GEETANJALI INSTITUTEOFTECHNICALSTUDIES

DEPARTMENT OFCOMPUTERAPPLICATION (MCA)

CURRICULUM

Geetanjali Institute of Technical Studies
Department of Computer Application
(MCA)

MCA Department

Vision

Aims to generate groomed, technically competent and skilled intellectual professionals to meet the current challenges of the modern computing industry.

Mission

The Department of Computer Applications (MCA) strives to provide quality and competency-based education Through necessary infrastructure and fine-tune the younger generation to encounter the challenges ahead with Courage.

MCA (Computer Application) - PROGRAMME OUTCOMES (POs)

A student will develop:

PO1: Computational Knowledge: Acquire in-depth computational knowledge and mathematics with an ability to abstract and conceptualize models from defined problems and requirements.

PO2: Problem Analysis: Identify, formulate, conduct literature survey and solve complex computing problems through analysis as well as provide optimal solutions.

PO3: Design / Development of Solutions: Design and evaluate solutions for complex problems, components or processes that meet specified needs after considering public health and safety, cultural, societal, and environmental factors.

PO4: Conduct investigations of complex Computing problems: Conduct literature survey to analysis and extract information relevant to unfamiliar problems and synthesize information to provide valid conclusions and interpret data by applying appropriate research methods, tools and design experiments.

PO5: Modern Tool Usage: Create, select, adapt and apply appropriate techniques, resources and modern IT tools to complex computing system activities, with an understanding of the limitations.

PO6: Professional Ethics: Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.

PO7: Life-long Learning: Engage in lifelong learning independently for continual development to improve knowledge and competence as a computing professional.

PO8: Project management and finance: Demonstrate knowledge and understanding of management principles and apply these to multidisciplinary software development as a team member and manage projects efficiently as a leader considering economical and financial factors.

PO9: Communication Efficacy: Understand and communicate effectively with the computing community and with society at large, regarding complex computing systems activities confidently and effectively by writing effective reports and design documentations by adhering to appropriate standards, make effective presentations and give / receive clear instructions.

PO10: Societal and Environmental Concern: Understand responsibilities and consequences based on societal, environmental, health, safety, legal and cultural issues within local and global contexts relevant to professional computing practices.

PO11: Individual and Team Work: Function effectively as an individual, as a member or leader in diverse teams in multidisciplinary environments.

PO12: Innovation and Entrepreneurship: Identify a timely opportunity for entrepreneurship and use innovation to pursue and create value addition for the betterment of the individual and society at large.

MCA (Computer Application) - Programme Educational Objectives (PEOs)

The MCA graduates will be able to
PEO 1: Practice software engineering principles and standards to develop software to meetcustomer requirements across verticals.

PEO 2: Contribute to build sustainable and inclusive applications using mathematical, simulation and meta- heuristic models

PEO 3: Demonstrate entrepreneurial qualities through individual competence and team work

PEO 4: Achieve successful professional career with integrity and societal commitments leading tolifelong learning

MCA (Computer Application) - PROGRAM SPECIFIC OUTCOMES (PSO's)

MCA graduates will be able to:

PSO1: Solve real world computing system problems of various industries by understanding and applying the principles of mathematics, computing techniques and business concepts

PSO2: Design, test, develop and maintain desktop, web, mobile and cross platform softwareapplications using modern tools and technologies

SCHEME
I Semester: MCA
Common to all branches of MCA

		MCAYear1-SemesterI						
Theory								
S.No.	**Course Code**	**Course Title**	**Hours**		**Marks**			**Credits**
			L	**P**	**IA**	**ETE**	**Total**	
1	MCA-101	MathematicalFoundationsinComputerScience	3		30	70	100	3
2	MCA-102	ObjectOrientedProgrammingwithC++	3		30	70	100	3
3	MCA-103	Operating System	3		30	70	100	3
4	MCA-104	Computer Architecture	3		30	70	100	3
5	MCA-105	Database Systems	3		30	70	100	3
6	MCA-106	Web Technologies	3		30	70	100	3

Practical								
1	MCA-151	ObjectOrientedProgrammingLab		2	30	70	100	01
2	MCA-152	SQL-PL/SQLLab		2	30	70	100	01
3	MCA-153	Web Technologies Lab		2	30	70	100	01
4		SODECA					100	02
			Total		**270**	**630**	**1000**	**23**

L=Lecture=Practical, **IA**=InternalAssessment,**ETE**=EndTermExam

MCA Year1-Semester II								
Theory								
S.No.	**Course Code**	**Course Title**	**Hours**		**Marks**			**Credits**
			L	**P**	**IA**	**ETE**	**Total**	
1	MCA-201	Java Technologies	3		30	70	100	3
2	MCA-202	Computer Networks	3		30	70	100	3
3	MCA-203	Data Structures	3		30	70	100	3
4	MCA-204	SoftwareEngineering&UML	3		30	70	100	3
5	MCA-205	PythonProgramming	3		30	70	100	3
6	MCA-206	Business Informatics	3		30	70	100	3
Practical								
1	MCA-251	DataStructuresLab		2	30	70	100	01
2	MCA-252	Java Technologies Lab		2	30	70	100	01
3	MCA-253	PythonProgrammingLab		2	30	70	100	01
4		SODECA					100	02
Total					270	630	1000	23

L=Lecture=Practical, **IA**=InternalAssessment,**ETE**=EndTermExam

III Semester: MCA
Commontoallbranchesof MCA

S.No.	Course Code	Course Title	Hours		Marks			Credits
III-Semester(Second Year)MCAYear2 -SemesterIII								
Theory								
			L	P	IA	ETE	Total	
1	MCA-301	Cloud Computing	3		30	70	100	3
2	MCA-302	AnalysisandDesignof Algorithm	3		30	70	100	3
3	MCA-303	Artificial Intelligence	3		30	70	100	3
4	MCA-304	Information Security	3		30	70	100	3
5	MCA-305	MobileApplicati onDevelopment	3		30	70	100	3
6	MCA-306	Elective1	3		30	70	100	3
Practical								
1	MCA-351	ADA Lab		2	30	70	100	01
2	MCA-352	Mobile ApplicationDev elopmentLab		2	30	70	100	01
3	MCA-353	Summer Industrial Training Presentation		2	30	70	100	01
4		SODECA					100	02
Total					270	630	1000	23

L=Lecture,**P**=Practical,**IA**=InternalAssessment,**ETE**=EndTermExam

IV Semester: MCA
Commontoallbranchesof MCA

S.No.	Course Code	Course Title	Hours		Marks			Credits
			L	P	IA	ETE	Total	
MCAYear2-SemesterIV								
Theory								
1	MCA-401	Software Project Management	3		30	70	100	3
2	MCA-402	Elective2	3		30	70	100	3
Practical								
3	MCA-451	Industrial Project		12	30	70	100	06
4		SODECA					100	02
Total			90	210			400	14

L=Lecture=Practical, **IA**=InternalAssessment,**ETE**=EndTermExam

List of Open Electives for Computer Science & Engineering			
Subject Code	Title	Subject Code	Title
Open Elective -I		**Open Elective -II**	
MCA-306	a) DataMiningand Warehousing b) BigDataTechnol ogies c) Soft Computing	MCA-402	a) Principles of Management and Information System b) Machine Learning c) Data Science with R

SYLLABUS
MCA-101:Mathematical Foundations in Computer Science

SN	Course Code	Course Outcomes
1	CO11101.1	Abletocalculaterankofmatrix,characteristicequation&characteristicroots&usetheapplicability of Cayley Hamilton Theorem to find inverse of matrix which is very important in manyengineeringapplication.
2	CO11101.2	Studentsunderstandvariousmethodstosolveordinarydifferential equationoffirst and Higher order. Which placeimportantrolein all branches of Engineering.
3	CO11101.3	Students understand various methods to solve ordinary differential equation of secondorderwithvariablecoefficientwhichisusefulforsolvingthepracticalproblemswhicharisein the industry.
4	CO11101.4	ToUnderstandtheconceptofPDE,includingformationandsolutionoflinearandnonlinear PDE. Further discussion about Lagrange's method, standard form and Charpitmethodto solve PDE.
5	CO11101.5	To understand the classification of second order PDE including the solution of one-dimensional wave and Hear equation by method of separation of variables with boundary condition.

Credit-1   **Max.Marks: 100 (IA: 30, ETE: 70)**
0L+0T+2P   **EndTermExam:2Hours**

SN	CONTENTS	Hours
1	**Matrices:** Introduction,RankofMatrix,Solving SystemofEquations,InverseofaMatrix,Set theory, Principle of inclusion and exclusion, partitions, Permutation andCombination,Relations,Propertiesofrelations,Matricesofrelations,Closure Operationsonrelations,Functions-injective,subjectiveandobjectivefunctions.	8
2	**Probability:** Probability Classical, relative frequency and axiomatic definitions of probability, addition rule and conditional probability, multiplication rule, total probability, Bayes' Theorem and independence problems. Introduction to Statistics-Population,Sample,Variable,DescriptiveStatistics-Mean,Mode,Median,MeasuresofSpread-Range, Interquartile Range, Variance, and Standard Deviation.	8
3	**Propositions&PropositionalCalculus:** Propositionsandlogicaloperators, Truthtable,Propositionsgeneratedbyaset, Equivalence and implication, Basic laws,Functionallycompletesetofconnectives,Normalforms,ProofsinPropositionalcalculus,Predicate calculus.	8
4	**Data Representation:** Data Representation-Floating point Arithmetic–Addition,Subtraction,MultiplicationandDivisionoperation.Pitfalloffloatingpointrepresentation,Errorsin numerical computation Iterative Methods, Measurement of Accuracy by using Absolute ErrorandRelativeError	8

5	**Graphs Trees:** Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths andCircuits,EulerianandHamiltonianGraphs,Multigraphs,PlanarGraphs,Euler's Formula,SpanningTrees	8
	TOTAL	**40**

Suggested Readings:

1. KennethH.Rosen DiscreteMathematicsandItsApplications TataMcGrawHill, 7thEdition,2017.
2. SeymourLipschutzMarcLarasLipson, VarshaH.Patil DiscreteMathematics(Schaum'sOutlines)(SIE)Revised3rd Edition,2017.
3. MurraySpiegelJohnSchiller R.AluSrinivasanDebasree Goswami ProbabilityandStatistics 3rd Edition,2017 Salaria,R.S ComputerOriented.

MCA-102: ObjectOrientedProgrammingwithC++

SN	Course Code	Course Outcomes
1	CO11102.1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
2	CO11102.2	Understand dynamic memory management techniques using pointers, constructors, destructors, etc.
3	CO11103.3	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
4	CO11104.4	Demonstrate the use of various OOPs concepts with the help of programs.
5	CO11105.5	To understand the classification File Handling.

Credit-1   **Max.Marks: 100 (IA: 30, ETE: 70)**
0L+0T+2P   **EndTermExam: 2Hours**

SN	CONTENTS	Hours
1	**OOP Paradigm:** CharacteristicsofOOP,ComparisonbetweenfunctionalprogrammingandOOP Approach, characteristicsofobjectorientedlanguage-objects, classes, inheritance, reusability, userdefineddatatypes, polymorphism, overloading.	8
2	**Introduction to C++:** Identifier and keywords, constants, C++ operators, type conversion, Variable declaration, statements, expressions, input and output, conditional expression loopstatements,breakcontrolstatements,Classes,memberfunctions,objects,arraysofclassobjects,pointersandclasses,nestedclasses, constructors,destructorsInline Member functions, static class member, friend functions, anddynamicmemoryallocation.	8
3	**PolymorphismandInheritance**: Function overloading, operator overloading, polymorphism, early binding,polymorphismwithpointers, virtual functions, late binding, purevirtualfunctions.Singleinheritance,typesofinheritance,typesofbaseclasses,typesofderivations, Multiple inheritances, container classes, memberaccesscontrol.	8
4	**ExceptionsandTemplates**: ExceptionSyntax,MultipleExceptions,FunctionTemplates,FunctionTemplateswithmultipleargumenttemplates	8

5	**File Handling in C++:** C++Streams, ConsoleStreamClasses,FormattedAndUnformattedConsoleI/OOperations,manipulators, FileStreams, ClassesFileModes, FilePointersand ManipulationsFileI/O	8
	TOTAL	**40**

Suggested Readings:

1. K.R.Venugopal, RajKumarBuyya, "Mastering++",McGraw-Hill, 2017.
2. RajaramR,ObjectOrientedProgrammingandC++",2ndEdition,NewAgeInternational,2013.
3. EBalagurusamy,"ObjectOrientedProgrammingwithC++",TataMcGrawHill, 2006
4. Yahwant Kanetkar,"C++Programming",BPBPublication

MCA-103: Operating System

SN	Course Code	Course Outcomes
1	CO11103.1	Understand the basics of operating systems like kernel, shell, types and views of operating systems.
2	CO11103.2	Describe the various CPU scheduling algorithms and remove deadlocks.
3	CO11103.3	Explain various memory management techniques and concept of thrashing.
4	CO11103.4	Use disk management and disk scheduling algorithms for better utilization of external memory.
5	CO11103.5	Explain the various features of distributed OS like Unix, Linux, windows etc.

Credit-1   **Max.Marks: 100 (IA: 30, ETE: 70)**

0L+0T+2P   **EndTermExam:2Hours**

SN	CONTENTS	Hours
1	**Introduction:** Definition and types of operating systems, Batch Systems, multi programming, timesharing, parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls, system programs, system boot. Process Management : Process concept, Process scheduling, Cooperatingprocess,Threads,Interposescommunication,CPUschedulingcriteria,Schedulingalgorithms,Multiple-processorscheduling and Algorithm evaluation	8
2	**Process Synchronization and Deadlocks**: The Critical-Section problem, synchronization hardware, Semaphores , Classical problem of synchronization, Critical regions, Monitors, Deadlock-system model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock,Combinedapproachtodeadlockhandling. **StorageManagement**:MemoryManagement–LogicalandPhysicalAddressSpace, Swapping, Contiguous Allocation, Paging, Segmentation with paging,VirtualMemory,Demandpaginganditsperformance,Pagereplacement Algorithms, Allocationofframes, Thrashing, PageSizeandotherconsiderations.	8
3	**IntroductiontoconceptofOpenSourceSoftware:** IntroductiontoLinux, EvolutionofLinux, Linux's. UNIX,DifferentDistributionsof Linux, Installing Linux, Linux Architecture, Linux file system (inode, Superblock, Mounting and Unmounting), Essential Linux Commands (Internal andExternalCommands),Kernel,ProcessManagementinLinux,SignalHandling, System call, Systemcallfor Files,ProcessesandSignals.	8
4	**Shell Programming:** Shell Programming – Introduction to Shell, Various Shell of Linux, Shell Commands, I/O Redirection and Piping, Vi and Emacs editor, Shell control statements, Variables, if-then-else, case-switch, While, Until, Find, ShellMetacharacters,ShellScripts,Shellkeywords,TipsandTraps,BuiltinCommands,Handling documents, C language programming, Prototyping, Coding,	8

	Compiling,TestingandDebugging,Filters	
5	**Linux System Administrations:** File listings, Ownership and Access Permissions, File and Directory types, Managing Files, User and its Home Directory, Booting and Shutting down (Boot Loaders, LILO, GRUB, Bootstrapping, init Process, System services)	**8**
	TOTAL	**40**

SuggestedReadings:

1. SilberschatzandGalvin,"OperatingSystemConcepts",10thedition,WileyIndia,2018.
2. AndrewS. Tanenbaum,AlbertS.Woodhull, "OperatingSystemsDesign&implementation",3rd Edition,PearsonEducation,2006.
3. UNIX:ConceptsandApplications, SumitabhaD as,McGraw-Hill,4thEdition, 2008.

MCA - 104: Computer Architecture

SN	Course Code	Course Outcomes
1	CO1104.1	Explain the organization of basic computer, its design and the design of control unit.
2	CO11104.2	Demonstrate the working of central processing unit and RISC and CISC Architecture
3	CO11104.3	Describe the operations and language f the register transfer, micro operations and input- output organization.
4	CO11104.4	Understand the organization of memory and memory management hardware.
5	CO11104.5	Elaborate advanced concepts of computer architecture, Parallel Processing, interprocessor communication and synchronization.

Credit-1   **Max.Marks: 100 (IA: 30, ETE: 70)**

0L+0T+2P   EndTermExam: 2Hours

SN	CONTENTS	Hours
1	**BasicBuildingBlocks**:Gates,BooleanFunctionsandExpressionsDesigningGateNetworks, K-map simplification, Useful Combinational Parts, Programmable Combinational Parts, Timing and Control, Latches, Flip-flops, Registers andCounters,SequentialCircuits. **Arithmetic/Logic Unit**: Numbers Representation, Arithmetic Operations, Floating-Point Arithmetic.	8
2	**Register Transfer Language and Micro-operations**: Concept of bus, data movement among registers, and a language to represent conditional data transfer, datamovement from/ to memory. Design of Arithmetic & Logic Unit and Control UnitControl design hardwired control, micro programmed arithmetic and logical operations along with register transfer, timing in register.	8
3	**Instruction and Addressing**: A simple computer organization and instruction set, instruction formats, addressing modes, instruction cycle, instruction execution in terms of microinstructions, interrupt cycle, concepts of interrupt and simple 1/O organization, Synchronous & Asynchronous data transfer, Data Transfer Mode: Program Controlled, Interrupt driven, DMA (Direct Memory Access). Implementation of processor using the building blocks..	8
4	**Memory System Design**: Memory Origination, Memory Hierarchy, Main Memory (RAM/ROM chips), Auxiliary memory, Associative memory, CacheMemory, Virtual Memory. Assembly Language Programs, Assembler Directives, Pseudo Instructions, Macroinstructions, Linking and Loading.	8
5	**Vector and Array Processing**: Shared-Memory, Multiprocessing, DistributedMufti Computing. **Microprocessor Concepts**: Pin Diagram of 8085, Architecture of 8085,Addressing Mode of 8085, functional block diagram of 8085 assembly language, instruction set of 8085.	8
	TOTAL	**40**

SuggestedReadings:

1. M.MorrisMano"ComputerSystemArchitecture"PrenticeHall,2017

2. DavidA.PattersonandJohnL.Hennessy,ComputerOrganizationandDesign:TheHardware/SoftwareInterface, FifthEdition,MorganKaufmann/Elsevier,2014.
3. CarlHamacher, ZvonkoVranesic, Safwat ZakyandNaraigManjikian, ComputerOrganizationandEmbeddedSystems,SixthEdition,Tata McGrawHill,2012.

105: Database Systems

SN	Course Code	Course Outcomes
1	CO11105.1	Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
2	CO11105.2	Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing.
3	CO11105.3	Learn and apply Structured query language (SQL) for database definition and database manipulation.
4	CO11105.4	Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
5	CO11105.5	Understand various transaction processing, concurrency control mechanisms and database protection mechanisms.

Credit-1   **Max.Marks: 100 (IA: 30, ETE: 70)**

0L+0T+2P   EndTermExam: 2Hours

SN	CONTENTS	Hours
1	**Introduction** OverviewofDBMS,DatabaseSystemv/sFileSystem,ArchitectureofDBMS,Datamodels, Entity Relationship Diagram, Types of Keys, Integrity Rules, DataDictionary,Normalization(1NF,2 NF,3NF,BCNF,4NF,5NF),inclusiondependencies,losslessjoindecompositions,Codd'sRules	8
2	**Transaction Management** Transactions:Concepts,ACIDProperties,StatesOfTransaction,Serializaibility,Conflict& ViewSerializableSchedule,Checkpoints,DeadlockHandling	8
3	**DatabaseQuerying&ConcurrencyControl** RelationalAlgebra,SetOperations, Relational Calculus, StepsInQueryProcessing,Algorithms For Selection, Sorting And Join Operations, Understanding Cost Issues In Queries, Query Optimization, Transformation Of Relational Expressions, QueryEvaluationPlans ConcurrencyControl:LocksBasedProtocols,TimeStampBasedProtocols,ValidationBasedProtocol, MultipleGranularity,Multi-versionSchemes	8
4	**RecoverySystem&Security** FailureClassifications,Recovery&Atomicity,LogBaseRecovery,RecoverywithConcurrent Transactions, Shadow Paging, Failure with Loss of Non-VolatileStorage,RecoveryFromCatastrophicFailure,IntroductiontoSecurity&Authorization,Introductiontoemerging Databases-OODBMS,ORDBMS, Distributed database, Multimedia database, Special database-limitations ofconventionaldatabases,advantagesofemergingdatabases.	8
5	**SQL and PL/SQL** Introduction to SQL: CharacteristicsofSQL,AdvantagesofSQL,SQLdatatypesand literals, Types of SQL commands, SQL operators, Tables, views and indexes,Constraints,Group Byand Having Clause,OrderByClause,Queriesand sub	8

queries, Functions, PL/SQL basics, blocks, architecture, variables, constants, attributes, character set,PL/SQLcontrolstructure,datatypes, conditional and sequentialcontrolstatements,cursors,exceptions,triggers,functions,procedures and packages..			
		TOTAL	**40**

Suggested Readings:

1. ThomasConnolly,CarolyanBegg,,"DatabaseSystems,:APracticalApproachtoDesign,ImplementationandManagement,AddisonWesley,2014
2. SimonAR,"StrategicDatabaseTechnology:Management fortheyear2000",MorganKaufmann,1995
3. GrayJandReuterA, "TransactionProcessing:ConceptsandTechniques", MorganKaufmann,1993.
4. S.K.Singh,"DatabaseSystem:Concept ,DesignandApplication"PEARSON,2006
5. RaghuRamkrishnan,JohannesGehrke,"DatabaseManagementSystems",McGrawHillInternational, 2007
6. C.J.Date,Longman,"AnIntroductiontoDatabaseSystem",PearsonEducation,2003

MCA-106: Web Technologies

SN	Course Code	Course Outcomes
1	CO11106.1	Explain the history of the internet and related internet concepts that are vital in understanding web development
2	CO11106.2	Discuss the insights of internet programming and implement complete application over the web.
3	CO11107.3	Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet.
4	CO11106.4	Utilize the concepts of JavaScript and Java
5	CO11106.5	Use web application development software tools i.e. Ajax, PHP and XML etc. and identify the environments currently available on the market to design web sites.

Credit-1   **Max.Marks: 100 (IA: 30, ETE: 70)**
0L+0T+2P   EndTermExam:2Hours

SN	CONTENTS	Hours
1	**IntroductiontoHTML** Theinternet:historyoftheWorldWideWeb, hardwareandsoftwaretrend,objecttechnology–javascript object,scriptingfortheweb-browserportability. Introduction of HTML: introduction, markup language, editing HTML : commontags,headers,textstyles,linking,images,formattingtext,horizontalrulesand moreline breaks, unordered lists, nested and ordered lists, basic HTML tables :intermediate HTML tables and formatting : basic HTML forms, more complexHTML forms,HTML5:InputTypes&Attributes,internallinking,creatingandusing image maps	8
2	**JavaScript** Introduction to scripting: introduction- memory concepts- arithmetic- decision-making. Java script control structures, Java script functions: introduction – program Units in java script - function definitions, duration of identifiers, scope rules,recursion,java scriptglobalfunctions. JavaScript arrays: introduction,array-declaringandallocatingarrays,references Andreferenceparameters–passingarraystofunctions,multiplesubscriptedarrays.Javascriptobjects:introduction,math, string, and date,Booleanandnumberobjects.	8
3	**Dynamic HTML** CSS: introduction – inline styles, creating style sheets with the style element,conflictingstyles, linkingexternalstylesheets,positioningelements,backgrounds,element dimensions,textflowandtheCSSboxmodel,userstylesheets,FilterandTransitions,HTMLDOM,BrowserBOM Event model:introduction,eventONCLICK,event ONLOAD–errorhandlingwithONERROR,trackingthemouse withevent,more DHTMLevents.	8

4	**IntroductiontoPHP&WebServerArchitecture** Overview of PHP Capabilities, PHP HTML embedding tags & syntax, Simple script examples,PHP & HTTP Environment variables. PHP Language Core-Variables,Constants,DataTypes,PHP:Operators,FlowControl&Loops,Arrays,String, FunctionsInclude&requirestatements,SimpleFile&DirectoryAccess Operations,	**8**
5	Error handling, Processing HTML form using GET, POST, REQUEST, SESSION,COOKIEvariables,SendingE-mail,DatabaseOperationswithPHP,ConnectingtoMy-SQL (or any other database), Selecting a db., building & Sending Query,retrieving,updating&insertingdata,CMS:WordPress. Note:XAMMPisusedforPHP	**8**
	TOTAL	**40**

Suggested Readings:

1. JenniferRobbins,"LearningWebDesign:ABeginner'sGuidetoHTML,CSS,JavaScript,andWebgraphics",orally,2018
2. AdrianW.West,"PracticalWeb DesignforAbsoluteBeginners",2016
3. HarveyM.Dietel, PaulDietel& TemR. Nieto,", Internet& WorldWideWebHowtoProgram",Pearson, 2011
4. IvanBayross."Web enabledcommercialapplicationdevelopment usingHTML,DHTML,JavaScript, PERL-CGI",BPBPublications,2010.

Object Orientated Programming Lab

Credit: 01

Max. Marks: 100 (IA:30, ETE: 70)
End Term Exam: 3 Hour

SN	Course Code	Course Outcomes
1	CO11151.1	To implement concepts of linear data structures like Stack and Queue.
2	CO11151.2	To implement various Sorting and Searching Techniques.
3	CO11151.3	To learn programming solve problems using both arrays and pointers
4	CO11151.4	To implement concepts of non-linear data structures
5	CO11151.5	To implement concept of linked list.

Sr. No.	Experiment Name	CO Mapped
1.	Students will understand Develop solutions CommandsofLinux.	CO11151.1
2.	Students will understand the Shell Programming	CO11151.1
3.	Students will Understand Accessing help options, File names and Wild Card, Types of Files, Directory Hierarchy,Operations.	CO11151.3
4.	Students will Understand introduction of vi and gedit Editor, File Permissions and Simple Filter Commands.	CO11151.1
5.	Students will Understand control statements:-Programs on if-else ladder, iterative statements, Functions and recursions,predefined functions.	CO11151.4
6.	Students will Understand Objects, Functions and Constructor, Programs on classes and objects constructors, functions,inline functions, Friend function.	CO11151.4
7.	Students will Understand Polymorphism:-Programs on Function Overloading, overriding, Operator overloading,programs on different type of inheritances, virtual function	CO11151.4
8.	Students will Understand Exception Handling and File Handling: - Programs on input/output Streams, ExceptionHandling, File Handling, and Template Classes.	CO11151.1

SQL-PL/SQLLab

Credit: 01   **Max. Marks: 100 (IA:30, ETE: 70)**
                                                         End Term Exam: 3 Hour

SN	Course Code	Course Outcomes
1	CO11152.1	To implement concepts of SQLdatatypes, Operators, Literals, Constraints.
2	CO11152.2	To implement theroleofPL/SQLBlock Structure.
3	CO11152.3	To learn programming Conditional Statements
4	CO11152.4	To implement concepts of Iterations
5	CO11152.5	To implement concept DatabaseProgrammingwithRecordVariables.

Sr. No.	Experiment Name	CO Mapped
1.	Students will understand SQLdatatypes, Operators, Literals, Constraints	CO11152.1
2.	Students will understand SQLdatatypes, Operators, Literals, Constraints	CO11152.1
3.	Students will understand AssignmentonQueries:Select/From/Where/Group By/HavingClause/Order By Clause/SQLOperators/Joins/Built-in Functions	CO11152.3
4.	Students will understand PL/SQLBlock Structure	CO11152.1
5.	Students will understand Conditional Statements	CO11152.4
6.	Students will understand Iterations:SimpleLoops,ForLoop,WhileLoop,Nested Loops	CO11152.4
7.	Students will understand Exception Handling	CO11152.4
8.	Students will understand DatabaseProgrammingwithRecordVariables	CO11152.4

Web Technologies Lab

Credit: 01   **Max. Marks: 100 (IA:30, ETE: 70)**
                                                      End Term Exam: 3 Hour

SN	Course Code	Course Outcomes
1	**CO11153.1**	To implement concepts of SQLdatatypes, Operators, Literals, and Constraints.
2	**CO11153.2**	To implement theroleofPL/SQLBlock Structure.
3	**CO11153.3**	To learn programming Conditional Statements
4	**CO11153.4**	To implement concepts of Iterations
5	**CO11153.5**	To implement concept DatabaseProgrammingwithRecordVariables.

Sr. No.	Experiment Name	CO Mapped
1.	Students will understand Elements & Attributes, HTML Formatting tags, Links.	**CO11153.1**
2.	Students will understand CSS Syntax, CSS Attribute Selectors.	**CO11153.1**
3.	Students will understand CSS Box Model, Display, Opacity, Float, and Clear.	**CO11153.3**
4.	Students will understand Numbers and Number Methods, Math, JavaScript Dates: Formats and Methods.	**CO11153.1**
5.	Students will understand JavaScript Events, JavaScript, JavaScript Forms (API and Validation), Objects.	**CO11153.4**
6.	Students will understand Iterations: Simple Loops, For Loop, While Loop, Nested Loops.	**CO11153.4**
7.	Students will understand Variables, Data Types, Constants, Operators, and Programming Loops.	**CO11153.4**
8.	Students will understand PHP Form Handling, Require & Include PHP with MySQL.	**CO11153.4**

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SYLLABUS
MCA-201: Java Technologies

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Credit: 03   **Max. Marks: 100 (IA:30, ETE:70)**
                                                                 End Term Exam: 3 Hours

SN	Course Code	Course Outcomes
1	CO12201.1	Understand the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading for developing reusable software components.
2	CO12201.2	knowledge to design and develop dynamic, database-driven application using J2EE and Servlet
3	CO12201.3	Students will learn how to connect to any JDBC-compliant database, and perform hands on practice with a database to create database-driven connectivity.
4	CO12201.4	Ability to create dynamic and interactive web sites and interaction with client and server using JSP
5	CO12201.5	Understand the concept of MVC as well as advance java practices

SN	CONTENTS	Hours
1	**Introduction to Java** OOP in Java, Characteristics of Java, Fundamental Programming Structures in Java, Abstract Class, Interfaces, Defining Methods, Inheritance, Overloading, Overriding, Packages, Exception Handling, Threads, Thread Life-Cycle	**08**
2	**J2EE Overview** Need of J2EE, J2EE Architecture, J2EE APIs, J2EE Containers. Web Application Basics, Architecture and Challenges of Web Application, Servlet Life Cycle, Developing and Deploying Servlets, Exploring Deployment Descriptor (web.xml), Handling Request and Response, Initializing a Servlet. Servlet Chaining, Session Tracking and Management	**08**
3	**JDBC** The JDBC Connectivity Model, Types of JDBC Drivers., Basic steps to JDBC, setting up a connection to database, Creating and executing SQL statements, Result Set and Result Set Metadata Object, Accessing Database.	**08**
4	**Java Server Pages** Basic JSP Architecture, Life Cycle of JSP, JSP Tags & Expressions, JSP Implicit Objects, JSP Directives, Tag Libraries ,Using JDBC with JSP , Accessing a Database, Adding a Form, Updating the Database.	**08**
5	**Introduction to Spring** Overview of Spring Framework- Inversion of Control / Dependency Injection Concepts, Aspect Oriented Programming - concept ,Spring MVC Architecture , Bean Factory and Application Context, Attaching and Populating beans, Injecting data through setters and constructors , Listening on events, Publishing events, Spring MVC Layering, Dispatcher Servlet, Writing a Controller, DAO, Models, Services, Spring Configuration File, Error handling Strategy.	**08**
TOTAL		**40**

Suggested Readings:
1. BruceEckel,"ThinkinginJava", 4th Edition, PrenticeHall,2006.
2. CayS.Horstmann, "CoreJava,VolumeI:Fundamentals",9th Edition,PearsonEducation,2014.
3. Santosh KumarK,"JDBC,Servlet,andJSP:Black Book",KogentSolutionsInc.,2008.
4. MadhusudhanKonda,"JustSpring",1stedition,O"Reilly,2011.
5. E.Balagurusamy,"ProgrammingwithJava:APrimer",TataMcGraw-Hill,2010

MCA-202: Computer Networks

Credit: 03

Max. Marks: 100 (IA:30, ETE:70)
End Term Exam: 3 Hours

SN	Course Code	Course Outcomes
1	CO12202.1	Build an understanding of the fundamental concepts of computer Networking.
2	CO12202.2	Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3	CO12202.3	Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking
4	CO12202.4	Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks
5	CO12202.5	Students will Able to learn design to local network with full security.

SN	CONTENTS	Hours
1	**Networking Fundamentals** Introduction, Data & Information, Data Communication-Characteristics of Data Communication, Components of Data Communication, Data Representation, Data Flow- Simplex, Half Duplex, Full Duplex, Computer Network- Categories of a network, Protocol- Elements of a Protocol, Networking Standards, Reference Models- OSI Model, TCP/IP Model, Comparison of OSI and TCP/IP Model	**08**
2	**The Physical Layer** Transmission Media- Guided & Unguided, PSTN: Structure of the Telephone System, Data & Signals Data types, Signal types- Analog & Digital, Modulation Techniques, Modem, Cable Modem, Protocols: DSL, ISDN. **The Data Link Layer Design Issues** Framing, Error Control-Error Detection and Correction, Flow Control, Protocols: FDDI, CDDI, Frame Relay, ATM, 802.11, PPP, HDLC.	**08**
3	**The Medium Access Sub-Layer** Multiple Access Protocols: ALOHA, CSMA, Ethernet: Switched Ethernet, Fast Ethernet, Gigabit Ethernet, DLL Switching: Internetworking, Repeaters, Hubs, Bridges, Switches, Routers, Gateways, Virtual LANs.	**08**
4	**The Network Layer** Design Issues, Routing Algorithms: Link State Routing, Distance Vector Routing, Flooding, Routing Protocols: RIP, IGRP, EIGRP, OSPF, Internetworking: Tunneling, Fragmentation, IPV4, IPV6 Basics, BGP. The Transport Layer Protocols: UDP, TCP, Headers	**08**
5	**The Application Layer** DNS: The DNS Name Space, Name Servers-Mail: SMTP, POP3, HTTP, FTP, Telnet, Network Management: SNMP. **Network Security** Cryptography: Encryption, Decryption, Private/Public Key, Digital Signatures, SSL, Firewalls, PGP, S/MIME.	**08**
TOTAL		**40**

Suggested Readings:

1. Andrew S.Tanenbaum, "Computer Networks ", Prentice Hall, 5thEdition (Paperback) January 2013

2. Douglas E.Comer& M. S. Narayana, "Computer Networks and Internets with Internet Applications", Pearson Education, 4th Edition, 2009.

3. Fred Halsall, "Data Communications, Computer Networks and Open Systems", Addison Wesley, 4th Edition, 2001.

MCA-203: Data Structures

Credit: 03   **Max. Marks: 100 (IA:30, ETE:70)**
                                                   End Term Exam: 3 Hours

SN	Course Code	Course Outcomes
1	CO12203.1	To impart the basic concepts of data structures and algorithms.
2	CO12203.2	To Understand basic concepts about Queues & Linked List
3	CO12203.3	To Understand basic concepts about tree & its techniques.
4	CO12203.4	To understand concepts about searching and sorting techniques.
5	CO12203.5	To Understand basic concepts about graphs & its techniques.

SN	CONTENTS	Hours
1	**Introduction** Basic data structures such as arrays, linked list, stack, trees and queues and their applications, linked and sequential representation Basic Terminology, Elementary Data organization, Data Structure operations. Preliminaries of algorithm, Algorithm analysis and complexity. **Stack** Implementation of stack, operations on stack. Applications of stack: Conversion of infix-expressions to prefix and postfix expressions, evaluation of postfix expression.	**08**
2	**Queues** Implementation of queues, Operations on Queue, Types of Queues - Circular queue, Dequeue and Priority Queue. **Linked List** Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, insertion and deletion to/from Linked Lists, insertion and deletion Algorithms, Doubly linked list, Header lists, circular lists, sorted lists.	**08**
3	**Trees** Basic terminology and definitions. Array and Linked Representation of Binary trees, Traversing Binary trees. Binary Search Trees: Binary Search Tree (BST), Traversal, Insertion and Deletion in BST, and Introduction to balanced BST (AVL Trees)	**08**
4	**Searching:** Sequential search, binary search, comparison and analysis. **Sorting** Insertion Sort, Bubble Sort, Quick Sort, Two-Way-Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for internal Sorting.	**08**
5	**Graphs** Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees	**08**
TOTAL		**40**

Suggested Readings:

1. DonaldE.Knuth,"TheArtofComputerProgramming",Volumes1&3 PearsonEducation,2009.
2. StevenS.Skiena,"TheAlgorithmDesignManual",SecondEdition,Springer,2008.
3. D.SMalik,"DataStructuresusingC++",CengageLearning,2ndedition,2009
4. E.Horowitz&Sahni,"FundamentalDataStructure",GalgotiaBookSource, 2007.

MCA-204: SoftwareEngineering&UML

Credit: 03

Max. Marks: 100 (IA:30, ETE:70)
End Term Exam: 3 Hour

SN	Course Code	Course Outcomes
1	CO12204.1	Student will be understand fundamental concepts in software engineering, SDLC, software requirements specification, formal requirements specification and verification
2	CO12204.2	Student will learn about Software Project Management and Cost estimation.
3	CO12204.3	Student will understand basic of requirement analysis and Structured analysis.
4	CO12204.4	Student will learn fundamental software design and Effective modular design.
5	CO12204.5	Student will know about object-oriented analysis and basic UML.

SN	CONTENTS	Hours
1	**Software Engineering Fundamentals** Software Engineering - A layered Technology, The importance of software, software myths, software engineering paradigms, Software Process Models: Linear Sequential Model, Prototyping Model, RAD Model Evolutionary Software Process Models: Incremental Model, Spiral Model Component Assembly Model, Formal Methods, Fourth-Generation Techniques.	**08**
2	**Analysis Concepts and Principles** Analysis Concepts and Principles, the Elements of the Analysis Model Data Modifying, Functional Modeling and Information Flow and Behavior Modeling, Mechanics of Structured Analysis, Data Dictionary. Requirement analysis, tasks, analyst, software prototyping, specification principles, representation and the software requirements specification.	**08**
3	**Software Project Planning** Software Project Planning, Size Estimation, Cost Estimation, Models, Static, single variable models, Static, Multivariable Models, COCOMO, The Putnam Resource Allocation Model, Risk Identification and Projection: RMMM, Project scheduling and Tracking. Software Design Process, Design Principles, and Design Concepts: Effective ModularDesign, Design Heuristics, Design Documentation, Design Methods: Data Design, Architectural Design, Interface Design, Human Computer Interface Design, Procedural Design. Case Study for Design of any Application Project.	**08**
4	**Software Testing** S/W Testing Fundamentals, White Box Testing, Black Box Testing, software testing strategies, verification and Validation, System Testing, Unit testing, Integration testing and Debugging. Software Maintenance Maintainability – maintenance Tasks, Characteristics of a good quality software. Case Study for Testing Techniques	**08**
5	**Unified Modeling Language (UML)** Unified Modeling Language, Basic structures and modeling classes, common modeling techniques, relationships, common mechanism, class diagrams. Advanced structured modeling, advanced classes and relationships, interfaces, types and roles, instances and object diagram. Basic idea of behavioral modeling. State diagrams, Interaction diagrams, Use case diagrams Object- oriented concepts and principles. Identifying the elements of an object model. Object oriented projects metrics and estimation	**08**
TOTAL		**40**

Suggested Readings:

1. Grady Booch, James Rumbaugh, IvarJacobson.," The Unified Modeling Language User Guide", 2nd Edition, 2017.

2. James Rumbaugh. MichealBlaha "Object oriented Modeling and Design with UML", 2011.

3. Ali Behforooz, Hudson, "Software Engineering Fundamentals", Oxford, 2009.
4. Charles Ritcher, "Designing Flexible Object Oriented systems with UML", TechMedia , 2008.

MCA-205: PythonProgramming

Credit: 03

Max. Marks: 100 (IA:30, ETE: 70)
End Term Exam: 3 Hour

SN	Course Code	Course Outcomes
1	CO12205.1	To acquire programming skills in core Python.
2	CO12205.2	To acquire basic principles of Python programming language
3	CO12205.3	To acquire Object Oriented Skills in Python
4	CO12205.4	To develop the skill of designing Graphical user Interfaces in Python
5	CO12205.5	To develop the ability to write database applications in Python

SN	CONTENTS	Hours
1	**Introduction and Overview** Introduction, What is Python, Origin, Comparison, Comments, Variables and Assignment, Identifiers, Basic Style Guidelines, Python Objects, Standard Types, Other Built-in Types, Internal Types, Operators, Built-in Functions, Numbers and Strings. Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Sequences: Strings, Sequences, Strings, String-only Operators, Built-in Functions, String Built-in Methods, Special Features of Strings, Memory Management, Python Application Examples.	**08**
2	**Lists and Dictionaries** Built-in Functions, List type built in Methods, Special Features of Lists, Tuples, Tuple Operators and Built-in Functions, Special Features of Tuples, Introduction to Dictionaries, Built-in Functions, Built-in Methods, Dictionary Keys, Conditionals and Loops: if statement, else Statement, elif Statement, while Statement, for Statement, break Statement, continue Statement, pass Statement, else Statement	**08**
3	**Object, Classes and Files** Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, Class variables, Inheritance, Polymorphism, Type Identification, File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Units.	**08**
4	**Regular Expression and Exception Handling** Regular Expression: Introduction/Motivation, Special Symbols and Characters for REs, REs and Python. What Are Exceptions? Exceptions in Python, Detecting and Handling Exceptions, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions	**08**
5	**Database Interaction** SQL Database Connection using Python, Creating and Searching Tables, Reading and storing config information on database, Programming using database connections, Python Multithreading: Understanding threads, Forking threads, synchronizing the threads, Programming using multithreading	**08**
TOTAL		**40**

Suggested Readings:

1. Allen B. Downey, "Think Python", O"Reilly Media, 2016

2. Amit Ashok Kamthane, Ashok NamdevKamthane, " Programming and Problem Solving with Python" , McGraw Hill HED, 1st Edition, 2017

3. SakisKasampalis, Quan Nguyen, Dr Gabriele Lanaro, Ingram, "Advanced Python Programming", short title, 2019

MCA-206: Business Informatics

Credit: 03   **Max. Marks: 100 (IA:30, ETE:70)**
                                                        End Term Exam: 3 Hour

SN	Course Code	Course Outcomes
1	CO12206.1	Demonstrate knowledge and skills in the logical foundations of informatics, data representation, models, structures and informatics-centric management
2	CO12206.2	Document experience of their participation in professional organizations that promote responsible computing and service to society.
3	CO12206.3	Demonstrate a personal learning strategy for continuing education and lifelong learning that is independent of employer sponsorship.
4	CO12206.4	Define terms and explain basic principles, concepts and theories from another domain or discipline in which IT resources will be deployed.
5	CO12206.5	Identify the impact of technology and information systems on the business environment and demonstrate skills necessary to initiate, manage, and execute an IT project.

SN	CONTENTS	Hours
1	**Business Environment and Dependence on IT** Introduction to Business Informatics, Organizational Structure and Design, Dependence on Technology, Integrating Technology with Business Environment, IT and Corporate Strategy, Sustaining a Competitive Edge through application of IT in Management Functions.	**08**
2	**E-Commerce** Definition, Objectives, Components, Advantages and disadvantages, Scope, E- Commerce Models, E-Commerce Opportunities for Industries, Growth of E- Commerce, e-Commerce Applications- E-Marketing, E-Customer Relationship Management, E-Supply Chain Management, E-Governance, E-Buying, E-Selling, E-Banking, E-Retailing.	**08**
3	**E-Payments and Security issues in E-Commerce** Introductions, Special features, Types of E-Payment Systems (EFT, E-Cash, E- Cheque, Credit/Debit Card, Smart Card, Digital Tokens and Electronic Purses/ Wallets), Security risk of E-Commerce, Types of threats, Security Tools, Cyber Laws, Business Ethics	**08**
4	**ERP** Introduction, Needs and Evolution of ERP Systems, ERP Domain, ERP Benefits, ERP and Related Technologies, Relevance to Data Warehousing and Data Mining, ERP Drivers, Evaluation Criterion for ERP product, ERP Life Cycle: Adoption decision, Acquisition, Implementation, Use & Maintenance, Evolution and Retirement Phases, ERP Units, ERP Success & Failure Factors	**08**
5	**Information Systems** Introduction, Categories of System: Open, Closed, Physical, Abstract, Dynamic, Static etc., Types of Information Systems: TPS, MIS, DSS, OLAP, OLTP, Expert System, Internet Based Systems, Learning Management Systems, Business Process Re-Engineering.	**08**
TOTAL		**40**

Suggested Readings:

1. Dr. K Abirami Devi & Dr. M Alagammai, "E-Commerce Essentials", Margham Publication, 2012.

2. Kenneth C. Laudon, Karol Traver, "E-Commerce 2014", Prentice Hall Publication, 2013.

3. Enterprise Resource Planning Systems System, Lifecycle, Electronic Commerce and Risk by Daniel E.O. Leary, 2011

4. WamanJawadekar, Management Information System: Text and Cases, Tata McGraw Hill, June 2009

MCA-251: Data Structures Lab

Credit: 01

Max. Marks: 100 (IA:30, ETE: 70)
End Term Exam: 3 Hour

SN	Course Code	Course Outcomes
1	CO12251.1	To implement concepts of linear data structures like Stack and Queue.
2	CO12251.2	To implement various Sorting and Searching Techniques.
3	CO12251.3	To learn programming solve problems using both arrays and pointers
4	CO12251.4	To implement concepts of non-linear data structures
5	CO12251.5	To implement concept of linked list.

Sr. No.	Experiment Name	CO Mapped
1.	Array implementation of Stack and Queue	CO12251.1
2.	Linked list implementation of List, Stack Queue	CO12251.1
3.	Array implementation of QUEUE	CO12251.3
4.	Applications of List, Stack and Queue ADTs	CO12251.1
5.	Implementation of Binary Trees and operations of Binary Trees	CO12251.4
6.	Implementation of Binary Search Trees	CO12251.4
7.	Implementation of AVL Trees	CO12251.4
8.	Implementation of Heaps using Priority Queues.	CO12251.1
9.	Graph representation and Traversal algorithms	CO12251.4
10.	Applications of Graphs	CO12251.4
11.	Implementation of searching and sorting algorithms	CO12251.2

MCA-252: Java Technologies Lab

Credit: 01

Max. Marks: 100 (IA:30, ETE:70)
End Term Exam: 3 Hour

SN	Course Code	Course Outcomes
1	CO12252.1	Students will be able to understand and explain the fundamentals of java programming and also recognize programming concepts of swing and applets in java.
2	CO12252.2	Students will be able to apply concept of object-oriented programming in advance Java.
3	CO12252.3	Students will be able to understand GUI programming and database connectivity in java and also make a project in advance java.
4	CO12252.4	Students will be able to create Website development according to user requirements with J2EE and JSP servlets.

Sr. No.	Experiment Name	CO Mapped
1.	Simple java applications for understanding references to an instant of a class	CO12252.2
2.	Handling strings in JAVA	CO12252.2
3.	Package creation	CO12252.2
4.	Developing user defined packages in java	CO12252.2
5.	Use of Interfaces	CO12252.2
6.	Threads, Multithreading	CO12252.2
7.	Exception Handling	CO12252.2
8.	Dynamic HTML using Servlet	CO12252.4
9.	Use of get() and Post() methods	CO12252.4
10.	Cookies in Servlet	CO12252.4
11.	Session tracking and Management	CO12252.3
12.	JDBC	CO12252.3
13.	JSP Actions elements	CO12252.3
14.	Directives elements in JSP	CO12252.4
15.	JSP Tags	CO12252.4
16.	Implement JDBC with JSP	CO12252.4
17.	Implement JDBC with Servlet	CO12252.4
18.	Applications using Spring Web MVC	CO12252.1

MCA-253: Python Programming Lab

Credit: 01   **Max. Marks: 100 (IA:30, ETE:70)**
                                                     End Term Exam: 3 Hour

SN	Course Code	Course Outcomes
1	**CO12253.1**	Understand and develop Computational Thinking concepts.
2	**CO12253.2**	Express a problem-solving strategy to breakdown a complex problem into a series of simpler tasks.
3	**CO12253.3**	Describe python programs that appropriately utilize built-in functions and control flow statements
4	**CO12253.4**	Use functions for structuring Python programs.
5	**CO12253.5**	Represent compound data using Python lists, tuples, dictionaries

Sr. No.	Experiment Name	CO Mapped
1.	Implement a sequential search	**CO12253.2**
2.	Create a calculator program	**CO12253.1**
3.	Explore String Functions	**CO12253.4**
4.	Implement Selection Sort	**CO12253.4**
5.	Implement Stack	**CO12253.4**
6.	Read and Write into a file	**CO12253.4**
7.	Demonstrate usage of basic regular expression	**CO12253.2**
8.	Demonstrate use of advanced regular expressions for data validation	**CO12253.2**
9.	Demonstrate use of List	**CO12253.5**
10.	Demonstrate use of Dictionaries	**CO12253.5**
11.	Create Comma separate files(CSV), Load CSV files into internal data structure	**CO12253.3**
12.	Write script to work like a SQL SELECT statement for internal data structure	**CO12253.3**

SYALLABUS
III-Semester (Second Year) MCA Year 2 - Semester III
MCA-301 Cloud Computing

Credit: 03

Max. Marks: 100 (IA: 30,ETE:70)

End Term Exam: 3 Hour

Course Code	COURSE OUTCOME
CO23301.1	Illustrate the concepts of Cloud Computing, key technologies, strengths, and types of cloud.
CO23301.2	Ability to understand various service delivery models of cloud computing Architecture.
CO23301.3	Connect with the concept of virtualization in cloud computing.
CO23301.4	Identify security implications in cloud computing.
CO23301.5	Ability to work on cloud and how to utilize it in the real world.

S.NO	CONTENT	TEACHING HOURS
1	**Introduction to Cloud**: Cloud Computing at a Glance, Vision of Cloud Computing, Defining a Cloud, Cloud Computing Reference Model. Characteristics and Benefits, Challenges Ahead, Historical Developments, Risks and Approaches of Migration into Cloud ,Types of Clouds, Services models, Cloud Reference Model.	8
2	**Cloud Architecture**: cloud architecture, features and benefits of Servive Models: Software as a Service (SaaS),Platform as a Service (PaaS), Infrastructure as a Service (IaaS), Service providers, challenges and risks in cloud adoption. Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing.	8
3	**Virtualization**: Introduction, Characteristics of Virtualized Environment, Taxonomy of Virtualization Techniques, Virtualization and Cloud computing, Pros and Cons of Virtualization, Technology Examples-VMware and Microsoft Hyper-V. Virtualization of CPU, Memory, I/O Devices, Virtual Cluster ,datacenterand Resources Management.	8
4	**Securing the Cloud**: Cloud Information security fundamentals, Cloud security services, Design principles, Policy Implementation, Cloud Computing Security Challenges, Cloud Computing Security Architecture. Legal issues in cloud Computing. **Data Security in Cloud**: Risk Mitigation , Understanding and Identification of Threats in Cloud, SLA-Service Level Agreements, Trust Management.	8
5	**Defining the Clouds for Enterprise**: Storage as a service, Database as a service, Process as a service, Information as a service, Integration as a service and Testing as a service. Disaster Management in Cloud: Disasters in the Cloud, Disaster Recovery Planning.	8
TOTAL		40

SUGGESTED REFERENCES:

1   Krutz , Vines, "Cloud Security " , Wiley Pub, 2014
2   Velte, "Cloud Computing- A Practical Approach" ,TMH Pub, 2015

III-Semester (Second Year) MCA Year 2 - Semester III
MCA-302 Analysis and Design of Algorithm

Credit: 03

Max. Marks : 100 (IA: 30, ETE: 70)

End Term Exam: 3 Hour

Course Code	COURSE OUTCOME
CO23302.1	Students will be able to design algorithms for various computing problems.
CO23302.2	Design algorithms using appropriate design techniques (greedy, dynamic programming etc.
CO23302.3	Students will be able to critically analyze the different algorithm design techniques for a given problem.
CO23302.4	Able to explain important algorithmic design paradigms (divide-and-conquer and Backtracking) and apply when an algorithmic design situation calls for it.
CO23302.5	Able to Describe the classes P, NP, and Complete and be able to prove that a certain problem is NP-Complete.

S.NO	CONTENT	TEACHING HOURS
1	**Introduction** - Algorithm definition and specification – Design of Algorithms, and Analysis of Algorithms, Asymptotic Notations, Growth of function: Asymptotic notations Performance Analysis Space complexity, Time complexity, Divide and conquer- General method, applications – Binary search, Merge sort, Quick sort	8
2	**The Greedy method General method** – knapsack problem – minimum cost spanning tree (Prims and Kruskal algorithm) – single source shortest path-DijkastraAlgorithm	8
3	**Dynamic Programming** – general method – multistage graphs – all pair shortest path – 0/1 Knapsack – traveling salesman problem – flow shop scheduling	8
4	**Backtracking:** General method – 8-Queens problem – sum of subsets – graph coloring – Hamiltonian cycles– knapsack problem. Branch and bound:- The Method – 0/1 Knapsack problem – traveling sales person.	8
5	**Parallel models**: Basic concepts, performance Measures, Parallel Algorithms: Parallel complexity, Analysis of Parallel Addition, Parallel Multiplication and division, parallel Evaluation of General Arithmetic Expressions, First-Order Linear recurrence. **NP-hard and NP-complete problems**: Basic Concepts, non-deterministic algorithms, Nphard graph problems and scheduling problems.	8
TOTAL		40

SUGGESTED REFERENCES:

1 Donald E. Knuth, "The Art of Computer Programming", Volumes 1& 3 Pearson Education,2009.

2 Steven S. Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008.

III-Semester (Second Year) MCA Year 2 - Semester III
MCA-303 Artificial Intelligence

Credit: 03   Max. Marks: 100 (IA: 30, ETE:70)

End Term Exam: 3 Hour

Course code	COURSE OUTCOME
CO23303.1	Demonstrate fundamental understanding of artificial intelligence (AI) and expert systems.
CO23303.2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning
CO23303.3	Apply basic principles of AI in solutions that require real world knowledge representation and learning
CO23303.4	Students will learn about Natural Language Processing
CO23303.5	Learn about learning concepts, neural network, and architecture of expert system.

S.NO	CONTENT	TEACHING HOURS
1	General Issues and overview of AI Concept of AI, AI technique, Characteristics of AI applications Problem Solving, Search and Control Strategies General Problem solving, Production systems, and Control strategies, forward and backward chaining Exhaustive searches: Depth first and Breadth first search.	8
2	Heuristic Search Techniques Hill climbing, Branch and Bound technique, Best first search and A* algorithm, AND/OR Graphs, Problem reduction and AO* algorithm, Constraint Satisfaction problems, Game Playing Min Max Search procedure.	8
3	Knowledge Representation First Order Predicate Calculus, Resolution Principle and Unification, Inference Mechanisms Horn's Clauses, Semantic Networks, Frame Systems , Scripts, Conceptual Dependency AI Programming Languages.	8
4	Natural Language Processing: Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Tokenization, Part-of Speech Tagging, Issues in Part-of-Speech tagging. Semantics and pragmatics-Requirements for representation, Syntax-Driven Semantic analysis, Introduction to syntactic analysis.	8
5	Expert Systems Introduction to Expert Systems, Architecture of Expert Systems, Expert System Shells, Knowledge Acquisition, Case Studies of Expert System. Learning: Concept of learning, Types of learning.	8
TOTAL		40

SUGGESTED REFERENCES:

1. Nils J. Nilsson, "Principles of Artificial Intelligence (Symbolic Computation / Artificial Intelligence)", reprint edition, 2014.
2. Stuart Russell, Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education, 3 rd edition, 2010.
3. 3. Daniel Jurafsky, James H. Martin Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.

III-Semester (Second Year) MCA Year 2 - Semester III
MCA-304 Information Security

Credit: 03

Max. Marks : 100 (IA: 30,ETE:70)

End Term Exam: 3 Hour

Course code	COURSE OUTCOME
CO23304.1	Develop a basic understanding of cryptography, how it has evolved and some key encryption techniques used today, Develop an understanding of security policies
CO23304.2	To master and implement different encryption algorithms along with different encryption techniques.
CO23304.3	To master fundamentals of program security.
CO23304.4	To ensure complete knowledge about security of networks.
CO23304.5	To master protocols for security services

S.NO	CONTENT	TEACHING HOURS
1	**Introduction to Information Security:** Attacks, Vulnerability, Security Goals, Security Services and mechanisms. Conventional substitution and transposition ciphers, One-time Pad, Block cipher and Stream Cipher, Steganography. Classical Encryption Techniques.	8
2	**Symmetric and Asymmetric Cryptographic Techniques:** DES, AES, RSA algorithms. Hash Functions Message Authentication & Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Birthday Attacks, Security Of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures: Digital Signatures, Authentication Protocol, Digital Signature Standard (DSS), Proof Of Digital Signature Algorithm.	8
3	**Program Security :** No malicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of- use Errors, Viruses, Trapdoors, Salami attack, Man-in-the- middle attacks, Covert channels.	8
4	**Security in Networks :** Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security, Firewalls – Design and Types of Firewalls, Personal Firewalls, IDS, Email Security – PGP,S/MIME.	8
5	**Administering Security:** Security Planning, Risk Analysis, Organizational Security policies. Legal Privacy and Ethical Issues in Computer Security: Protecting Programs and data, Information and the law, Rights of Employees and Employers, Software failures, Computer Crime, Ethical issues in Computer Security, case studies of Ethics.	8
TOTAL		40

SUGGESTED REFERENCES:

1   Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, Handbook of AppliedCryptography, CRC Press, 2011.

MCA-305 Mobile Application Development

Credit: 03   Max. Marks: 100 (IA: 30, ETE:70)

End Term Exam: 3 Hour

Course code	COURSE OUTCOME
CO23305.1	Build an application using Android development environment.
CO23305.2	Designing and understanding mobile applications.
CO23305.3	Development of environment for android architecture.
CO23305.4	Understanding the complete details about goggle map gprs, wifi, Bluetooth like advance android applications.
CO23305.5	advancing students to new technologies like ios and touch framework etc.

S.NO	CONTENT	TEACHING HOURS
1	**INTRODUCTION** Introduction to mobile applications, Market and business drivers for mobile applications, Difficulties in Mobile Development, Mobile Myths, When to Create an App, Types of Mobile App. Design Constraints for mobile applications, both hardware and software related, Architecting mobile applications, user interfaces for mobile applications, touch events and gestures.	8
2	**ADVANCED DESIGN** Designing applications with multimedia and web access capabilities. Integration with GPS and social media networking applications, Accessing applications hosted in a cloud computing environment, Design patterns for mobile applications, Understanding Application users, Information Design, Achieving quality constraints.	8
3	**TECHNOLOGY I ANDROID** Establishing the development environment Android architecture Android Application Structure, Emulator, Android virtual device, UI design, Fragments, Activity, Services, broadcast receiver, Intents/Filters, Content provider-SQLite Programming, SQLITE open, Helper, SQLite Database, and Interaction with server side applications.	8
4	**Advanced ANDROID** Using Google Maps, GPS and Wi-Fi Integration, Android Notification, Audio Manager, Bluetooth, Camera and Sensor Integration, Sending SMS, Phone Calls, Publishing Android Application. Introduction to KOTLIN.	8
5	**TECHNOLOGY II IOS** Introduction to Objective C iOS features UI implementation Touch frameworks Data persistence using Core Data and SQLite, Action and Outlets, Delegates and Storyboard, Location aware applications using Core Location and Map Kit, Integrating calendar and address book with social media application Using Wifi iPhone marketplace.	8
TOTAL		40

SUGGESTED REFERENCES:

1   Reto Meier, Ian Lake,"Professional Android, 4th Edition", Wiley, 2018.

2   Neil Smyth "Android studio 2.2 Development Essentials 7th Edition" Payload Media 2017.

3   Murat Yener, OnurDundar, "Expert Android Studio", Wiley, 2016.

4   Jerome Dimarzio "Beginning Android Programming with Android Studio" Wiley
     Publication, 2016.

MCA-306-I(a) Data Mining and Data Warehousing Elective I(a)

Credit: 03   Max. Marks: 100 (IA: 30, ETE:70)

End Term Exam: 3 Hour

Course code	COURSE OUTCOME
CO23306.1	Understand the functionality of the various data mining and data warehousing component.
CO23306.2	Describe the designing of Data Warehousing so that it can be able to solve the root problems
CO23306.3	To understand various rules of Data Mining and their techniques to solve the real time problems
CO23306.4	Complete introduction to decision tree and construction algorithms.
CO23306.5	Basic understanding about data mining techniques and data extraction concepts.

S.NO	CONTENT	TEACHING HOURS
1	**Data Warehousing**: Introduction to Data Warehouse and OLAP, Data Warehouse and DBMS Multidimensional data model, OLAP operations. Data preprocessing, Data cleaning, Data transformation, Data reduction, Discretization and generating concept hierarchies.	8
2	**Data Mining**: Introduction, Definition, KDD vs. DM, DBMS vs. DM, DM Techniques, Issues and Challenges in DM, DM Applications. DM algorithms: Classification and Prediction - Parametric and non-parametric technology: Bayesian classification, two class and generalized class classification, classification error.	8
3	**Association rules**: Association Rules: Apriori Algorithm, Partition, FP-tree growth algorithms, Generalized association rule. Motivation and terminology, Correlation analysis. Clustering: Basic issues in clustering, Partitioning methods: k-means, K-MEDOID Algorithm, Hierarchical methods: distance-based agglomerative and divisible clustering, nonhierarchical techniques.	8
4	**Decision Trees**: Decision tree introduction, Tree pruning, Extracting classification rules from decision trees, Decision tree construction algorithms, Decision tree construction with presorting.	8
5	**Techniques for Data mining**: Data Mining software and applications: Introduction to Text mining: extracting attributes (keywords), structural approaches (parsing, soft parsing). Introduction to Web mining: classifying web pages, extracting knowledge from the web Data Mining software and applications.	8
TOTAL		**40**

SUGGESTED REFERENCES:

1   W. H. Innmon, Building the Data Warehouse, Wiley Computer Publishing, 2005

Credit: 03   Max. Marks: 100 (IA: 30, ETE:70)

End Term Exam: 3 Hour

Course code	COURSE OUTCOME
CO23306.1	Introduction to big data and its architecture and applications.
CO23306.2	Security related knowledge of big data.
CO23306.3	Explaining the Hadoop ecosystem and data access tools in brief.
CO23306.4	To make students understand HDFS in detail.
CO23306.5	Difference between NOSQL and SQL.

S.NO	CONTENT	TEACHING HOURS
1	**Understanding Big Data**: Introduction, Need, Importance of Big data, Classification of Digital Data, Four Vs, Drivers for Big data, Big data Terminology, Industry examples and Top Challenges Facing Big Data, Responsibilities of data scientists, Technology Challenges for Big data, Convergence of key trends, Big data Architecture. Big data Applications: Healthcare, Finance, Advertising, Marketing, Transportation, Education, Government, Cyber Security etc.	8
2	**Web Analytics**: Big data and Marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, Open source technologies, cloud and big data, Crowd Sourcing Analytics, inter and trans firewall analytics.	8
3	**Hadoop Ecosystem**: Introduction to Hadoop, Features of Hadoop, Hadoop Versions, Hadoop Architecture, Introduction to Data Management and **Data Access tools**: Data Management using Flume, Oozie, Zookeeper; Hive, Pig, Avro, SQOOP for data access. Introduction to Data Processing and Data **Storage tools**: MapReduce, YARN, HDFS, HBase.	8
4	**HDFS**: HDFS concepts, Name Node, Design working of Hadoop distributed file system (HDFS). **MapReduce**: Introduction, MapReduce workflows, Split, map, combine, scheduling, shuffle and sort YARN. Problems & examples in MapReduce	8
5	**NO SQL Data Management**: Problem with Relational Database Systems. Introduction to NOSQL, Advantages of NOSQL, SQL versus NOSQL. Aggregate data models, key-value and document data models, relationships, graph databases, schema less databases.	8
TOTAL		40

1	ArshdeepBahga, Vijay Madisetti, "Big Data Analytics: A Hands-On Approach", VPT, 2018
2	NandhiniAbirami R, SeifedineKadry, Amir H. Gandomi, BalamuruganBalusamy, "Big Data: Concepts, Technology, and Architecture", Wiley, 1st edition 2021
3	EMC Education Services, " Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", 2015

III-Semester (Second Year)
MCA Year 2 - Semester III
MCA-306_Elective I(C) Soft Computing

Credit: 03   Max. Marks: 100 (IA: 30,ETE:70)

End Term Exam: 3 Hour

Course code	COURSE OUTCOME
CO23306.1	Understand the concepts of Neuro, Fuzzy and Soft Computing and understand the Input Space partitioning and Fuzzy Modeling
CO23306.2	Understand the concept of Artificial Neuron and its model.
CO23306.3	Understand the concepts of Neuro Fuzzy Modeling, Methods that Cross-fertilize ANFIS and RBFN and Framework Neuron Functions for Adaptive Networks, Neuro Fuzzy Spectrum
CO23306.4	To understand the concepts of Genetic Algorithm and understand the Working Principle, Procedure of GA, Flow chart of GA, Genetic Representations, Encoding, Application of GA.
CO23306.5	Complete understanding about soft computing.

S.NO	CONTENT	TEACHING HOURS
1	**Introduction to Soft Computing** :Introduction of Hard and Soft Computing, Unique features of Soft computing, Components of Soft computing, Fuzzy Computing, Evolutionary Computation, Genetic Algorithm, Swarm Intelligence, Ant Colony Optimizations, Neural Network, Machine Learning , Associative Memory, Adaptive Resonance Theory, Introduction to Deep Learning.	8
2	**Neural Networks Introduction and Architecture**: Neuron, Nerve structure and synapse, Artificial Neuron and its model, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Back propagation networks architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, back propagation algorithm, applications.	8
3	**Fuzzy Logic** Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion, Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Inference Systems, applications.	8
4	**Genetic Algorithms** Traditional optimization and search techniques, Genetic Algorithms: Basic concepts of GA, working principle, procedures of GA, Process flow of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.	8
5	**Hybrid Systems** Integration of neural networks, fuzzy logic and genetic algorithms. GA Based Back Propagation Networks, Fuzzy Back Propagation Networks, Fuzzy Associative Memories, Simplified Fuzzy ARTMAP.	8

TOTAL		40

MCA-351: ADA LAB

Credit: 01Max. Marks: 100 (IA: ETE:70)
End Term Exam: 3 Hour

Course Code	COURSE OUTCOME
CO23351.1	Illustration of search and sort techniques.
CO23351.1	Complete understanding about greedy method.
CO23351.1	Students understand the detail about dynamic programming.
CO23351.1	Makes students learn backtracking.
CO23351.1	Knowledge about knapsack problem.

S.NO	EXPERIMENT NAMES	CO PO MAPPING
1	Linear search & binary search, Sorting Techniques.	CO23351.1
2	Single source shortest path-Dijkastra Algorithm	CO23351.1
3	Greedy method:-knapsack problem	CO23351.1
4	Greedy method minimum cost spanning tree 5.	CO23351.1
5	Traveling salesman problem – flow shop scheduling.	CO23351.1
6	Dynamic Programming – 0/1 Knapsack	CO23351.1
7	Dynamic Programming – traveling salesman problem	CO23351.1
8	Backtracking 8-Queens problem	CO23351.1
9	Backtracking Sum of Subsets	CO23351.1
10	Backtracking – graph coloring – Hamiltonian cycles– knapsack problem	CO23351.1

MCA-352: MOBILE APPLICATION DEVELOPMENT LAB

Credit: 01   Max. Marks: 100 (IA: ETE:70)

End Term Exam: 3 Hour

Course code	COURSE OUTCOME
CO23302.1	Makes student understand GUI features.
CO23302.2	Students learn to write an android program to implement activity life cycle.
CO23302.3	Makes student able to develop different applications related to animations.
CO23302.4	Students learn to use database.
CO23302.5	Makes student understand how to use notification.

S.NO	EXPERIMENT NAME	CO PO MAPPING
1	Develop an application that uses GUI components, Font and Colors..	CO23302.1
2	Write an android program to implement activity life cycle using toast messages with proper positioning	CO23352.2
3	Develop an application that uses Layout Managers and event listeners	CO23352.2
4	Write an application that draws basic graphical primitives on the screen..	CO23352.2
5	Write an application that basic graphical primitives and animations	CO23352.2
6	Develop an application that makes use of databases.	CO23352.2
7	Develop an application that makes use of Notification Manager.	CO23352.2
8	Develop a native application that uses GPS location information	CO23352.2
9	Implement an application that creates an alert upon receiving a message.	CO23352.2
10	Write a mobile application that makes use of feed.	CO23352.2
11	Develop a mobile application to send an email.	CO23352.2
12	Mini Project using Android Studio	CO23352.2

SYLLABUS
MCA-401: Software Project Management

Credit: 03

Max. Marks: 100 (IA:30, ETE: 70)
End Term Exam: 3 Hours

SN	Course Code	Course Outcomes
1	CO24401.1	Able to Explain Conventional Software Management Process to Develop Software
2	CO24401.2	Able to Identify factors for Improving Software Economics
3	CO24401.3	Ability to find the Relationships among Different Life Cycle Phases
4	CO24401.4	Able to Predict Metrics and forecasting guidelines for Project Cost Schedule and Quality Control.
5	CO24401.5	Compare and Differentiate Organization Structure and Project Structure.

SN	CONTENTS	Hours
1	**Project Management**: The management spectrum, the people, the product, the process, the project, critical practices Metrics for Process and Project: Metrics in the process and project Domains, software measurements, metrics for software quality, integrating metrics within software process, metrics for small organizations, establishing a software metrics program. Introduction of Project Management tool: Trello, Jira, Asana, Zoho, Wrike.	08
2	**Estimation:** Project planning Process, software scope and feasibility, resources, software project estimation, empirical estimation models, estimation for object oriented projects, estimation for Agile development and web engineering projects, the make/buy decision.	08
3	**Project Scheduling:** Basic concepts, project scheduling, defining a task set and task network, scheduling, earned value analysis. Risk Management: Reactive V/S proactive Risk Strategies, software risks, Risk identification, Risk projection, risk refinement, risk mitigation, monitoring and management, the RMMM plan Quality Planning: Quality Concepts, Procedural Approach to Quality Management, Quantitative Approaches to Quality Management, Quantitative Quality Management Planning, Setting the Quality Goal, Quality Process Planning, Defect Prevention Planning.	08
4	**Quality Management:** Quality Concepts, Software Quality assurances, software reviews, formal technical reviews, Formal approaches to SQA, Statistical Software Quality assurances, Change Management: software Configuration Management, The SCM repository, SCM Process,Configuration Management for Web Engineering	08
5	**Project Execution And Closure:** Reviews. The Review Process, Planning, Overview and Preparation, Group Review Meeting, Rework and Follow-up, One-Person Review, Guidelines for Reviews in Projects, Project Closure: Project Closure Analysis, The Role of Closure Analysis, Performing Closure Analysis. **Project Monitoring and Control**: Project Tracking, Activities Tracking, Defect Tracking, IssuesTracking, Status Reports, Milestone Analysis, Actual Versus Estimated Analysis of Effort and Schedule, Monitoring Quality.	08
TOTAL		**40**

Suggested Readings:

- Dr. P. Rizwan Ahmed, " Software Project Management", 1stEdition, Margham Publications, 2016
- Walker Royce, "Software Project Management, A Unified Framework", 1st Edition, 2006.
- Joel Henry, "Software Project Management", 1st Edition, Pearson Education, 2006.
- PradeepPai, "Project Management",, First Edition, Pearson, 2019

MCA-402: Principles of Management and Information System [Elective-2(a)]

Credit: 03   **Max. Marks: 100 (IA:30, ETE: 70)**
                                  End Term Exam: 3 Hours

SN	Course Code	Course Outcomes
1	CO24402.1	Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, and have same basic knowledge on international aspect of management.
2	CO24402.2	To understand the planning process in the organization.
3	CO24402.3	Demonstrate the ability to directing, leadership and communicate effectively.
4	CO24402.4	Able to understand basic concepts Information System, and different types of Information Systems.
5	CO24402.5	Able to design and develop various, Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management.

SN	CONTENTS	Hours
1	**Management: An Overview** Definition, Concept, Functions, Process, Scope and Significance of Management. Nature of Management, Managerial Roles, Managerial Skills and Activities, Difference between Management and Administration. Significance of Values and Ethics in Management	08
2	**Planning & Organizing:** Nature and purpose of planning, Significance of Planning, Elements and Steps of Planning, Types of planning, Objectives and Policies Decision Making, Organizing Principles, Span of Control, Departmentalization, Line and Staff Authority &Relationship, Authority, Delegation and Decentralization. Formal and Informal Organizations.	08
3	**Directing & Controlling:** Effective Directing, Supervision, motivation theories, motivational techniques, Job Satisfaction, Job Enrichment, Leadership-Concept, Styles and Theories System and Process of Controlling, Concept, Types and Process, Techniques of Controlling, Coordination-Concept, Importance, Principles and Techniques of Coordination, use of computers and IT in Management control.	08
4	**Information System:** Data vs. Information vs. Knowledge, Information Systems meaning, functions and dimensions and need. Categorization of Organizational Information Systems – hierarchical and functional perspective, Interdependence between organization and IS, IS strategies for competitive advantage using Porter's Five Forces Model and Value Chain Model	08
5	**Information Systems Management:** Planning the Use of IT, Managing the Computing Infrastructure, Enterprise Applications, Developing Business/IT Solutions, Outsourcing, User Rights and Responsibilities, Implementation and Controlling of Information System.	08
TOTAL		**40**

Suggested Readings:

1.Kenneth Laudon, JaneLaudonEssentials of Management Information Systems, PHI Publication,   10th Edition
2.Terry and Franklin, Principles of Management, AITBS Publishers & Distributors, Delhi, Eighth Edition.
3. Joseph L Massie "Essentials of Management", Prentice Hall of India, Fourth Edition, 2003.
4. W.S. Jawadekar, "Management Informat