions of Speech:Syllable; Accent; Pitch; Rhythm; Intonation; Paralinguistic features of voice; Listening Skills: ActiveListening,Passive Listening.methods forimprovingListeningSkills

Unit-V
 Value-Based Text Readings Following essays form the suggested text book with emphasis on Mechanicsofwriting.

(i)   Humanisticand ScientificApproachestoHuman ActivitybyMoodyE. Prior
(ii)   TheLanguageofLiteratureandSciencebyA.Huxley
(iii)   ManandNaturebyJ.Bronowski
(iv)   TheSocialFunctionofLiteraturebyIanWatt
(v)   ScienceandSurvival byBarryCommoner
(vi)   TheMotheroftheSciencesbyA.J.Bahm
(vii)   TheEffect ofScientificTemper onManbyBertrandRussell.

Text Books
  1. ImproveYourWritinged.V.N.AroraandLaxmi Chandra,OxfordUniv.Press,2001,NewDelhi

2. TechnicalCommunication: APractical Approach:MadhuRani andSeemaVerma-AcmeLearning
3. Technical Communication- Principles and Practices by Meenakshi Raman & Sangeeta Sharma, OxfordUniv.Press

ReferenceBooks

1. CommunicationSkillsforEngineersandScientists,SangeetaSharmaet.al.PHILearningPvt.Ltd,2011,NewDelhi
2. BusinessCorrespondenceandReport WritingbyProf.R.C.Sharma&KrishnaMohan,TataMcGrawHill&Co.Ltd.,2001, New Delhi
3. WordPowerMadeEasybyNormanLewis,W.R.GoyalPub.&Distributors,2009,Delhi.
4. Developing Communication Skills by Krishna Mohan, MecraBannerji- Macmillan India Ltd.1990, Delhi
5. Manual of Practical Communication by L.U.B.Pandey: A.I.T.B.S. Publications India Ltd.; KrishanNagar, 2013,Delhi
6. EnglishGrammar andUsagebyR.P.Sinha,OxfordUniversityPress,2005,NewDelhi.
7. SpokenEnglish-A manualofSpeechand PhoneticsbyR.K.Bansal&J.B.Harrison,OrientBlackswan,2013, New Delhi
8. BusinessEnglishbyKenTaylor,Orient Blackswan,2011,NewDelhi

COMPUTER CONCEPTS AND PRINCIPLES OF PROGRAMMING (MCA-112)

Course Outcomes
1. To learn the basics of different types of programming
2. To understand the syntax and building blocks of the C- program.
3. To learn to solve a problem using the CProgram.
4. To compile and debug a C- Program.
5. To generate an executable file from program.

UNIT1:   08Hours

IntroductiontoComputers:

Generations of Computer, Classification of Computers on various Parameters viz. Size, Purpose, Numberof Users, Software, Application and System Software, Computer Hardware, Storage Devices, MemoryHierarchy,MagneticTape,FlashMemory, Cache andits Levels,SSD.

NumberSystem: Binary,OctalandHexadecimalNumberSystems,Inter-ConversionsinVariousNumbersSystems, BinaryArithmetic.

UNIT1:   06Hours

IntroductiontoOperatingSystem,ItsVariousFunctions,PopularOperatingSystems—Android,Windows, Difference between Linux and Unix, iOS, Google Chrome, Modern Computing Models: CloudComputing Model and Its Benefits, Grid Computing, Green Computing, Internet of Things (IoT), BigDataAnalytics, Modern Applications ofIT

UNIT1:   10Hours

A Short History of Programming Languages, Development of Early Languages, Evolution of SoftwareArchitectures, Role of Programming Languages, Attributes of a Good Language?Approaches to ProblemSolving, Concept of Algorithm andFlow Charts, Machine Language, Assembly Language and High LevelLanguage,Conceptof Assembler, Compiler, Loader and Linker.

Language Standardization and InternationalizationTranslators and Virtual Architectures,Binding Times,Syntactic Elements of a Programming Language, Program-Sub Program Structure, Stages in Translation,AnalysisofSourceProgram,SynthesisofObjectProgram,IntroductiontoPythonProgramming.

UNIT1:   08Hours

Data Objects, Variables and Constants, Data Types, Declarations, Type Checking and Type Conversion,Assignment and Initialization, Condition Checking, Looping, Structured Data Types, Arrays, Records,Lists,Executable Objects,Methods

UNIT1:   08Hours

NamingandReferencingEnvironments,RecursiveSubPrograms,StaticandDynamicScope,Encapsulation,Abstraction,Abstract DataTypes,Classes,Inheritance,ObjectsandMessagePassing,

Text Books:
1. ProgrammingLanguages: DesignandImplementationbyTerranceW.Pratt,MarvinV.Zalkowitz,T. V. Gopal, Fourth Edition,Pearson
2. Fundamentalsof Computers,V.RajaRamanandNeeharikaAdabala,SixthEdition,PHI
3. Concepts, Techniques and Models of Computer Programming by Peter Van Roy and Seif Haridi,MITPress
4. Computer Concepts: Introductory by June Jamrich Parsons & Dam Oja Eighth Edition CengageLearning

Reference:

1. Programming Languages:Designand Implementation,Terrence W.Pratt,Prentice Hall Publishers
2. Computer Science-A Structured Programming Approach UsingC, byBehrouzA.Forouzan,RichardF. Gilberg, Thomson, Third Edition[India Edition], 2007.
3. Object-Oriented Programming with C++ by E.Balagurusamy

ACCOUNTING AND FINANCIAL MANAGEMENT (MCA-113)

Course Outcomes
1. Define bookkeeping and accounting.
2. Explain the general purposes and functions of accounting.
3. Explain the differences between management and financial accounting.
4. Describe the main elements of financial accounting information – assets, liabilities, revenue and expenses.
5. Identify the main financial statements and their purposes

Unit I: (6Hrs)
Overview:Accountingconcepts,conventionsandprinciples;AccountingEquation,InternationalAccounting principles and standards; Matching of Indian Accounting Standards with InternationalAccountingStandards
Unit II: (12 Sessions)
MechanicsofAccounting:Doubleentrysystemofaccounting,journalizingoftransactions;preparation of final accounts, Trading Account, Manufacturing Accounts, Profit & Loss Account,Profit & Loss Appropriation account and Balance Sheet, Policies related with depreciation,

inventoryandintangibleassetslikecopyright, trademark, patents andgoodwill.

Unit III   (12 Sessions)
Analysis of financial statement: Ratio Analysis- solvency ratios, profitability ratios, activity ratios,liquidity ratios, market capitalization ratios ; Common Size Statement ; Comparative Balance SheetandTrend Analysis of manufacturing,service &bankingorganizations.

UnitIV   (10Sessions)
FundsFlowStatement:Meaning,ConceptofGrossandNetWorkingCapital,PreparationofScheduleofChangesinWorkingCapital,PreparationofFundsFlowStatementanditsanalysis;CashFlow Statement: Various cashandnon-cashtransactions, flow ofcash, preparationofCashFlowStatementand itsanalysis.

 SuggestedReadings
1) Narayanswami -FinancialAccounting:AManagerialPerspective(PHI,2ndEdition)
2) Mukherjee-FinancialAccountingforManagement(TMH,1stEdition)
3) Ramchandran&Kakani -Financial AccountingforManagement (TMH,2ndEdition)
 4) GhoshT P-AccountingandFinance for Managers(Taxman, 1st Edition).
5) MaheshwariS.N&Maheshwari SK–AnIntroductiontoAccountancy(Vikas,9thEdition)
6) AshishK.Bhattacharya-EssentialsofFinancialAccounting(PHI,NewDelhi)
7) GhoshT.P-FinancialAccountingforManagers(Taxman, 3rdEdition)
8) Maheshwari S.N&Maheshwari SK–Atextbookof AccountingforManagement(Vikas, 1stEdition)
9) GuptaAmbrish-Financial AccountingforManagement (PearsonEducation,2ndEdition)
10) ChowdharyAnil -FundamentalsofAccountingandFinancial Analysis(PearsonEducation,1stEdition).

DISCRETE MATHEMATICS (MCA – 114)

Course Outcomes
1. Be familiar with constructing proofs.
2. Be familiar with elementary formal logic.
3. Be familiar with set algebra.
4. Be familiar with combinatorial analysis.
5. Be familiar with recurrence relations.
6. Be familiar with graphs and trees, relations and functions, and finite automata.
7. Be exposed to the strategies for compare relative efficiency of algorithms

Unit-I: (10Hrs)
Set Theory: Introduction, Size of sets and cardinals, Venn diagrams, Combination of sets, Multisets,Orderedpairs and Setidentities.
Relations & Functions: Relations - Definition, Operations on relations, Composite relations, Properties of relations, Equalityofrelations,Partialorderrelation.Functions-Definition,Classificationoffunctions,Operations onfunctions, Recursively defined functions.
Notion of Proof: Introduction, Mathematical Induction, Strong Induction and Induction with Nonzerobasecases.

Unit-II: (08Hrs)
Lattices: Introduction, Partial order sets, Combination of partial order sets, Hasse diagram, Introductionoflattices,Properties oflattices – Bounded,Complemented,ModularandComplete lattice.

Unit-III: (08Hrs)
BooleanAlgebra: Introduction,AxiomsandTheoremsofBooleanalgebra,Booleanfunctions.Simplificationof

BooleanFunctions,Karnaughmaps,Logicgates,Digital circuitsandBooleanalgebra.

Unit-IV: (08Hrs)
Propositional&PredicateLogic: Propositions,   Truth   tables,   Tautology,   Contradiction,
Algebraofpropositions, Theory of Inference and Natural Deduction. Theory of predicates, First order
predicate,Predicateformulas, quantifiers, Inferencetheoryofpredicatelogic.

Unit-V:
(06Hrs)
RecurrenceRelations: Introduction,Growthoffunctions,Recurrencesfromalgorithms,Methodsofsolvingrecurrences.
Combinatorics: Introduction,CountingTechniques,PigeonholePrinciple,Pólya'sCountingTheory.

TextBooks:

1. DiscreteMathematicsandItsApplications,KennethH.Rosen,McGraw-Hill,2006.
2. DiscreteMathematicalStructures,B.Kolman,R.C.Busby,andS.C.Ross,PrenticeHall,2004.
3. DiscreteandCombinatorialMathematics,R.P.Grimaldi,AddisonWesley,2004.
4. DiscreteMathematicalStructures,YNSingh,Wiley-India,FirstEdition,2010.

Computer Organization (MCA-115)

Course Outcomes
1. Understand the theory and architecture of central processing unit.
2. Analyze some of the design issues in terms of speed, technology, cost, performance.
3. Design a simple CPU with applying the theory concepts.
4. Use appropriate tools to design verify and test the CPU architecture.
5. Learn the concepts of parallel processing, pipelining and interprocessor communication.
6. Understand the architecture and functionality of central processing unit.
7. Exemplify in a better way the I/O and memory organization.
8. Define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.

Unit-1:DigitalElectronics   (08Hrs)
 Data Representation in Computer Systems
Introduction,PositionalNumberingSystems,ConvertingBetweenBases,SignedIntegerRepresentation,Floating-Point Representation, Character Codes

 Arithmetic
Overview,FixedPointAdditionandSubtraction,FixedPointMultiplicationandDivision,FloatingPoint
Arithmetic

 BooleanAlgebraandDigitalLogic
Introduction,BooleanAlgebra,BooleanExpressions,BooleanIdentities,K-Maps&Mapminimization,
LogicGates,DigitalComponents, CombinationalCircuits,SequentialCircuits

Unit-2:Memory, RegisterandRegistertransfer   (08 Hrs)
Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Bus Arbitration,Arithmetic

Logic, Shift Micro-operation, Arithmetic Logic Shift Unit, Design of Fast address,Arithmetic Algorithms (addition, subtraction, Booth Multiplication), IEEE standard for Floatingpointnumbers.

MemoryHierarchy,MainMemory(RAMandROMChips),organizationof2Dand2Auxiliarymemory, Cachememory, Virtual Memory, Memorymanagementhardware

Unit3: Control Design (08 Hrs)

Hardwired & Micro Programmed (Control Unit): Fundamental Concepts (Register Transfers, Performing of arithmetic or logical operations, Fetching a word from memory, storing a word inmemory), Execution of a complete instruction, Multiple-Bus organization, Hardwired Control, Microprogrammedcontrol(Microinstruction, Microprogramsequencing, Wide-Branchaddressing, Microinstruction with Next-addressfield, PrefetchingMicroinstruction).

Unit4: (08Hrs)

ProcessorDesign: ProcessorOrganization:Generalregisterorganization, Stackorganization, Addressingmode, Instructionformat, Datatransfer&manipulations, ProgramControl, ReducedInstructionSetComputer.

Input-Output Organization:I/O Interface, Modes of transfer, Interrupts & Interrupt handling, ProgrammedI/O, DirectMemoryaccess, Input-Outputprocessor, SerialCommunication.

Unit5: (8Hrs)

RISC&CICSArchitecture, BasicMIPSImplementation, Pipelining, Instruction-levelParallelism, Parallel Processing Challenges, Flynn's Classification, Hardware Multi-threading, Multicoreprocessing.

Text-Books(TB)
1. LogicandDigitalDesign,*MorrismanoandKimicharels4thEdition,PrenticeHall.*
2.ComputerSystemArchitecture,M.Mano(PHI)
3.ComputerOrganization,Vravice,Zaky&Hamacher(TMHPublication)

ReferenceBooks(RB)
1. StructuredComputerOrganization,Tannenbaum(PHI)
2. ComputerOrganization,Stallings(PHI)
3. ComputerOrganization,JohnP.Hayes(McGrawHill)

MCA-151
PROFESSIONAL COMMUNICATION PRACTICALS

Course Outcome

1. **Better pronunciation and accent**
2. **Ability to use functional English**
3. **Competency in analytical skills and problem solving skills**

LTP002

InteractiveandCommunicativePracticalwithemphasisonOralPresentation/SpokenCommunicationbasedonInternationalPhoneticAlphabets(I.P.A.)

LISTOFPRACTICALS
1. GroupDiscussion:PracticalbasedonAccurateandCurrentGrammaticalPatterns.
2. Conversational Skills for Interviews under suitable Professional Communication Lab conditions with emphasis onKinesics.
3. CommunicationSkillsforSeminars/Conferences/WorkshopswithemphasisonParalinguistics/Kinesics.
4. PresentationSkillsforTechnicalPaper/ProjectReports/ProfessionalReportsbasedonproperStressandIntonationMechanics.
5. Official/PublicSpeakingbasedonsuitableRhythmicPatterns.
6. Theme-Presentation/Key-NotePresentationbasedoncorrectargumentationmethodologies.
7. IndividualSpeechDelivery/ConferenceswithskillstodefendInterjections/Quizzes.
8. ArgumentativeSkills/RolePlayPresentationwithStressandIntonation.
9. ComprehensionSkillsbasedonReadingandListeningPracticalsonamodelAudio-VisualUsage.

ReferenceBooks
1. BansalR.K.&Harrison:PhoneticsinEnglish,OrientLongman,NewDelhi.
2. Sethi&Dhamija:ACourseinPhoneticsandSpokenEnglish,PrenticeHall,NewDelhi.
3. L.U.B.Pandey&R.P.Singh,AManualofPracticalCommunication,A.I.T.B.S.Pub.IndiaLtd.KrishanNagar,Delhi.

4. Joans Daniel, English Pronouncing Dictionary, Cambridge Univ. Press.

MCA151

Programming Lab

Course Outcome

1. Read, understand and trace the execution of programs written in C language.
2. Write the C code for a given algorithm.
3. Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
4. Write programs that perform operations using derived data types.

 WriteaprograminC/C++:
1. thatacceptsthemarksof5subjectsandfindsthesumandpercentagemarksobtainedbythestudent.
2. thatcalculatestheSimpleInterestandCompoundInterest.(ThePrincipal,Amount,RateofInterestandTime areenteredthroughthekeyboard).
3. tocalculatetheareaandcircumferenceofacircle.
4. thatacceptsthetemperatureinCentigradeandconvertsintoFahrenheitusingtheformulaC/5=(F-32)/9.
5. thatswapsvaluesoftwovariablesusingathirdvariable.
6. thatcheckswhetherthetwonumbersenteredbytheuserareequalornot.
7. tofindthegreatestofthreenumbers.
8. thatfindswhetheragivennumberisevenorodd.
9. thattellswhetheragivenyearisaleapyearornot.
10. todemonstratetheuseofswitchcasestatement.
11. tounderstandtheconceptofpointers.
12. toprintthesumofallnumbersuptoagivennumber.
13. tofindthefactorialofagivennumber.
14. toprintsumofevenandoddnumbersfrom1toNnumbers.
15. toprinttheFibonacciseries.
16. tocheckwhethertheenterednumberisprimeornot.
17. tofindthesumofdigitsoftheenterednumber.
18. tofindthereverseofanumber.
19. toprintArmstrongnumbersfrom1to100.
20. toconvertbinarynumberintodecimalnumberandviceversa.
21. thatsimplytakeselementsofthearrayfromtheuserandfindsthesumoftheseelements.
22. thatinputstwoarraysandsavessumofcorrespondingelementsofthesearraysinathirdarrayandprintsthem.
23. tofindtheminimumandmaximumelementofthearray.
24. tosearchanelementinaarrayusingLinearSearch.
25. tosorttheelementsofthearrayinascendingorderusingBubbleSorttechnique.

26. toaddandmultiplytwomatricesofordernxn.
27. thatfindsthesumofdiagonalelementsofamxnmatrix.
28. toimplementstrlen(),strcat(),strcpy()usingtheconceptofFunctions.
29. todemonstratethestructureandunion.
30. toimplementdifferentfilehandlingfunctions.
31. todemonstratetheobjectorientedconcepts.

Note:TheInstructormayadd/delete/modify/tuneexperiments,whereverhe/shefeelsinajustifiedmanner.

MCA– IISemester
ComputerBasedNumerical& StatisticalTechniques (MCA-211)

Course Outcomes
1. To develop the mathematical skills of the students in the areas of numerical methods.
2. To teach theory and applications of numerical methods in a large number of engineering subjects which require solutions of linear systems, finding eigen values, eigenvectors, interpolation and applications, solving ODEs, PDEs and dealing with statistical problems like testing of hypotheses.
3. To lay foundation of computational mathematics for post-graduate courses, specialized studies and research.

Unit-I

Floating point Arithmetic: Representation of floating point numbers,Operations,Normalization,Pitfallsoffloatingpointrepresentation,Errorsinnumericalcomputation

IterativeMethods: ZerosofasingletranscendentalequationandzerosofpolynomialusingBisectionMethod,IterationMethod,Regula-Falsimethod,NewtonRaphsonmethod,Secantmethod,Rateofconvergenceofiterativemethods.

Unit-II

Simultaneous Linear Equations: Solutions of system of Linear equations, GaussEliminationdirectmethodandpivoting,IllConditionedsystemofequations,Refinementofsolution.GaussSeidaliterativemethod,RateofConvergence

Interpolationandapproximation: Finite Differences, DifferencetablesPolynomialInterpolation:Newton's forwardandbackwardformula

Central Difference Formulae: Gauss forward and backward formula, Stirling's,Bessel's

Interpolationwithunequalintervals: Langrange'sInterpolation,NewtonDivideddifferenceformula

Unit-III

NumericalDifferentiationandIntegration: Introduction,NumericalDifferentiation, NumericalIntegration, Trapezoidal rule, Simpson's rules, Boole'sRule

Solution of differential equations: Picard's Method, Euler's Method, Taylor'sMethod,Runge-Kuttamethods,Predictor-correctormethod,Automaticerrormonitoring,stabilityofsolution.

Unit-IV

Curvefitting,CubicSplineandApproximation: Methodofleastsquares,fittingofstraightlines,polynomials,exponentialcurvesetc

Frequency Chart: Different frequency chart like Histogram, Frequency curve, Pi-chart.

Regressionanalysis: LinearandNon-linearregression, Multiple regression

Unit-V

Timeseriesandforecasting:Movingaverages,smootheningofcurves,forecastingmodelsandmethods.

Testing of Hypothesis: Test of significance, Chi-square test, t-test, F-TestApplicationtomedicine,agricultureetc.

References:

1.RajaramanV.,"ComputerOrientedNumericalMethods",PHI

2.Gerald&Wheatley,"AppliedNumericalAnalyses",AW

3.Jain,IyengarandJain,"NumericalMethodsforScientificandEngineeringComputations",NewAgeInt.

4.GrewalB.S.,"NumericalmethodsinEngineeringandScience", KhannaPublishers,Delhi

5.T.Veerarajan,TRamachandran,"TheoryandProblemsinNumericalMethods",TMH

6.PradipNiyogi,"NumericalAnalysisandAlgorithms",TMH

7.FrancisScheld,"NumericalAnalysis",TMH

9.GuptaS.P.,"StatisticalMethods",SultanandSons

Data Structures (MCA-212)

Course Outcomes
1. Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms
2. Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs
3. Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs
4. Demonstrate different methods for traversing trees
5. Compare alternative implementations of data structures with respect to performance
6. Compare and contrast the benefits of dynamic and static data structures implementations
7. Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack
8. Design and implement an appropriate hashing function for an application
9. Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing

Unit–I: Introduction:
BasicTerminology,ElementaryDataOrganization,DataStructureoperations,AlgorithmComplexityandTime-Spacetrade-off.
Arrays: ArrayDefinition,RepresentationandAnalysis,SingleandMultidimensional Arrays, addresscalculation,application of arrays, Ordered List,SparseMatricesandVectors.
Stacks: Array Representation and Implementation of stack, Operations on Stacks:Push&Pop,ArrayRepresentationofStack,LinkedRepresentationofStack,Operations AssociatedwithStacks,
Applicationofstack: Conversion of Infix to Prefix and Postfix Expressions,Evaluation of postfix expression using stack. Recursion: Recursive definition andprocesses,recursioninC,exampleofrecursion,TowerofHanoiProblem,simulating recursion.

Unit–II

Queues: Array and linked representation and implementation of queues,Operations on Queue: Create, Add,Delete, Full and Empty. Circular queue, Deque,andPriorityQueue.
Linked list: Representation and Implementation of Singly Linked Lists, Two-wayHeader List, Traversingand Searching of Linked List, Overflow and Underflow,Insertion and deletion to/from Linked Lists algorithm(Beginning, end and middle),Doublylinkedlist,LinkedListinArray,Polynomialrepresentationandaddition,Generalized linkedlist, Garbage Collection and Compaction.

Unit-III

Trees: Basic terminology, Binary Trees, Binary Tree Representation, AlgebraicExpressions, Complete BinaryTree. Extended Binary Trees,Array and LinkedRepresentation of Binary trees, Traversing Binary trees, Threaded Binary trees,Traversing ThreadedBinarytrees,

Binary SearchTrees: BinarySearchTree(BST),InsertionandDeletioninBST,ComplexityofSearchAlgorithm,Pat hLength,AVLTrees.

Unit IV

Searching: Sequential search,binarysearch,comparisonandanalysis
Sorting: Insertion Sort,BubbleSorting,
QuickSort,TwoWayMergeSort,HeapSort,SortingonDifferentKeys,PracticalconsiderationforInternalSorting

Unit-V

Graphs:
Terminology&Representations,Graphs&Multi-graphs,DirectedGraphs,SequentialRepresentations of Graphs, Adjacency Matrices, Traversal, ConnectedComponentandSpanningTrees,MinimumCostSpanningTrees.
FileStructures: PhysicalStorageMediaFileOrganization,OrganizationofrecordsintoBlocks,SequentialFiles,Index ingandHashing,Primaryindices,Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and HashingTechniques andtheirComparisons.

TextBooks
1.Y. Langsam, M. Augenstin and A. Tannenbaum, Data Structures using C

andC++,PearsonEducationAsia,2ndEdition,2002.

2.Ellis Horowitz, S. Sahni, D. Mehta Fundamentals of Data Structures inC++,GalgotiaBookSource,NewDelhi.

ReferenceBooks

1.S.Lipschutz,Data StructuresMc-GrawHillInternationalEditions

2.Jean-Paul Tremblay, Paul. G. Soresan, An introduction to data structures withApplications,TataMc-GrawHillInternationalEditions

3.A.MichaelBerman,DatastructuresviaC++, OxfordUniversityPress

4.M. Weiss,DataStructuresandAlgorithm Analysisin C++,PearsonEducation

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MCAII Semester
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IntroductiontoAutomata Theory&FormalLanguages (MCA-213)

Course Outcomes
1. To provide a formal connection between algorithmic problem solving and the theory of languages and automata and develop them into a mathematical (abstract) view towards algorithmic design and in general computation itself.
2. The course should in addition clarify the practical view towards the applications of these ideas in the engineering part as well.
3. Become proficient in key topics of theory of computation, and to have the opportunity to explore the current topics in this area

Unit-I:
BasicconceptsofAutomataTheory: Alphabets,StringsandLanguages,DeterministicFiniteAutomata (DFA) and Nondeterministic Finite Automata (NFA) – Definition, Representation usingTransitionTablesandStateDiagrams,LanguageofDFAandNFA.NFAwithε-transitions,LanguageofNFAwithε-transitions,Equivalence of NFAand DFA

Unit – II:
Regular Expressions and Languages: Introduction, Definition of regular expression, Kleen'sTheorem, Equivalence of regular expression and Finite Automata, Pumping Lemma for regularLanguages, Closure properties of Regular Languages, Decision properties of Regular Languages,Finite Automata with Output: Moore and Mealy Machine, Equivalence of Moore and MealyMachines.

Unit –III:
Non-Regular Grammars: Definition of Grammar, Classification of Grammars, Chomosky'sHierarchy. Context Free Grammars (CFG) and Context Free Languages (CFL)- Definition,Examples, Derivation trees, Ambiguous Grammars,Simplification of Grammars, Normal formsof CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs, Pumpinglemma for CFLs. Push Down Automata (PDA): Definition and Description, Language of PDAandits applications.

Unit –IV:
Turing Machines: Introduction, Basic Features of a Turing Machine, Language of a TuringMachine, Variants of Turing Machine: Multitapes, Nondeterministic Turing Machine, UniversalTuring Machine. Turing Machine as Computer of Integer functions, Halting problem of TuringMachine,Church-TuringThesis

Unit–V:
Undecidability: Introduction, Undecidable problems about Turing Machines, Rice's Theorem,Post's Correspondence problem (PCP) and Modified PCP. Tractable and Intractable Problems: PandNP, NPComplete Problems,Introductiontorecursive functiontheory

TextBooks:
1.IntroductiontoAutomatatheory,LanguagesandComputation,J.E.Hopcraft,R.Motwani,andUllman.2nd edition, Pearson Education Asia
2.Introductiontolanguagesandthetheoryofcomputation,JMartin,3rdEdition,TataMcGrawHill
3.ElementsandTheoryofComputation, CPapadimitrou and C.L. Lewis, PHI
4.MathematicalFoundationofComputerScience,Y.N.Singh,New AgeInternational

InnovationandEntrepreneurship (MCA-214)

Course Outcomes

1. Key concepts underpinning entrepreneurship and its application in the recognition and exploitation of product/ service/ process opportunities
2. Key concepts underpinning innovation and the issues associated with developing and sustaining innovation within organisations
3. How to design creative strategies for pursuing, exploiting and further developing new opportunities
4. Issues associated with securing and managing financial resources in new and established organizations

Unit-I:InnovationandEntrepreneurship   **(8Hrs)**

What is innovation and entrepreneurship? Innovation Types and sources, recognizing opportunities,actingontheopportunities,innovationstrategiesandmanagement,strengtheningthenationalinnovationsystem, fosteringinnovation andentrepreneurship

UnitII:Entrepreneurship   **(8Hrs)**
Meaning, Definition and concept of Enterprise, Entrepreneurship and Entrepreneurship Development,EvolutionofEntrepreneurship,TheoriesofEntrepreneurship,CharacteristicsandSkillsofEntrepreneurship,Entrepreneurship andEconomicDevelopment;ClassificationandTypesofEntrepreneurs; Entrepreneurial Competencies; Factor Affecting Entrepreneurial Growth – Economic,Non-Economic Factors; Concepts of Intrapreneurship, Entrepreneur v/s Intrapreneur, Traits/Qualities ofanEntrepreneur; ManagerVs. Entrepreneur,ProblemsofEntrepreneurship.

UnitIII:Opportunity/IdentificationandProductSelection   **(8 Hrs)**MeaningandconceptofEntrepreneurialCompetency,DevelopingEntrepreneurialCompetencies,Entrepreneurial Culture, Entrepreneurial Mobility, Factors affecting Entrepreneurial mobility, Types ofEntrepreneurialmobility.EntrepreneurialOpportunitySearchandIdentification;CriteriatoSelectaProduct;ConductingFeasibilityStudies; ProjectFinalization;SourcesofInformation

UnitIV: (8Hrs)
RoleofGovernment inpromotingEntrepreneurship,MSMEpolicyinIndia,
AgenciesforPolicyFormulationandImplementation: DistrictIndustriesCenters(DIC),SmallIndustriesServiceInstitute(SISI),EntrepreneurshipDevelopmentInstituteofIndia(EDII),NationalInstitute of Entrepreneurship & Small Business Development (NIESBUD), National EntrepreneurshipDevelopment Board(NEDB),
Financial Support System: Forms of Financial support, Long term and Short term financial support,SourcesofFinancialsupport,Development FinancialInstitutions,InvestmentInstitutions
Unit V: (8Hrs)
Women Entrepreneurship: Meaning, Characteristic features, Problems of Women Entrepreneurship inIndia,DevelopingWomenEntrepreneurshipinIndia,ConceptofSocialEnterpriseandSocialEntrepreneurship,SocialEntrepreneurs,SustainabilityIssuesinSocialEntrepreneurship,RuralEntrepreneurship,FamilyBusinessEntrepreneurship
Project Management: Concept,Features, Classification of projects, Issues in Project Management,Project Identification, Project Formulation, Project Design and Network Analysis, Project Evaluation,Project Appraisal, ProjectReportPreparation, Specimen ofa ProjectReport

CaseStudies-Atleast4(four)duringthisCourse

SuggestedReadings:
1. Lall&Sahai:Entreprenurship(ExcelBooks)
2. Couger,C-Creativityand Innovation(IPP, 1999)
3. KakkarDN-EnterpreneurshipDevelopment(WileyDreamtech)
4. A.K.Rai–EntrepreneurshipDevelopment,(VikasPublishing)
5. Sehgal&Chaturvedi-EntrepreneurshipDevelopment(UDHPublishing)
6. R.V.Badi&N.V.Badi- Entrepreneurship(VrindaPublications)
7. Holt -Entrepreneurship: NewVentureCreation (Prentice-Hall).
8. Barringer MJ -Entrepreneurship(Prentice-Hall)

9. Nina Jacob, - Creativity in Organisations (Wheeler, 1998)Desai, Vasant (2003). Small-ScaleIndustriesand Entrepreneurship.Himalaya PublishingHouse,Delhi.

10. Kaulgud,Aruna(2003).EntrepreneurshipManagement.VikasPublishingHouse,Delhi.38
11. Cynthia,L.Greene(2004).EntrepreneurshipIdeasinAction.ThomsonAsiaPvt. Ltd.,Singapore.
12. Chandra, Ravi (2003). Entrepreneurial Success: A Psychological Study. Sterling PublicationPvt.Ltd.,NewDelhi.
13. Balaraju,Theduri(2004).EntrepreneurshipDevelopment:AnAnalyticalStudy.AkanshaPublishingHouse, UttamNagar, New Delhi.
14. David, Otes (2004). A Guide to Entrepreneurship. Jaico Books Publishing House, Delhi.Taneja(2004). Entrepreneurship. GalgotiaPublishers.

Human Values &Professional Ethics (MCA-215)

Course Outcomes

1. Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
2. Identify the multiple ethical interests at stake in a real-world situation or practice
3. Articulate what makes a particular course of action ethically defensible
4. Assess their own ethical values and the social context of problems
5. Identify ethical concerns in research and intellectual contexts, including academic integrity,
6. use and citation of sources, the objective presentation of data, and the treatment of human subjects

Morals, Values and Ethics - Integrity - work Ethic - Service Learning - Civic Virtue - Respect for others – Living peacefully - Caring - Sharing - Honesty - Courage - Valuing time - Co-operation - Commitment - Empathy - Self-Confidence - Character - Spirituality - The role of engineers in modern society - social expectations.

Sense of 'Engineering Ethics' - Variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - Consensus and controversy - Models of Professional Roles & Professionalism - theories about right action - Self-interest - customs and religion - uses of ethical theories.

Engineering as experimentation - engineers as responsible experimenters - Research ethics -Codes of ethics - Industrial Standard - Balanced outlook on law - the challenger case study.
Safety and risk - assessment of safety and risk - Riysis - Risk benefit analysis and reducing risk - Govt.

Regulator's approach to risks - the three mile island and Chernobyl case studies & Bhopal - Threat of Nuclear power, depletion of ozone, greenery effects - Collegiality and loyalty - respect for authority – collective bargaining - Confidentiality - conflicts of interest - occupation crime - professional rights - employees' rights - Intellectual Property rights (IPR) - discrimination.

Multinational corporations - Business ethics - Environmental ethics - computer ethics - Role in Technological Development - Weapons development engineers as managers - consulting engineers - engineers as expert witnesses and advisors - Honesty - leadership - sample code of conduct ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management Institution of electronics and telecommunication engineers (IETE), India, etc.,.

Text Books:
1. Mika martin and Roland Scinger, 'Ethics in Engineering', Pearson Education/Prentice Hall, New York 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V.S, 'Engineering Ethics', Prentice Hall of India, New Delhi, 2004.
3. Charles D. Fleddermann, 'Ethics in Engineering', Pearson Education/Prentice Hall, New Jerssy, 2004 (Indian Reprint)
Reference Books:
1. Charles E Harris, Michael S. Protchard and Michael J Rabins, 'Engineering Ethics - Concept and Case', Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
2. 'Concepts and Cases', Thompson Learning (2000)
3. John R Boatright, 'Ethics and Conduct of Business', Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, 'Fundamentals of Ethics for Scientists and Engineers', Oxford University of Press, Oxford, 2001.

MCA-251
DATASTRUCTURESLAB

Course Outcome:
1. Be able to design and analyze the time and space efficiency of the data structure
2. Implement different sorting and searching algorithms
3. Implement the stack, Queue and their applications
4. Implement various types of linked lists and their applications
5. Be capable to identity the appropriate data structure for given problem
6. Have practical knowledge on the applications of data structures
7. Perform basic operations on trees and graphs and determine minimum spanning tree

WriteaPrograminCorC++for:
1. **Sorting:**Bubblesort,SelectionsortandQuicksort.
2. **Searching**:LinearSearchandBinarySearch.
3. ArrayimplementationofStackandCircularQueue.
4. DynamicimplementationofStack,LinkedListandCircularlyLinkedList.
5. torealizethecreationofBinarySearchTree.
6. forpostordertreetraversal.
7. torealizegraphdatastructure.
8. toobtainminimumcostspanningtreeofagivenweightedgraph.
9. tofindshortestpathusingWarshal'salgorithmandDijikstraalgorithm.

Note:TheInstructormayadd/delete/modify/tuneexperiments,whereverhe/shefeelsinajustifiedmanner.

MCA-252
COMPUTERBASEDNUMERICALANDSTATISTICALTECHNIQUESLAB

Course Outcome
1. Learning of making automated solution of numerical methods using C language
2. Understand error, source of error and its affect on any numerical computation and also analyzing the efficiency of any numerical algorithm.
3. Learn how to obtain numerical solution of nonlinear equations using Bisection, Newton – Raphson and fixed-point iteration methods.
4. Solve system of linear equations numerically using direct and iterative methods.
5. Understand the methods to construct interpolating polynomials with practical exposure.
6. Understand the various approaches dealing the data using theory of probability
7. Analyze the different samples of data at different level of significance using various hypothesis testing.
8. Develop a framework for estimating and predicting the different sample of data for handling the uncertainties.

WriteaprograminC:
1. todemonstratetheerrorsproducedduringnumericalcomputationswithfloatingpointnumbers.
2. tofindrootsofalgebraic/trancedentalequationsusingBisection,NewtonRaphson,regul-falsimethods.
3. todetermineinterpolatingpolynomialusingLangrangemethod,Newton'sdivideddifferencemethodofinterpolation
4. toimplementmethodofleastsquarecurvefitting.
5. todeterminenumericaldifferentiation.
6. toimplementnumericalintegrationusingTrapezoidalruleandSimpson's3/8rules.
7. toimplementRunge-Kuttasecondorderandfourthordermethodforsolvingdifferentialequations
8. toimplementPredictor-Correctormethodforsolvingdifferentialequations
9. todisplayvarioustypesoffrequencychart

Note:TheInstructormayadd/delete/modify/tuneexperiments,whereverhe/shefeelsinajustifiedmanner.

CH CHARAN SINGH UNIVERISTY
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EVALUATION SCHEME &SYLLABUS

Evaluation Scheme and SyllabusFor

Second Year

M.C.A.(MasterofComputerApplication)

(EffectivefromtheSession:2017-18)

Master of Computer Application Third Semester

S. No.	Subject Code	SubjectName	Periods			EvaluationScheme					Credit
			L	T	P	Sessional			ESE	Total	
						CT	TA	Total			
1.	MCA311	OperatingSystems	3	1	0	20	10	30	70	100	04
2.	MCA312	WebTechnology	3	1	0	20	10	30	70	100	04
3.	MCA313	Design&Analysisof Algorithms	3	1	0	20	10	30	70	100	04
4.	MCA314	ComputerBasedOptimizationTechniques	3	1	0	20	10	30	70	100	04
5.	MCA315	Cyber Security	3	0	0	20	10	30	70	100	03
6.*	MCA 316	Introduction to Programming and ComputerOrganization*	3	0	0	20	10	30	70	100	--
Practical											
7.	MCA351	OperatingSystemsLab	0	0	3	30	20	50	50	100	02
8.	MCA352	Design&Analysisof AlgorithmsLab	0	0	6	30	20	50	50	100	03
		Total								700	24

FourthSemester

S. No.	Subject Code	SubjectName	Periods			EvaluationScheme					Credit
			L	T	P	Sessional			ESE	Total	
						CT	TA	Total			
1.	MCA411	DatabaseManagementSystems	3	1	0	20	10	30	70	100	04
2.	MCA412	ComputerNetworks	3	1	0	20	10	30	70	100	04
3.	MCA413	ArtificialIntelligence	3	1	0	20	10	30	70	100	04
4.	MCA414	CompilerDesign	3	1	0	20	10	30	70	100	04
5.	MCA415	Elective–I (Mobile Computing)	3	1	0	20	10	30	70	100	03
6.*	MCA416	Fundamental of Data Structure, NumericalandComputationalTheory*	3	0	0	20	10	30	70	100	--
Practical											
7.	MCA451	MiniProject	0	0	6	30	20	50	50	100	03
8.	MCA452	DatabaseManagementSystemsLab	0	0	3	30	20	50	50	100	02
		Total	15	5	6					700	24

***Note:**MCALateralEntrycandidatesarerequiredtoqualifyfollowingtwoauditcoursesalso.Thesecourseswillbeof qualifying natureandshallnot be considered towardssemester totalof marks.*

* AuditCoursesto becompletedbyMCALateralEntryStudentsonly.

1. *Audit Course1:RCA-A01*
2. *Audit Course2: RCA-A02*

<u>ListofElectives</u>

Elective–I
1. RCA-E11:Design&Development ofApplications
2. RCA-E12:Client-ServerComputing
3. RCA-E13:DataWarehousing &DataMining
4. RCA-E14:AdvancedComputerArchitecture
5. RCA-E15:MobileComputing

Session :- 2017-2018

Department of Computer Application

Program Outcome for all program offered by the Institution:-

Program Outcome (PO) - MCA

- Apply knowledge of Computing fundamentals, Computing specialization, Mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.
- Identify, formulate, research literature, and solve complex Computing problems reaching substantiated conclusions using fundamental principles of Mathematics, Computing sciences, and relevant domain disciplines.
- Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
- Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
- Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
- Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.
- Recognize the need, and have the ability, to engage in independent learning for continual development as a Computing professional.
- Demonstrate knowledge and understanding of computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
- Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
- Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
- Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

Specific Programme Outcomes (SPO) - MCA
- To prepare graduates who will create systems through software development to solve problems in Industry domain areas.
- To Prepare Graduates who will contribute to societal growth through research in their chosen field.
- To prepare graduates who will perform both as an individual and in a team through good analytical, design and implementation skills.

- To prepare graduates who will be lifelong learners through continuous professional development.

OperatingSystems (MCA 311)

Course Outcome
1. Explain main components, services, types and structure of Operating Systems.
2. Apply the various algorithms and techniques to handle the various concurrency control issues.
3. Compare and apply various CPU scheduling algorithms for process execution.
4. Identify occurrence of deadlock and describe ways to handle it.
5. Explain and apply various memory, I/O and disk management techniques.

UNIT I–INTRODUCTION: - Computer System Overview-Basic Elements, Instruction Execution,Interrupts,MemoryHierarchy,CacheMemory,DirectMemoryAccess,MultiprocessorandMulticoreOrganization.Operatingsystemoverview-objectivesandfunctions,EvolutionofOperatingSystem.

UNIT II–PROCESSES: - Process States, Process Description and Process Control. Processes andThreads,TypesofThreads,MulticoreandMultithreading,Windows7-ThreadandSMPManagement.

UNIT III-CONCURRENCY AND SCHEDULING:-Principles of Concurrency-Mutual Exclusion,Semaphores,Monitors,Readers/Writersproblem.Deadlocks-prevention-avoidance-detection,Scheduling-Types ofScheduling-Scheduling algorithms.

UNIT IV–MEMORY:-Memory management requirements, Partitioning, Paging and Segmentation,Virtualmemory-
Hardwareandcontrolstructures,operatingsystemsoftware,Linuxmemorymanagement,Windows memorymanagement.

UNIT V - INPUT/OUTPUT AND FILE SYSTEMS: - I/O management and disk scheduling – I/Odevices, organization of I/O functions; OS design issues, I/O buffering, disk scheduling, Disk cache.File management – Organization, Directories, File sharing, and Record blocking, secondary storagemanagement.

References:-
1. Silberschatz,GalvinandGagne,"OperatingSystemsConcepts",Wiley
2. AndrewS.Tanenbaum,"ModernOperatingSystem",PHILearning
3. Tanenbaum/Woodhaull"OperatingSystemDesignandImplementation", PearsonPublication.
4. HarveyMDietel,"AnIntroductiontoOperatingSystem",PearsonEducation
5. Flynn,"UnderstandingOperatingSystem",Cengage.
6. DMDhamdhere,"OperatingSystems:AConceptbasedApproach",McGrawHill.
7. CharlesCrowley,"OperatingSystems:ADesign-OrientedApproach",TataMcGrawHillEducation".
8. StuartE.Madnick&JohnJ.*Donovan.OperatingSystems.*McGrawHill.
9. A.K.Sharma,"OperatingSystem",UniversityPress.
10. AchyutSGodbole,Atulkahate,"OperatingSystem",McGrawHill

Web Technology(312)

Course Outcome:

1. On completion of this course, a student will be familiar with client server architecture and able to develop a web application using web technologies.
2. Students will gain the skills and project based experience nee Course Outcomes : ded for entry into web application and development careers.
3. Students are able to develop a dynamic webpage by the use of java script and DHTML. Students will be able to write a well formed / valid XML document. Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.
4. Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database.

5. The course is intended for those who have never done anything with HTML or web pages (static and dynamic), and would like to build this basic knowledge for starting a career as a web developer or for learning how to program HTML for web pages HTML/ HTML5, CSS, JavaScript, VB Script.
6. Web development strategies using server side programming with ASP, JSP, Com/D-Com, PHP and at the end of the course you'll gain knowledge about where to go next to further your front-end web development skills.

UNITI-INTRODUCTION&WEBDESIGN:-
Introduction:ConceptofWWW,InternetandWWW,HTTPProtocol:RequestandResponse,WebbrowserandWebservers, FeaturesofWeb2.0

WebDesign:Conceptsofeffectivewebdesign,WebdesignissuesincludingBrowser,Bandwidth and Cache, Display resolution, Look and Feel of the Website, Page Layout and linking,Usercentricdesign,Sitemap,Planningandpublishingwebsite,Designingeffectivenavigation.

UNITII-HTML&STYLESHEETS:-HTML:BasicsofHTML,formattingandfonts,commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Characterentities,framesandframesets,BrowserarchitectureandWebsitestructure.OverviewandfeaturesofHTML 5
Style sheets : Need for CSS, introduction to CSS, basic syntax and structure, using CSS,backgroundimages,colorsandproperties,manipulatingtexts,usingfonts,bordersandboxes,margins,paddinglists, positioningusingCSS, CSS2, Overviewandfeatures ofCSS3

UNIT III- JAVESCRIPT &XML:-JavaScript : Client side scripting with JavaScript, variables,functions,conditions,loopsandrepetition,Popupboxes,AdvanceJavaScript:JavaScriptandobjects, JavaScriptownobjects, theDOM andweb browserenvironments, Manipulation usingDOM,formsandvalidations,DHTML:CombiningHTML,CSSandJavaScript,Eventsandbuttons

XML: Introduction to XML, uses of XML, simple XML, XML key components, DTD andSchemas,Using XMLwith application.TransformingXMLusingXSLandXSLT

UNIT IV- PHP:-PHP : Introduction and basic syntax of PHP, decision and looping with examples,PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files,Advance Features: Cookiesand Sessions,ObjectOriented ProgrammingwithPHP

UNIT V- MYSQL:-PHP and MySQL : Basic commands with PHP examples, Connection to server,creatingdatabase,selectingadatabase,listingdatabase,listingtablenames,creatingatable,inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin anddatabasebugs

References:-
1. DevelopingWebApplications,RalphMoseleyand M.T.Savaliya,Wiley-India
2. WebTechnologies,BlackBook,DreamtechPress
3. HTML5,BlackBook,DreamtechPress
4. WebDesign,JoelSklar,Cengage Learning
5. DevelopingWebApplicationsinPHPandAJAX,Harwani,McGrawHill
6. InternetandWorldWideWebHowtoprogram,P.J.Deitel&H.M.Deitel,Pearson

<div align="center">**Design andAnalysisofAlgorithms(MCA 313)**</div>

Course Outcomes
1. Argue the correctness of algorithms using inductive proofs and invariants.
2. Analyze worst-case running times of algorithms using asymptotic analysis.
3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.
5. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
6. Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.
7. Explain the different ways to analyze randomized algorithms (expected running time, probability of error). Recite algorithms that employ randomization. Explain the difference between a randomized algorithm and an algorithm with probabilistic inputs.

UNIT-I INTRODUCTION: Algorithms, Analyzing algorithms, Complexity of algorithms, Growthof functions, Performance measurements, Sorting and order Statistics - Shell sort, Quick sort, Mergesort,Heap sort, Comparison ofsortingalgorithms, Sortingin lineartime.

UNIT-IIADVANCEDDATASTRUCTURES:-Red-Blacktrees,B-trees,BinomialHeaps,FibonacciHeaps.

UNIT-IIIDIVIDEANDCONQUER,GREEDYMETHOD: Sorting,MatrixMultiplication,Convex hull and Searching. Greedy methods with examples such as Optimal Reliability Allocation,Knapsack, and Minimum Spanning trees-Prim's and Kruskal's algorithms, Single source shortestpaths– Dijkstra's andBellman Ford algorithms.

UNIT–IVDYNAMICPROGRAMMING,BACKTRACKINGANDBRANCHANDBOUND:
- Dynamic programming with examples such as Knapsack, All pair shortest paths – Warshall's andFloyd's algorithms, Resource allocation problem. Backtracking, Branch and Bound with examplessuch as Travelling Salesman Problem, Graph Colouring, n-Queen Problem, Hamiltonian Cycles andSum ofsubsets.

Unit -V Selected Topics: Algebraic Computation, Fast Fourier Transform, String Matching, TheoryofNP-completeness, Approximationalgorithms and Randomizedalgorithms.

References:-

1. ThomasH.Coreman,CharlesE.LeisersonandRonaldL.Rivest,"IntroductiontoAlgorithms",PrinticeHall ofIndia.
2. RCTLee,SSTseng,RCChangandYTTsai,"IntroductiontotheDesignandAnalysisofAlgorithms",McGrawHill , 2005.
3. E.Horowitz&SSahni,"FundamentalsofComputerAlgorithms",
4. Berman,Paul,"Algorithms",CengageLearning.
5. Aho,Hopcraft,Ullman,"TheDesignandAnalysisofComputerAlgorithms",PearsonEducation,2008.
6. JonKleinberg,EvaTardos,"AlgorithmDesign",PearsonEducation.

COMPUTERBASEDOPTIMIZATIONTECHNIQUES(MCA 314)

Course Outcomes
1. Formulate and solve problems as networks and graphs.
2. Develop linear programming (LP) models for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transport problems.
3. Solve the problems using special solution algorithms

UNIT I-PRELIMINARIES:-Inventory Models and Replacement problems: Inventory models –variouscosts-deterministicinventory models,Singleperiodinventory modelwithshortestcost,stochasticmodels,Applicationofinventorymodels,Economiclotsizes-pricebreaks,andReplacement problems-capital equipment-discounting costs-replacement in anticipation of failure-groupreplacement-stochasticnatureunderlyingthefailurephenomenon.

UNITII-LINEARPROGRAMMINGPROBLEMS(LPP):-DefinitionofLPP,Graphical
Solutions of Linear Programming Problems, Simplex Method, and Artificial Variable Method, TwoPhase Method, Charnes' Big-M Method, Sensitivity Analysis, Revised Simplex Method, Duality,DualSimplexMethod

UNIT III-INTEGER LINEAR PROGRAMMING PROBLEMS: - Integer Linear ProgrammingProblems, Mixed Integer Linear Programming Problems, Cutting Plane Method, Branch and BoundMethod,0-1integerlinearprogrammingproblem.TransportationProblems:IntroductiontoTransportation Model, Matrix Form of TP, Applications of TP Models, Basic Feasible Solution of aTP, Degeneracy in TP, Formation of Loops in TP, Solution Techniques of TP, Different Methods forObtainingInitialBasicFeasibleSolutionsviz.MatrixMinimaMethod,RowMinimaMethod,Column Minima Methods, Vogel's Approximation Method, Techniques for Obtaining Optimal BasicFeasibleSolution. AssignmentProblems: Definition, HungarianMethodforAP.

UNITIV-INTRODUCTIONTONLP:-
DefinitionofNLP,ConvexProgrammingProblems,QuadraticProgrammingProblems,Wolfe'sMethodforQuadraticProgramming,Kuhn-TuckerConditions, Geometrical Interpretation of KT-Conditions, KT-Points etc. Dynamic Programming:Bellman's Principle of optimality of Dynamic Programming, Multistage decision problem and itssolution by Dynamic Programming with finite number of stages, Solution of linear programmingproblemsas aDynamicProgrammingproblem

UNITV-QUEUINGTHEORY:-
IntroductiontoQueues,BasicElementsofQueuingModels,QueueDisciplines,MemorylessDistribution,RoleofExponentialandPoissonDistributions,MarkovianProcess,ErlangDistribution,SymbolsandNotations,DistributionOf Arrivals,DistributionofServiceTimes, DefinitionofSteadyand TransientState, PoissonQueues.

References:-
1. Hadley,G.,"LinearProgramming,andMassachusetts",Addison-Wesley
2. Taha,H.A,"OperationsResearch–An Introduction",Macmillian
3. Hiller,F.S.,G.J. Lieberman,"IntroductiontoOperationsResearch",Holden-Day
4. HarveyM.Wagner,"PrinciplesofOperationsRsearchwitheApplicationstoManagerialDecisions",PrenticeHallofIndiaPvt.Ltd.
5. SwarupKetal, "OperationResearch",S.Chand

CyberSecurity(MCA 315)

Course Outcome

1. Follow a structured model in Security Systems Development Life Cycle (SDLC)
2. Detect attack methodology and combat hackers from intrusion or other suspicious attempts at connection to gain unauthorized access to a computer and its resources
3. Protect data and respond to threats that occur over the Internet
4. Design and implement risk analysis, security policies, and damage assessment
5. Plan, implement and audit operating systems' security in a networked, multi-platform and cross platform environment
6. Provide contingency operations that include administrative planning process for incident response, disaster recovery, and business continuity planning within information security

UNITI

Introductiontoinformationsystems,TypesofinformationSystems,DevelopmentofInformation Systems, Introduction to information security, Need for Information security, Threats toInformationSystems,InformationAssurance,CyberSecurity,andSecurityRisk Analysis.

UNITII

Application security (Database, E-mail and Internet), Data Security Considerations-Backups,ArchivalStorageandDisposalofData,SecurityTechnology-FirewallandVPNs,IntrusionDetection,Access Control.

Security Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail viruses,Macro viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce-Electronic Payment System, e-Cash, Credit/Debit Cards. Digital Signature, public KeyCryptography.

UNITIII

DevelopingSecureInformationSystems,Application Development Security,InformationSecurity Governance & Risk Management, Security Architecture & Design SecurityIssues in Hardware, Data Storage& Downloadable Devices, Physical Security of IT Assets, AccessControl,CCTVand intrusion DetectionSystems,Backup SecurityMeasures.

UNITIV

SecurityPolicies,WhyPoliciesshouldbedeveloped,WWWpolicies,EmailSecuritypolicies,PolicyReview Process-Corporatepolicies-SampleSecurityPolicies,PublishingandNotificationRequirement ofthePolicies.

Information Security Standards-ISO,IT Act, Copyright Act, Patent Law, IPR. Cyber Laws inIndia;ITAct2000Provisions,IntellectualPropertyLaw:Copy RightLaw,SoftwareLicense,Semiconductor LawandPatentLaw.

References:-

1. CharlesP.Pfleeger,ShariLawerancePfleeger,"AnalysingComputerSecurity",PearsonEducationIndia.
2. V.K.Pachghare,"CryptographyandinformationSecurity",PHILearningPrivateLimited,DelhiIndia.
3. Dr.SuryaPrakashTripathi,Ritendra Goyal,PraveenkumarShukla ,"IntroductiontoInformationSecurityand CyberLaw"WilleyDreamtech Press.
4. Schou,Shoemaker,"InformationAssurancefortheEnterprise",TataMcGrawHill.
5. CHANDER,HARISH,"CyberLawsAndItProtection",PHILearningPrivateLimited,Delhi,India

AuditCourse-1
IntroductiontoProgrammingandComputerOrganization(MCA 316)

Course Outcomes

- To understand the structure, function and characteristics of computer systems.
- To understand the design of the various functional units and components of computers.
- Understand concepts of register transfer logic and arithmetic operations
- Explain different types of addressing modes and memory organization
- To identify the elements of modern instructions sets and their impact on processor design.
- To explain the function of each element of a memory hierarchy,
- Summarize the Instruction execution stages
- To presenting foundation concepts of programming and software code organization.
- Able to implement the algorithms and draw flowcharts for solving problems.
- Demonstrate an understanding of computer programming language concepts.

UNIT-I
NaturalNumbers:-WellOrderingPrinciple,PrincipleofMathematical Induction.
SetTheory:-OrderedSets,Relations,EquivalenceRelationsandPartitions,ModularArithmetic.
Functions:- Functions,Compositionof Functions,one-one,ontoandInverseofafunction

UNIT-II
Data representation: - signed and unsigned number representation, fixed and floating point representations.**BasicElectronics:-**
DigitalLogicBooleanalgebra.Combinationalandsequentialcircuits,GateMinimization.
ComputersFundamentals:-FunctionalUnits-
Processor,Memory,Input/output,RegisterOrganizedComputer,Buses-Organization,Hierarchical Bus,Types, Control,Timing, Width,Clock.

UNIT-III
CPUOrganization: Fundamentals,InstructionSetformats,modes,types,FixedandFloatingpointarithmetic.
ArchitectureConcepts:-InstructionsetarchitectureofaCPU-register,instructionexecutioncycle.
Pipelining: Basicconceptsofpipelining,throughputandspeedup,pipelinehazards.

UNIT-IV
Introductiontoprogramming:-Problemsolvingandexpressionofsolutionthroughflowchartandalgorithm.
Partsofaprogram:-
primitivedatatypes,variables,operatorsandtheirprecedence,expressions,input/output,conditionals and branching, loopingstatements.
StoredPrograms: Procedures,Functions,Storageclasses-scopeandlifetime,recursion.

References:-
1. DiscreteMathematicsandItsApplications:KennethH.Rosen
2. DigitalLogicandComputerDesign:M.MorrisMano
3. FundamentalsofProgrammingLanguages:DipaliP.Bavishankar,TechnicalPublications

<h1 style="text-align:center">OperatingSystemsLab(MCA 351)</h1>

Course Outcomes
1. To provide an understanding of the design aspects of operating system concepts through simulation
2. Simulation of CPU Scheduling Algorithms. (FCFS, RR, SJF, Priority, Multilevel Queuing)
3. Simulation of Page Replacement Algorithm

ToimplementCPUSchedulingAlgorithms

- FCFS
- SJF
- SRTF
- PRIORITY
- ROUNDROBIN

2. SimulateallPageReplacementAlgorithms

- FIFO
- LRU

3. SimulatePagingTechniqueofMemoryManagement

<h2 style="text-align:center">Design&AnalysisofAlgorithmsLab(MCA 352)</h2>
<p style="text-align:center">(UsingJavaandDot NetFramework)</p>

Course Outcomes

• Understand problems by applying appropriate algorithms.
• Analyze the efficiency of various algorithms.
• Apply techniques of stacks and queues to solve problems.
• Solve a program in many ways using different techniques.

1. ProgramforRecursiveBinary&LinearSearch.
2. ProgramforHeapSort.
3. ProgramforMergeSort.
4. ProgramforSelectionSort.
5. ProgramforInsertionSort.
6. ProgramforQuickSort.
7. StudyofNP-Completetheory.
8. Studyof Cook's theorem.
9. Studyof sortingnetwork.

<h2 style="text-align:center">MCA (IV)</h2>
<h2 style="text-align:center">DatabaseManagementSystems(MCA 411)</h2>

Course Outcome:

1. Defines the basics of the relational data model.
2. Lists the database design process steps.
3. Will be able to design and implement properly structured databases that match the standards based under realistic constraints and conditions.
4. Develops an Entity-Relationship model based on user requirements.

UNIT I–INTRODUCTION:-The Evolution of Database Systems- Overview of a Database ManagementSystem-Outline of Database-System Studies-The Entity- RELATIONSHIP DATA MODEL: Elements of theE/RModel-Design Principles-The Modellingof Constraints-WeakEntitySets

UNIT II - THE RELATIONAL DATA MODEL & ALGEBRA: - Basics of the Relational Model-FromE/R Diagrams to Relational Designs Converting Subclass Structures to Relations Functional Dependencies-Rules About Functional Dependencies-Design of Relational Database Schemas - Multivalued

Dependencies.RELATIONAL ALGEBRA: Relational Operations-Extended Operators of Relational Algebra-Constraints onRelations

UNITIII-SQL:-SimpleQueriesinSQL-Subqueries-Full-RelationOperations-DatabaseModifications-Defining a Relation Schema-View Definitions- Constraints and Triggers: Keys and Foreign Keys-Constraintson Attributes and Tuples Modification of Constraints-Schema-Level Constraints and Triggers -Java DatabaseConnectivity-SecurityandUserAuthorization in SQL

UNIT IV -INDEX STRUCTURE,QUERYPROCESSING:-IndexStructures:Indexeson SequentialFiles-Secondary Indexes-B-Trees-Hash Tables-Bitmap Indexes. QUERY EXECUTION: Physical-Query-PlanOperators-One-Pass,two-pass&indexbasedAlgorithms,BufferManagement,ParallelAlgorithms-EstimatingtheCost of Operations-Cost-Based PlanSelection-Order forJoins-Physical-QueryPlan

UNIT V - FAILURE RECOVERY AND CONCURRENCY CONTROL:-Issues and Models for ResilientOperation-Undo/Redo Logging-ProtectingagainstMedia Failures

CONCURRENCYCONTROL:SerialandSerializableSchedules-ConflictSerializability-EnforcingSerializability by Locks-Locking Systems with Several Lock Modes-Concurrency Control by Timestamps,validation.

TRANSACTIONMANAGEMENT: SerializabilityandRecoverability-ViewSerializability-ResolvingDeadlocks-DistributedDatabases:Commitand Lock

References:-
1. HectorGarcia-Molina, JeffUllman,and JenniferWidom,"DatabaseSystems:TheCompleteBook",Pearson Education,Second Edition,2008.
2. Silberschatz,H.KorthandSudarshanS.,"DatabaseSystemConcepts",6thEdition,McGraw-HillInternational,2010.
3. Elmasri R. and Shamakant B.Navathe, "Fundamentals of Database Systems", 6th Edition,AddisionWesley, 2011.

COMPUTERNETWORK(MCA 412)
Course Outcomes

1. Describe communication models TCP/IP, ISO-OSI model, network topologies along with communicating devices and connecting media.
2. Apply knowledge of error detection, correction and learn concepts of flow control along with error control.
3. Classify various IP addressing techniques, subnetting along with network routing protocols and algorithms.
4. Understand various transport layer protocols and their design considerations along with congestion control to maintain Quality of Service.
5. Understand applications-layer protocols and elementary standards of cryptography and network security.

UNITI-DATACOMMUNICATIONS:-
Data communication Components – Data representation and Data flow – Networks – Types of Connections – Topologies – Protocols and Standards – OSI model – Transmission Media – LAN –Wired LANs, WirelessLANs,ConnectingLANs,VirtualLANs.

UNITII–DATALINK LAYER:-
Error Detection and Error Correction – Introduction–Block coding–Hamming Distance – CRC–Flow Controland Error control – Stop and Wait – Go back – N ARQ – Selective Repeat ARQ – Sliding Window – Piggybacking– RandomAccess – CSMA/CD,CDMA/CA.

UNITIII–NETWORKLAYER:-
Switching–Logical addressing – IPV4 – IPV6–Address mapping–ARP, RARP, BOOTP and DHCP–Delivery,Forwardingand UnicastRoutingprotocols.

UNITIV–TRANSPORTLAYER:-
Process to Process Delivery – User Datagram Protocol – Transmission Control Protocol – SCTP – CongestionControl with Examples.

UNITV–APPLICATIONLAYER:-
DomainNameSpace–DDNS–TELNET–EMAIL–FiletransferWWW–HTTP–SNMP–Cryptography
–Basicconcepts.

References:-

1. BehrouzA.Forouzan,"DatacommunicationandNetworking",TataMcGraw–Hill,FourthEdition,2011.
2. LarryL.Peterson,PeterS.Davie,"ComputerNetworks",Elsevier,FifthEdition,2012.
3. WilliamStallings,"DataandComputer Communication", EighthEdition,PearsonEducation,2007.
4. JamesF.Kurose,KeithW.Ross,"ComputerNetworking:ATop–DownApproachFeaturingtheInternet",Pearson Education, 2005.

ArtificialIntelligence(MCA 413)

Course Outcomes :
1. Define the meaning of intelligence and study various intelligent agents.
2. Understand, analyze and apply AI searching algorithms in different problem domains.
3. Study and analyze various models for knowledge representation.
4. Understand the basic concepts of machine learning to analyze and implement widely used learning methods and algorithms.
5. Understand the concept of pattern
6. Classification and clustering techniques

Unit-I INTRODUCTION:-Introduction to Artificial Intelligence, Foundations and History of ArtificialIntelligence,ApplicationsofArtificialIntelligence,IntelligentAgents,StructureofIntelligentAgents.Computer vision, NaturalLanguage Possessing.

UNIT-II INTRODUCTION TO SEARCH:-Searching for solutions, Uniformed search strategies, Informedsearch strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games,Alpha -Beta pruning.

UNIT-III KNOWLEDGE REPRESENTATION &REASONING:-Propositional logic, Theory of firstorder logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning,Utilitytheory, Hidden MarkovModels (HMM),BayesianNetworks.

UNIT-IVMACHINELEARNING:-Supervisedandunsupervisedlearning,Decisiontrees,Statisticallearning models, Learning with complete data - Naive Bayesmodels, Learning with hidden data - EMalgorithm,Reinforcementlearning,

UNIT-VPATTERNRECOGNITION:-Introduction,Designprinciplesofpatternrecognitionsystem,Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) andLinear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbour (NN) Rule, BayesClassifier,SupportVectorMachine(SVM),K–means clustering.

References:-

1. StuartRussell,PeterNorvig,"ArtificialIntelligence–AModernApproach",PearsonEducation
2. ElaineRichandKevinKnight,"ArtificialIntelligence",McGraw-Hill
3. ECharniakandDMcDermott,"IntroductiontoArtificialIntelligence",PearsonEducation
4. DanW.Patterson,"Artificial IntelligenceandExpert Systems",PrenticeHallofIndia

CompilerDesign(MCA 414)

Course Outcomes:

1. Acquire knowledge of different phases and passes of the compiler and also able to use the compiler tools like LEX, YACC, etc.
2. Students will also be able to design different types of compiler tools to meet the requirements of the realistic constraints of compilers.
3. Understand the parser and its types, Top-Down and Bottom-up parsers and construction of LL, SLR, CLR, and LALR parsing table.
4. Implement the compiler using syntax-directed translation method and get knowledge about the synthesized and inherited attributes.
5. Acquire knowledge about run time data structure like symbol table organization and different techniques used in that.
6. Understand the target machine's run time environment, its instruction set for code generation and techniques used for code optimization

UNIT I - COMPILERS: GRAMMARS &AUTOMATA:-Languages – Grammars – Types of grammars – Context free grammar - regular expression - Recognizing of patterns - finite automation (deterministic & nondeterministic) Conversion of NDFA to DFA - Conversion of regular expression of NDFA – Thompson'sconstruction-minimizationofNDFA–Derivation -parse tree– ambiguity

UNITII-LEXICALANALYSIS:-Lexicalanalysis-handles-tokenspecification-designoflexicalanalysis (LEX) - Automatic generation of lexical analyzer - input buffering - A language for specifying lexicalanalyzers-implementationoflexicalanalyzer

UNIT III - SYNTAX ANALYSIS – PARSING:-Definition - role of parsers - top down parsing - bottom-upparsing - Left recursion - left factoring - Handle pruning , Shift reduce parsing - operator precedence parsing –FIRST-FOLLOW-LEADING-TRAILING-Predictiveparsing-recursivedescentparsing.LRparsing–LR (0) items - SLR parsing – Canonical LR - LALR parsing - generation of LALR - Ambiguous grammars - errorrecovery

UNITIV-SYNTAXDIRECTEDTRANSLATION:-IntermediateLanguages-prefix-postfix-Quadruple - triple - indirect triples – syntax tree- Evaluation of expression - three-address code- Synthesizedattributes – Inherited attributes – Conversion of Assignment statements- Boolean expressions –Backpatching -Declaration-CASEstatements.

UNITV-CODEOPTIMIZATION:-Localoptimization-LoopOptimizationtechniques–DAG–Dominators-Flowgraphs –Storage allocations-Peepholeoptimization – IssuesinCode Generation.

References:-

1. AlfredVAho,JefferyDUllman,RaviSethi,"Compilers,Principlestechniquesandtools",PearsonEducation2011
2. RaghavanV.,"Principlesof Compiler Design",TataMcGrawHill EducationPvt.Ltd.,2010.
3. DavidGalles,"ModernCompilerDesign",PearsonEducation,Reprint2012.
4. DasaradhRamaiah.K.,"IntroductiontoAutomataandCompiler Design",PHI, 2011

<p align="center">**RCA-E15MOBILECOMPUTING**</p>

Course Outcomes
1. Study and aware fundamentals of mobile computing.
2. Study and analyze wireless networking protocols, applications and environment.
3. Understand various data management issues in mobile computing.
4. Analyze different type of security issues in mobile computing environment.\
5. Study, analyze, and evaluate various routing protocols used in mobile computing

UNIT– I
Introduction,issuesinmobilecomputing,overviewofwirelesstelephony:cellularconcept,GSM:air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation incellularsystems, CDMA, GPRS.

UNIT-II
Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multipleaccess protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture,protocolstack, applicationenvironment, applications.

UNIT– III
Data management issues, data replication for mobile computers, adaptive clustering for mobile wirelessnetworks,Filesystem, Disconnected operations.

UNIT-IV
MobileAgentscomputing,securityandfaulttolerance,transactionprocessinginmobilecomputingenvironment.

UNIT– V
Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destinationsequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distancevectorrouting(AODV),Temporaryorderedroutingalgorithm(TORA),QoSinAdHocNetworks,applications.

References:-
1. J.Schiller,MobileCommunications,AddisonWesley.
2. A.Mehrotra,GSMSystemEngineering.
3. M.V.D.Heijden,M.Taylor,UnderstandingWAP,ArtechHouse.
4. CharlesPerkins,MobileIP,AddisonWesley.
5. CharlesPerkins,AdhocNetworks,AddisonWesley.

<p align="center">**AuditCourse-2**</p>
<p align="center">**RCA-A02FundamentalofDataStructure,NumericalandComputationalTheory**</p>

Course Outcomes
1. Apply the knowledge of data structure concepts and the various algorithms while designing and developing software and some hardware.
2. Analyze and prove the equivalence of languages and illustrate how to design finite state machines and convert regular expressions to FSA.

UNIT-I
Arrays:-Array Definition, Representation and Analysis, Single andMultidimensional Arrays, Searching:Sequential search, binary search, comparison and analysis, Sorting: Insertion Sort, Bubble sort, Quick Sort,TwoWayMerge Sort, Heap Sort.
Linked list:-Representation and Implementation of Singly Linked Lists, Two –way Header List, Traversingand Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists algorithm(Beginning,endand middle).

UNIT-II
BinarySearchTrees: BinarySearchTree(BST),InsertionandDeletioninBST,ComplexityofSearchAlgorithm.
CurvefittingandApproximation: Methodofleastsquares,fittingofstraightlines,polynomials,exponentialcurves.

Regressionanalysis: LinearandNon-linearregression,multipleregressions

UNIT-III
Time series Analysis and Hypothesis Testing:forecasting models and methods. Test of significance, Chi-squaretest, t-test,F-Test
Finite State Machines (FSM): Introduction, Deterministic (DFA), Nondeterministic (NFA). Conversions andEquivalence:EquivalencebetweenNFAwithandwithout transitions.NFAtoDFAconversion.Minimizationof FSM.

UNIT-IV
RegularExpression&RegularSet:Definition,Properties,PumpingLemma,andDecisionproblemforregularlanguage.
Grammar: Introduction, Definition, Differenttypes, Derivation Tree,Different
NormalForms,AmbiguousGrammar and itsimplications, Chomskyhierarchy.DifferentClassesofLanguages.
PushdownAutomata(PDA):Definition,PDAandCFL(Context-FreeLanguage),AcceptanceofStrings.
TuringMachine: Introduction,TuringMachineModel.

References:-

1. S.Lipschutz,"DataStructures",Mc-GrawHillInternationalEditions.
2. K.L.P.Mishra,N.Chandrasekaran,"TheoryofComputerScience",PHI.
3. RajendraKumar,"Theoryof Automata,LanguagesandComputation",Mc-GrawHill.
4. M.Goyal,"Computer-BasedNumerical&StatisticalTechniques",InfinitySciencePress.

MCA-451 Mini Project Lab

Course Outcomes
1. Learn to define objective and motivation of your mini - project Work in
2. reference of your Project Title.
3. Learn to explain Hardware and Software technologies used in your project work.
4. Learn to present and explain DFDs of Project (DFD-0, DFD-1, DFD-2 …).
5. Learn to present and explain ER Diagram of Project.
6. Learn to explain Front-End or User Interfaces (One by One) with Purpose and working.
7. Learn to explain Back-End or Database Tables used in your project.
8. Learn to explain Usability or Ultimate output of your project work.
9. Learn to explain Drawback or limitations of your project work.
10. Learn to explain how this work can be carried out in future for improvement.

RCA-452DatabaseManagementSystemsLab

Course Outcomes:
1.Students get practical knowledge on designing and creating relational database systems.
  2.Apply the basic concepts of Database Systems and Applications.
  3. Understand various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL
  4. Use the basics of SQL and construct queries using SQL in database creation and interaction.

Practical:
1. Installingoracle.
2. CreatingEntity-RelationshipDiagramusingcasetools.
3. WritingSQLstatements UsingORACLE/MYSQL:
   a) WritingbasicSQLSELECTstatements.
   b) Restrictingandsortingdata.
   c) Displayingdata frommultipletables.
   d) Aggregatingdatausinggroupfunction.
   e) Manipulatingdata.
   f) Creatingandmanagingtables.
4. NormalizationinORACLE.
5. Creatingcursorinoracle.
6. Creatingprocedure andfunctionsinoracle.
7. Creatingpackagesandtriggersinoracle.

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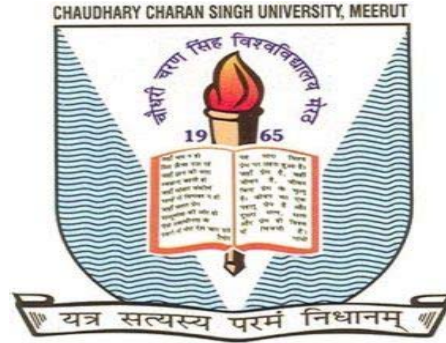
MasterofComputerApplications
ofThirdYear

(EffectivefromtheSession:2015-16)

MCA(Master of Computer Application)
(EffectivefromSession:2
015-16)
**YEARIII,
SEMESTER –V**

S. No.	COURS ECOD E	SUBJEC T	PERIODS			EVALUATIONSCHEME				
						SESSIONALEXAM			ESE	Subject Total
			L	T	P	CT	TA	Total		
1.	MCA-511	ComputerNetwork	3	1	0	30	20	50	100	150
2.	MCA-512	NetFramework&C#* (Elective-II)	3	1	0	30	20	50	100	150
3.	MCA-513	SoftwareEngineering	3	1	0	30	20	50	100	150
4.	MCA-514	SoftwareProjectManagement (Elective-III)	3	1	0	30	20	50	100	150
5.	MCA-515	InformationStorage&Management (Elective-IV)	3	1	0	30	20	50	100	150
PARCTICALS										
6.	MCA-551	DotNetFramework&C#Lab	0	0	3	30	20	50	50	100
7.	MCA-552	ProjectBasedOn SoftwareEngineering Lab	0	0	3	30	20	50	50	100
8.	GP-501	GeneralProficiency	0	0	0	-	-	50	-	50
		Total	**15**	**5**	**6**	**-**	**-**	**-**	**-**	**1000**

Year-III,SemesterVI

SNo	Subject Code	Subject	Period	EvaluationScheme				Total
				Sessional			Exam	
				CT	TA	Total		
1	MCA-611	Colloquium	0-0-2	-	200	200	-	200
2	MCA-612	Project	0-0-24	-	300	300	500	800

ListofElectivesforMCA

MCA-Elective-II

NMCAE21	NetworkSecurity&Cryptography
NMCAE22	NeuralNetwork
NMCAE23	PatternRecognition
NMCAE24	CloudComputing
NMCAE25*	ComputerNetwork
NMCAE26*	DotNetFramework&C#

MCA-Elective-III

NMCAE31	ImageProcessing
NMCAE32	Simulation&Modeling
NMCAE33	SoftwareProjectManagement
NMCAE34	RealTimeSystems

MCA-Elective-IV

NMCAE41	AdvancedDatabaseManagementSystems
NMCAE42	InformationStorage&Management
NMCAE43	SoftwareTesting
NMCAE44	BigData

Note:-*Tobeoptedbythestudentswhodidnotstudythesecoursesinearliersemesters.

Session :- 2017-2018

Department of Computer Application

Program Outcome for all program offered by the Institution:-

Program Outcome (PO) - MCA

- Apply knowledge of Computing fundamentals, Computing specialization, Mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.
- Identify, formulate, research literature, and solve complex Computing problems reaching substantiated conclusions using fundamental principles of Mathematics, Computing sciences, and relevant domain disciplines.
- Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
- Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
- Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
- Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.
- Recognize the need, and have the ability, to engage in independent learning for continual development as a Computing professional.
- Demonstrate knowledge and understanding of computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
- Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
- Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
- Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

Specific Programme Outcomes (SPO) - MCA
- To prepare graduates who will create systems through software development to solve problems in Industry domain areas.

- To Prepare Graduates who will contribute to societal growth through research in their chosen field.
- To prepare graduates who will perform both as an individual and in a team through good analytical, design and implementation skills.
- To prepare graduates who will be lifelong learners through continuous professional development.

MCA-511COMPUTERNETWORK

Course Outcomes
1. Describe communication models TCP/IP, ISO-OSI model, network topologies along with communicating devices and connecting media.
2. Apply knowledge of error detection, correction and learn concepts of flow control along with error control.
3. Classify various IP addressing techniques, subnetting along with network routing protocols and algorithms.
4. Understand various transport layer protocols and their design considerations along with congestion control to maintain Quality of Service.
5. Understand applications-layer protocols and elementary standards of cryptography and network security.

Unit-I

Introduction Concepts: Goals and Applications of Networks, Network structure and architecture,The OSI reference model, services, Network Topology Design - Delay Analysis, Back BoneDesign, Local Access Network Design, Physical Layer Transmission Media, Switching methods,ISDN, Terminal Handling.

Unit-II

Medium Access sub layer: Medium Access sub layer - Channel Allocations, LAN protocols -ALOHA protocols - Overview ofIEEEstandards -FDDI. Data LinkLayer -Elementary DataLinkProtocols,Sliding Window protocols, ErrorHandling.

Unit-III

NetworkLayer:NetworkLayer-Point-toPontNetworks,routing,CongestioncontrolInternetworking-TCP/IP,IP packet,IPaddress,IPv6.

Unit-IV

TransportLayer:TransportLayer-Designissues,connectionmanagement,sessionLayer-Designissues,remoteprocedurecall.PresentationLayer-Designissues,Datacompressiontechniques,cryptography-TCP -WindowManagement.

Unit-V

Application Layer: Application Layer: File Transfer, Access and Management, Electronic mail,VirtualTerminals,Otherapplication.ExampleNetworks-InternetandPublicNetworks.

TextBooks:
1. Forouzen,"DataCommunicationandNetworking",TMH
2. A.S.Tanenbaum,ComputerNetworks,PearsonEducation
3. W.Stallings,DataandComputerCommunication,MacmillanPress

References:
1. AnuranjanMisra,"ComputerNetworks",AcmeLearning
2. G.Shanmugarathinam,"EssentialofTCP/IP",FirewallMedia

MCA512:SoftwareEngineering

COURSE OUTCOME
1. Explain various software characteristics and analyze different software Development Models.
2. Demonstrate the contents of a SRS and apply basic software quality assurance practices to ensure that design, development meet or exceed applicable standards.
3. Compare and contrast various methods for software design.
4. Formulate testing strategy for software systems, employ techniques such as unit testing, Test driven development and functional testing.
5. Manage software development process independently as well as in teams and make use of various software management tools for development, maintenance and analysis.

Unit-I:Introduction

Introduction to Software Engineering, Software Components, Software Characteristics, SoftwareCrisis,SoftwareEngineeringProcesses,SimilarityandDifferencesfromConventionalEngineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC)Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models,Iterative Enhancement Models.

Unit-II:SoftwareRequirementSpecifications(SRS)

RequirementEngineeringProcess:Elicitation,Analysis,Documentation,ReviewandManagementofUserN eeds,FeasibilityStudy, InformationModeling, DataFlow Diagrams,EntityRelationshipDiagrams,DecisionTables,SRSDocument,IEEEStandardsforSRS.

Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software QualityFrameworks,ISO9000Models,SEI-CMM Model.

Unit-III:SoftwareDesign

Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization,Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, DesignStrategies:FunctionOrientedDesign,ObjectOrientedDesign,Top-DownandBottom-UpDesign.SoftwareMeasurementandMetrics:VariousSizeOrientedMeasures:Halestead'sSoftwareScien ce,FunctionPoint(FP)BasedMeasures,CyclomaticComplexityMeasures:ControlFlow Graphs.

Unit-IV:SoftwareTesting

Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing,TestingforFunctionalityandTestingforPerformance,Top-DownandBottom-UpTestingStrategies:TestDriversandTestStubs,StructuralTesting(WhiteBoxTesting),FunctionalTesting(BlackBoxTesting),TestDataSuitPreparation,AlphaandBetaTestingofProducts.

StaticTestingStrategies:FormalTechnicalReviews(PeerReviews),WalkThrough,CodeInspection,Compli ance withDesignand Coding Standards.

Unit-V:SoftwareMaintenanceandSoftwareProjectManagement

SoftwareasanEvolutionaryEntity,NeedforMaintenance,CategoriesofMaintenance:Preventive,Corrective andPerfectiveMaintenance,CostofMaintenance,SoftwareRe-Engineering,ReverseEngineering.SoftwareConfigurationManagementActivities,ChangeControl Process, Software Version Control, An Overview of CASE Tools. Estimation of VariousParameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO),ResourceAllocationModels,SoftwareRiskAnalysisandManagement.

References:
1. R.S.Pressman,SoftwareEngineering:APractitionersApproach,McGrawHill.
2. RajibMall,FundamentalsofSoftwareEngineering,PHIPublication.
3. K.K.AggarwalandYogeshSingh,SoftwareEngineering,NewAgeInternationalPublishers.

4. PankajJalote,SoftwareEngineering,Wiley
5. CarloGhezzi,M.Jarayeri,D.Manodrioli,FundamentalsofSoftwareEngineering,PHIPublication.
6. IanSommerville,SoftwareEngineering,AddisonWesley.

7. KassemSaleh,"SoftwareEngineering",CengageLearning.
8. Pfleeger,SoftwareEngineering,MacmillanPublication.

MCA513:DotNetFrameworkandC#

COURSE OUTOME:

1. Learn about MS.NET framework developed by Microsoft.
2. You will be able to using XML in C#.NET specifically ADO.NET and SQL server
3. Be able to understand use of C# basics, Objects and Types, Inheritance
4. Learn creating and implement Applications with C#.
5. Learn to develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services, web services.
6. Learn and be able to explain Security in the .NET framework and Deployment in the .NET.
7. Learn Assemblies and Deployment in .NET, Mobile Application Development.
8. Getting started with .net, data types & variables, using the .net framework , branching & flow control, Classes & objects, properties & methods, object oriented techniques etc.
9. Delegates & events, generics ,handling exceptions, collections classes

Unit-1
The.Netframework: Introduction,TheOriginof.NetTechnology,CommonLanguageRuntime(CLR),CommonTypeSystem(CTS),CommonLanguageSpecification(CLS),MicrosoftIntermediateLanguage(MSIL),Just-In–TimeCompilation,FrameworkBaseClasses.

Unit-II
C -Sharp Language (C#): Introduction, Data Types, Identifiers, Variables, Constants, Literals,Array and Strings, Object and Classes, Inheritance and Polymorphism, Operator Overloading,Interfaces, DelegatesandEvents.Typeconversion.

Unit-III
C#UsingLibraries: Namespace-System,Input-Output,Multi-Threading,Networkingandsockets,ManagingConsoleI/O Operations,WindowsForms, ErrorHandling.

Unit-IV
Advanced Features Using C#: Web Services, Window Services, Asp.net Web Form Controls,ADO.Net.DistributedApplicationinC#,UnsafeMode,GraphicalDeviceinterfacewithC#.

Unit-V
.NetAssembliesandAttribute:.NetAssembliesfeaturesandstructure,privateandshareassemblies, Built-Inattributeandcustom attribute.Introductionaboutgeneric.

References
1. Wiley,"BeginningVisualC#2008",Wrox
2. FergalGrimes,"Microsoft.NetforProgrammers".(SPI)
3. Balagurusamy,"ProgrammingwithC#",(TMH)
4. MarkMichaelis,"EssentialC#3.0:For.NETFramework3.5,2/e,PearsonEducation
5. ShibiParikkar,"C#with.NetFrameWork",FirewallMedia.

MCA-Elective-III

SoftwareProjectManagement
COURSE OUTCOME
1. Identify project planning objectives, along with various Course Outcomest/efforts models

2. Organize & schedule project activities to compute critical path for risk analysis
3. Monitor and control project activities
4. Formulate testing objectives and test plan to ensure good software quality under SEI- CMM

UNIT-I:IntroductionandSoftwareProjectPlanning

Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scopedocument,ProjectManagementCycle,SPMObjectives,ManagementSpectrum,SPMFramework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan,StructureofaSoftwareProjectManagementPlan,Softwareprojectestimation,Estimationmethods,Estimationmodels,Decisionprocess.

UNIT-II:ProjectOrganizationandScheduling

Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities andTasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule,Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques,NetworkDiagrams:PERT,CPM,BarCharts:MilestoneCharts,GanttCharts.

UNIT-III:ProjectMonitoringandControl

DimensionsofProjectMonitoring&Control,EarnedValueAnalysis,EarnedValueIndicators:BudgetedCost for WorkScheduled(BCWS),CostVariance(CV),ScheduleVariance(SV),CostPerformanceIndex(CPI),SchedulePerformanceIndex(SPI),InterpretationofEarned ValueIndicators,ErrorTracking,SoftwareReviews,TypesofReview:Inspections,Deskchecks, Walkthroughs,CodeReviews,PairProgramming.

UNIT-IV:SoftwareQualityAssuranceandTesting

TestingObjectives,TestingPrinciples,TestPlans,TestCases,TypesofTesting,LevelsofTesting,TestStrategies,ProgramCorrectness,ProgramVerification&validation,TestingAutomation&TestingTools,Conceptof SoftwareQuality,SoftwareQualityAttributes,SoftwareQualityMetricsandIndicators,TheSEICapabilityMaturityModelCMM),SQAActivities,FormalSQAApproaches:Proofofcorrectness,Statisticalqualityassurance,Cleanroomprocess.

UNIT-V:ProjectManagementandProjectManagementTools

SoftwareConfigurationManagement:SoftwareConfigurationItemsandtasks,Baselines,PlanforChange,ChangeControl,ChangeRequestsManagement,VersionControl,RiskManagement:Risksandrisktypes,RiskBreakdownStructure(RBS),RiskManagementProcess:Riskidentification,Riskanalysis,Riskplanning,Risk monitoring,CostBenefitAnalysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools,MS-Project.

References:

1. M.Cotterell,SoftwareProjectManagement,TataMcGraw-HillPublication.
2. Royce,SoftwareProjectManagement,PearsonEducation
3. KieronConway,SoftwareProjectManagement,DreamtechPress
4. S.A.Kelkar,SoftwareProjectManagement,PHIPublication.

NMCAE42:   InformationStorage&Management

COURSE OUTCOME
1. Learn storage networking technologies such as FC-SAN, IP-SAN, DAS, NAS, object-based, and unified storage.
2. Understand and articulate business continuity solutions – backup and replications, along with archive for managing fixed content
3. Explain key characteristics, services, deployment models, and infrastructure components of information storage infrastructure of classic and virtual infrastructure.
4. Describe information security requirements and solutions, and identify parameters for managing and monitoring storage infrastructure in classic, virtualized and cloud environments.
5. Explain physical and logical components of a storage infrastructure including storage subsystems, RAID and intelligent storage systems.

6. Learn managing & monitoring management of Industry standards (SNMP, SMI-S, CIM), Standard framework applications and Key management metrics thresholds, availability, capacity, security and performance.

Unit-I:IntroductiontoStorageTechnology

Data proliferation and the varying value of data with time & usage, Sources of data and statesof data creation, Data center requirements and evolution to accommodate storage needs,Overview of basic storage management skills and activities, The five pillars of technology,Overview of storage infrastructure components, Evolution of storage, Information LifecycleManagementconcept,Datacategorizationwithinanenterprise,StorageandRegulations.

Unit-II:StorageSystemsArchitecture

Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Componentarchitecture of intelligent disk subsystems, Disk physical structure components, properties,performance, and specifications, Logical partitioning of disks, RAID & parity algorithms, hotsparing, Physical vs. logical disk organization, protection, and back end management, Arraycaching properties and algorithms, Front end connectivity and queuing properties, Front endto host storage provisioning, mapping, and operation, Interaction of file systems with storage,Storagesystemconnectivity protocols.

Unit-III:Introduction toNetworkedStorage

JBOD, DAS, SAN, NAS, & CAS evolution, Direct Attached Storage (DAS) environments:elements,connectivity,&management,StorageAreaNetworks(SAN):elements&connectivity, Fibre Channel principles, standards, & network management principles, SANmanagement principles, Network Attached Storage (NAS): elements, connectivity options,connectivityprotocols(NFS,CIFS,ftp),&managementprinciples,IPSANelements,standards (SCSI, FCIP, FCP), connectivity principles, security, and management principles,ContentAddressableStorage(CAS):elements,connectivityoptions,standards,andmanagementprinci ples,HybridStoragesolutionsoverviewincludingtechnologieslikevirtualization& appliances.

Unit-IV:IntroductiontoInformationAvailability

Business Continuity and Disaster Recovery Basics, Local business continuitytechniques, emote business continuity techniques, Disaster Recovery principles &techniques.

Unit-V:Managing&Monitoring

Managementphilosophies(holisticvs.system&component),Industrymanagementstandards (SNMP, SMI-S, CIM), Standard framework applications, Key management metrics(thresholds, availability, capacity, security, performance), Metric analysis methodologies &trendanalysis,Reactiveandpro-activemanagementbestpractices,Provisioning&configuration change planning, Problem reporting, prioritization, and handling techniques,Managementtoolsoverview.

References

1.Information Storage and Management Storing, Managing, and Protecting DigitalInformation , by EMC, Hopkinton and Massachusetts, Wiley, **ISBN:**978812652147

MCA-551DotNetFramework&C#Lab

Course Outcome

At the end of this Lab course students will be able to:

1.Create user interactive web pages using ASP.Net.

2.Create simple data binding applications using ADO.Net connectivity.

3. Performing Database operations for Windows Form and web applications

1.ProgramsusingTCPSockets(likedateandtimeserver&client,echoserver&client,etc.)
2.ProgramsusingUDPSockets (likesimpleDNS)
3. ProgramsusingRawsockets(likepacketcapturingandfiltering)

4. ProgramsusingRPC
5. Simulationofslidingwindowprotocols

Colloquium (MCA-611)

Course Outcomes
1. Carry out a substantial research-based project
2. Demonstrate capacity to improve student achievement, engagement and retention
3. Demonstrate capacity to lead and manage change through collaboration with others
4. Demonstrate an understanding of the ethical issues associated with practitioner research
5. Analyze data and synthesize research findings
6. Report research findings in written and verbal forms
7. Use research findings to advance education theory and practice.
8. Learn how to create unique, plagiarism free content and how to Publish work.

IndustrialProject (MCA-612)
Course Outcomes

1. Learn to work in real practical software and industrial development environment where outer world find and access software services for their particular domain in various technologies.
2. Brush-up their knowledge complete in interested areas and software and web technologies.
3. Demonstrate a sound technical knowledge of their selected project topic.
4. Undertake problem identification, formulation and solution.
5. Design engineering solutions to complex problems utilising a systems approach.
6. Conduct an engineering project.
7. Communicate with engineers and the community at large in written an oral forms.
8. Demonstrate the knowledge, skills and attitudes of a professional engineer.
9. Learn to work in a team to accomplish the desired task in time bound and quality frame form.
10. Learn how to create report of project and presentation with professional required skill set.
11. Student learn Presentation Skills, Discussion Skills, Listening Skills, Argumentative Skills, Critical Thinking, Questioning, Interdisciplinary Inquiry, Engaging with Big Questions, Studying Major Works