TEACHING AND EXAMINATION SCHEME
Master of Computer Applications (2 Years Lateral Scheme)
Semester I
W.E.F. 2018 - 2019

	Paper Name (Theory)	Lec	Tut	Exam Hours	MAX MARKS	
					Sess-ional	Sem Exam
2Ymca-101	Open Source Technology & Operating Systems	5	1	3	20	80
2Ymca-102	Database Technology	5	1	3	20	80
2Ymca-103	C Programming & Data Structure	5	1	3	20	80
2Ymca-104	Computer Graphics	5	1	3	20	80
2Ymca-105	Java Programming & Object Oriented Concept	5	1	3	20	80
2Ymca-106	Computer Networks & Wireless Protocols	5	1	3	20	80
	Total of Sessional & Semester Exam Marks					**600**

	Paper Name (Practical)	Pract Hours	Exam Hours	Max Marks
2Ymca-107	Lab-Open Source	4	3	50
2Ymca-108	Lab-Database Technology	4	3	50
2Ymca-109	Lab-C Programming & Computer Networks	4	3	50
2Ymca-110	Lab-Java Programming & Computer Graphics	4	3	50
	Total of Practical Marks			**200**

Total of Theory & Practical Marks	**800**

TEACHING AND EXAMINATION SCHEME

Master of Computer Applications (2 Years Lateral Scheme)

Semester II

	Paper Name (Theory)	Lec	Tut	Exam Hours	MAX MARKS	
					Sess-ional	Sem Exam
2Ymca-201	Programming in Python	5	1	3	20	80
2Ymca-202	Programming in .NET & C#	5	1	3	20	80
2Ymca-203	Software Engineering & Project Management	5	1	3	20	80
2Ymca-204	Theory of Computation	5	1	3	20	80
2Ymca-205	Data Warehouse & Data Mining	5	1	3	20	80
2Ymca-206	Image Processing	5	1	3	20	80
	Total of Sessional & Semester Exam Marks					**600**

	Paper Name (Practical)	Pract Hours	Exam Hours	Max Marks
2Ymca-207	Lab-Python	4	3	50
2Ymca-208	Lab-.NET & C#	4	3	50
2Ymca-209	Lab-Data Mining	4	3	50
2Ymca-210	Lab-Image Processing	4	3	50
	Total of Practical Marks			**200**
	Total of Theory & Practical Marks			**800**

TEACHING AND EXAMINATION SCHEME
Master of Computer Applications (2 Years Lateral Scheme)
(2019-20)
Semester III

	Paper Name (Theory)	Lec	Tut	Exam Hours	MAX MARKS	
					Sess-ional	Sem Exam
2Ymca-301	Cloud Computing	5	1	3	20	80
2Ymca-302	Artificial Intelligence	5	1	3	20	80
2Ymca-303	Programming in ASP.NET	5	1	3	20	80
2Ymca-304	Information & Network Security	5	1	3	20	80
2Ymca-305	BIG DATA	5	1	3	20	80
2Ymca-306	Grid Computing	5	1	3	20	80
	Total of Sessional & Semester Exam Marks					**600**

	Paper Name (Practical)	Pract Hours	Exam Hours	Max Marks
2Ymca-307	Lab-ASP.NET	4	3	50
2Ymca-308	Lab-Artificial Intelligence	4	3	50
2Ymca-309	Lab-Big-Data	4	3	50
2Ymca-310	Lab-Grid Computing	4	3	50
	Total of Practical Marks			**200**
	Total of Theory & Practical Marks			**800**

TEACHING AND EXAMINATION SCHEME

Master of Computer Applications (2 Years Lateral Scheme)

Semester IV

	Paper Name (Theory)	Lec	Tut	Exam Hours	MAX MARKS	
					Sess-ional	Sem Exam
2Ymca-401	Web Programming	5	1	3	20	80
2Ymca-402	Mobile Application Development	5	1	3	20	80
2Ymca-403	Machine Learning	5	1	3	20	80
2Ymca-404	Soft Computing & Applications	5	1	3	20	80
2Ymca-405	Dissertation	5	1	3	40	160
	Total of Sessional & Semester Exam Marks					**600**

	Paper Name (Practical)	Pract Hours	Exam Hours	Max Marks
2Ymca-406	Lab-Web Programming	4	3	50
2Ymca-407	Lab-Mobile Application Development	4	3	50
2Ymca-408	Lab-Soft Computing	4	3	50
2Ymca-409	Seminar	4	3	50
	Total of Practical Marks			**200**
	Total of Theory & Practical Marks			**800**

Scheme of Examination
(For M. C. A. II Year – Lateral Entry)

Theory:

Part A:

1. 10 Question of 1 mark each – 10 marks
2. Answer should not exceed more than 20 words
3. All questions are compulsory

Part B:

1. 5 Questions of 2 marks each – 10 marks
2. Answer should not exceed more than 50 words
3. All questions are compulsory

Part C:

1. 3 Questions of 20 marks each – 60 marks. There will be an internal choice in each question.
2. Answer should not exceed 400 words
3. All questions are compulsory.

Sessional:

There will be sessional (internal assessment) of 20 marks conducted by the department.

Practical:

Practical exams shall be conducted by one internal and one external examiner of a batch of 20 students in a day.

Duration of Practical exam is 3 hours.

A Laboratory Exercise File should be prepared by each student for each practical paper and should be submitted during practical examinations.

Practical of 50 marks distribution is as under:

a. 30 marks for practical examination exercise for 3 questions
b. 10 marks for Viva-voce
c. 10 marks for Laboratory Exercise File

Eligibility:

BCA/BSC (CS)/BSC (IT) with Math as one of the subjects with at least 60% marks in aggregate. Admission is strictly on the basis of merit.

Scheme of Examination
(For M. C. A. II Year – Lateral Entry)

Reg. 17 (b)

The examination for the Master of Computer Applications (II Year – Lateral Entry) will consist of 4 semesters. The examination shall consist of (a) Theory papers (b) Laboratory / Practical work (c) seminar (d) minor project and (e) industrial dissertation work. Candidates will be required to pursue a regular, full time course of study at the University department for a period of two academic years in order to be eligible for appearing in the examination.

1. Eligibility for M. C. A.(II Year Lateral Entry): BCA/BSC (CS)/BSC (IT) with Math as one of the subjects with at least 60% marks in aggregate.

2. Examination:
   i. There shall be 39 papers (6 theory and 4 practical in semesters I to III, 5 theory and 4 practical in semester IV) of 3200 marks (I to IV Semester). Theory paper shall be of 3 hours duration having 100 marks. Out of 100 marks 20 marks shall be considered as internal assessment based on internal test and seminars and 80 marks will be of examination at the end of each semester as determined by the University. The practical shall be of 50 marks assessed by external examiner. The Seminar in IV Semester will be 50 marks which will be based on presentation and viva-voce assessed by external examiner. The Industrial Dissertation shall be 200 marks out of which 160 will be based on project presentation and viva-voce, assessed by external examiner and 40 marks will be assessed by internal examiner.

   ii. To pass a semester a candidate shall have to score 36% marks in each subject (theory and practical) separately and also 40% marks in aggregate of all the papers prescribed for the examination.

   iii. Due paper(s) will be applicable if a candidate obtains 40% marks in aggregate and fails in not more than three (3) papers (theory). Due paper(s) of first semester will be held along with the third semester and the due paper(s) of second semester will be held along with the fourth semester. The third and fourth semester due paper(s) will be held in the first and second semester respectively of the next year. The chance of due paper(s) will be given only thrice in each semester.

   iv. Wherever a candidate appears at for a due paper examination he/she will do so according to the syllabus in force.

   v. A candidate not appearing at any examination/absent in any paper of term end examination shall be deemed as fail.

3. A candidate for a pass in the examination shall be required to obtain:
    i. At least 40% marks in the aggregate of all the papers prescribed for the examination and
    ii. At least 40% marks in the practical(s) wherever prescribed at the examination, provided that if a candidate fails to secure at least 36% marks in each individual paper at the examination notwithstanding his/her having obtained the minimum percentage of marks required in the aggregate for that examination.

    No Division will be awarded in the I to III Semester examinations. Division shall be awarded at the end of the IV semester Examination on the combined marks obtained at the I to IV semester taken together as noted below:

Passed with First Division	60% of the aggregate marks taken together of all the IV semester examinations
Passed with second division	48%

    All the rest will be declared to have passed the examination.

    Provided that if a candidate clears any paper after a continuous period of two years since he/she was admitted to the M. C. A. II Year – Lateral Entry then for the passing marks, i.e. 36% marks, shall be taken into account in the case of such course(s).

    Provided further that in case where a candidate requires more than 36% marks in order to reach the requisite minimum aggregate i.e. 40% marks, as many marks, out of those actually secured by him/her will be taken into account as would enable him/her to make up the deficiency in the requisite minimum aggregate marks.

4. The grace marks shall be given up to 1% of the total aggregate marks of theory and practical of that semester in maximum one paper.

5. Candidates reappearing at an examination in a subsequent year shall be examined in accordance with the scheme and syllabi in force and shall be entitled to the award of the degree of year in which they clear the last failing/unclear paper.

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-101Open Source Technology & Operating Systems

Introduction to Operating Systems, goals of OS, operation of OS, resource allocater and related functions, classes of OS, batch processing, multi-processing, time sharing, distributed, real time systems, system calls, system programs, structure of OS, layer design of DOS, Unix, virtual machine OS, kernel based OS, micro-kernel based OS, architecture of Window 2000.

Process concept, interacting process, threads, fundamental of scheduling, scheduling criteria, long medium short term scheduling, scheduling algorithms , structure of concurrent system, critical section, critical region, inter-process communication, monitor and semaphores, implementation and uses.

Logical versus physical address, swapping, contiguous allocation, segmentation, paging, segmentation with paging, kernel memory allocation, page replacement algorithm, virtual memory, virtual memory with paging, demand paging, dead lock, characterization, methods for handling dead locks, prevention, avoidance, thrashing, allocation of frame, virtual memory using segmentation,

History of Linux, Linux architecture, Linux file System, file naming, types of files, directory command, file command, vi editor, locating files in Linux, filter pipe, shell variables, local and global variables, command substitution, if, while, for, shift, tar, basic networking commands in Linux.

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-102Database Technology

Information system, classification, conventional file system, object of database systems, data abstraction, data definition language, data manipulation language, database administrator. Database design stages, database model, database system architecture.

Centralized and client/server architecture in DBMS, entity relationship model, entities and entity sets their relationship, mapping constraints, generalization, aggregation, use of ER model for the design of databases, sequential, random, index sequential file organization, introduction and history of relational database, system relational algebra, normalization up to DKNF.

Create a Table in MS Access -Data Types, Field Properties, Fieldsnames, types, properties, default values, format, caption, validationrules Data Entry Add record delete recode and edit text Sort, find/replace,filter/select, re-arrange columns, freeze columns. Edit a Tables- copy, delete, import, modify table structure find replace.

Setting up Relationships- Define relationships, add a relationship, set a rule for Referential Integrity, change the join type, delete a relationship, save relationship Queries & Filter –difference between queries and filter,filter using multiple fields AND,OR,advance filter Queries create Query with one table,fiend record with select query, find duplicate record with query,find unmatched record with query, run query,save and change query.

Introduction to Forms Types of Basic Forms: Columnar, Tabular, Datasheet, Main/Subforms, add headers and footers, add fields to form, add text to form use label option button, check box,combo box, list box Forms Wizard, Create Template.

Introduction to Reports,Types of Basic Reports: Single Column, Tabular Report Groups/Total, single table report multi table report preview report print report, Creating Reports and Labels, Wizard

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-103C Programming & Data Structure

Overview of C Language: History of C, Character set, C tokens, Identifiers, Keywords,Data types, Variables, Constants, Symbolic Constants , Operators in C, Hierarchy ofOperators, Expressions, Type Conversions and Library Functions.

Managing Input and Output Operation: Formatted and Unformatted I/O Functions,Decision making, branching and looping: Decision Making Statements - if Statement, if–else statement, nesting of if-else statements, else–if ladder, switch statement,?operator

Looping - while, do-while, for loop, Nested loop, break, continue, and goto statements.Functions: Function Definition, prototyping, types of functions, passing arguments tofunctions, Nested Functions, Recursive functions.

Arrays: Declaring and Initializing, One Dimensional Arrays, Two Dimensional Arrays,Multi-Dimensional Arrays - Passing arrays to functions. Strings: Declaring andInitializing strings, Operations on strings, Arrays of strings, passing strings to functions.Storage Classes - Automatic, External, Static and Register Variables.

Structures-Declaring and Initializing, Nested structure, Array of Structure, PassingStructures to functions, Unions, typedef, enum, Bit fields. Pointers – Declarations,Pointer arithmetic, Pointers and functions, Call by value, Call by reference, Pointers andArrays, Arrays of Pointers, Pointers and Structures. Meaning of static and dynamicmemory allocation, Memory allocation functions,

Stack, single linked list, double linked list, circular linked list, prefix, postfix, infix, queue, d-queue Merge sort, quick sort

Graph,representation of Graph,operation on Graphs

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-104Computer Graphics

Interactive graphics, passive graphics, advantage of interactive graphics, classification of application, hardware and software requirement of computer graphics

Point, line, DDA algorithm, Bresenham's line algorithm, circle, circle generating algorithm, midpoint circle algorithm, ellipse generating algorithm, midpoint ellipse algorithm, polynomial and spline curves, parallel curve algorithms, curve function, filled area primitives, line attributes, curve attributes, area fill attributes, clippings, clipping lines.

2D transformation, matrix representation of 2D, composite transformation, translation, rotation, scaling, general pivot-point rotation, general fix scaling, other transformations, reflection, shear, affine transformations and transformation functions, window-to-view port transformation, clipping operation, point, line, Cohen-Sutherland line clipping, polygon clipping.

3D display method, parallel projection, perspective projection, visible line identification, depth cueing, surface rendering, polygon surface, table, equation, mashes, splines, representation, cubic spline interpolation, Bezeir Curves and surfaces, B-spline and surfaces, Beta-spline, 3D transformation, rotation, scaling, composite transformation, 3D transformation function.

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-105Java Programming & Object Oriented Concept

Introduction to Java, characteristics, Object oriented programming, data types, variables, arrays Control statements: selection, iteration, jump statements, operators, Introduction to classes, class fundamentals, constructor, methods, stack class, inheritance, creating multilevel hierarchy, method over riding, Packages and interfaces, exception handling, multi-threaded programming, I/O applets Java Library, string handling, string comparison, string buffer

Servlet Structure, Servlet packaging, HTML building utilities, Lifecycle, Single Thread model interface, Handling Client Request: Form Data, Handling Client Request: HTTP Request Headers. Generating server Response: HTTP Status codes, Generating server Response: HTTP Response Headers, Handling Cookies, Session Tracking.

Overview of JSP Technology, Need of JSP, Benefits of JSP, Advantages of JSP, Basic syntax, invoking Java code with JSP scripting elements, creating Template Text, Invoking java code from JSP, Limiting java code in JSP, using JSP expressions, comparing servlets and JSP, writing scriptlets. Using Scriptlets to make parts of JSP conditional, using declarations, declaration example. Controlling the Structure of generated servlets: the JSP page directive, import attribute, session attribute, isElignore attribute, buffer and auto flush attributes, info attribute ,errorPage and is errorPage attributes, is Thread safe Attribute, extends attribute, language attribute, Including files and applets in JSP Pages, using java beans components in JSP documents

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-106Computer Networks & Wireless Protocols

Introduction to Data communications and networking, protocols, standards and architecture, topology, transmission mode, OSI model, analog and digital signals, periodic and aperiodic signals, time and frequency domain, Fourier analysis concept.

Encoding digital to digital conversion, analog to digital conversion, digital to analog conversion, analog to analog conversion, transmission of digital data, DTE-DCE interface, EIA-232, EIA-449, X.21, modem, cable modem, guided and unguided, transmission media

Multiplexing, TDM, FDM, WDM, DSL, HDLC, error classification, types of errors, error detection, error correction, virtual redundancy check, longitudinal redundancy check, cyclic redundancy check.

Asynchronous transfer mode, protocol architecture, ATM cells, ATM layers, switches, circuit switching network and concepts, routing, packet switching, X.25, virtual circuit approach, point-to-point layers, link control protocol, network control protocol.

Enhancement over 2G, GPRS and EDGE network services and architectures, traffic dimensioning, CDMA2000 (1XRTT), WAP and SMS, migration path from 2G to 2.5G to 4G

UMTS basics, WCDMA interface, UTRAN architecture, establishment of UMTS speech cells, UMTS packet data (R99), high speech packet data handover and UMTS core network evolution

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-201Programming in Python

Programming basics and strings, numbers and operators, variables, making decisions

Functions, classes and objects, organizing programs, files and directories

Building modules, text processing,

Writing a GUI with Python, Accessing Databases

Python with XML, Network Programming, Programming with C, Numerical Programming,

Web Application and Web Services, Integrating Java with Python

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-202Programming in .NET with C#

Introduction to .NET, .NET Framework features & architecture, CLR, Common Type System, MSIL, Assemblies and class libraries. Introduction to visual studio, Project basics, types of project in .Net, IDE of VB.NET- Menu bar, Toolbar, Solution Explorer, Toolbox, Properties Window, Form Designer, Output Window, Object Browser. The environment: Editor tab, format tab, general tab, docking tab. visual development.

Variables -Declaring variables, Data Types, Forcing variables declarations, Scope & lifetime of a variable, Control flow statements: conditional statement, loop statement. Constants, Arrays, types of arrays, Collections.

Subroutines, Functions, Passing variable number of arguments,Optional Arguments, Returning value from function, Msgbox&Inputbox, overloading,constructor,inheritance,overriding,interfaces

Working with Forms : Loading, showing and hiding forms, controlling one form within another.Textbox, Label, Button, Listbox, Combobox, Checkbox,PictureBox, RadioButton, Panel, scroll bar, Timer, ListView, TreeView, toolbar, StatusBar.. OpenFileDialog, SaveFileDialog, FontDialog, ColorDialog, PrintDialog.LinkLabel.Designingmenus :ContextMenu, access &shorcut keys.

Database programming with ADO.NET – Overview of ADO, from ADO to ADO.NET, Accessing Data using Server Explorer. Creating Connection, Command, Data Adapter and Data Set with OLEDB and SQLDB.

Introduction to C#, variables, constants, identifiers, data types, expressions and operators, flow control and exception handling, control structures, properties, indexes, namespace, classes, objects, structures

Object oriented programming C#, pointers, delegates and events

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-203Software Engineering & Project Management

Concepts of Software Engineering, Software Characteristics, components applications, software Metrics and Models; Process and Product Metrics, Size metric, Complexity metric, McCabe's Cyclometic Complexity, Halsted Theory, Function Point Analysis.

System Development Life Cycle (SDLC) Steps, Water fall model, Prototypes, Spiral model.Planning and Software Project: Cost Estimation, Project Scheduling, Quality Assurance Plans, Project Monitoring Plans.

Software Development& Software Design : System design, detailed design, function oriented design, object oriented design user Interface design, Design level metrics: Phases, Process Models, Role of Management, Role of Metrics and Measurement, Software Quality factors

Coding and Testing: Programming Practices, verification, Monitoring and Control.Testing level metrics Software quality and reliability Clean room approach, software reengineering.

Testing & Reliability: Testing Fundamentals, Test case design, Functional Testing, Structural Testing, Test Plan activities during testing, Unit System , Integration Testing. Concept of Software Reliability, Software Repair and Availability, Reliability Models (JM, GO, MUSA Markov) Limitations of Reliability Models

Object-oriented analysis and design using UML

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-204Theory of Computation

Definition of Automation, finite automata, transition system, Finite State Systems, Basic definitions, Finite Automata, Regular Expressions, Deterministic Finite Automation (DFA), Non-deterministic Finite Automation (NFA), regular languages and regular sets, equivalence of DFA and NFA, minimizing the number of states of a DFA, NFA with E transitions, equivalence of DFA and NFA with E Transaction, Finite Automata with output, Equivalence of Moore and Mealy machine.

Regular Expression Formalism, Equivalence of regular expressions and finite automata, regular sets and their closure properties, pumping lemma for regular expressions, Application of regular expression.

Turing Machine: Elements, formalism, Transition graph for Turing machine, Complexity, Composite and iterative, Universal, multi-tape, multi-stack, multi-track Turing machine, Halting problem, recursively enumerable and recursive languages, function, TM Church's hypothesis,

Grammars: definition, notations, derivation process, derivation tree, context free language, ambiguous context free languages , simplification of context free grammar, normal forms, Chomsky hierarchy, Equivalence of right- linear and left – linear grammars, Equivalence of regular grammars and finite automata, pumping lemma for context free languages, Kuroda normal form.

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-205Data Warehouse & Data Mining

Introduction of data warehousing, basic concepts, data warehousing architecture , data characteristics, Reconciled data layers. Data transformation function, tools to support data reconciliation.

Data Modeling Techniques and Options: Dimensions and Query Hierarchies, Star Schema and Variants, Spatial Data: A Very Special Dimension, Storage Concerns and Planning Physical Database Design, Exploiting Parallel Technology, Indexes

Introduction to data mining, DM techniques, issues and challenges in Dm, Applications, association rules, Prior, Partition, Pincer-Search, Dynamic Itemset counting, FP-tree growth, Incremental, Boder Algorithm

Clustering Techniques, portioning, k-Medoid algorithm, Hierarchical, categorical clustering algorithm, Decision tree, best split, splitting indices and criteria, decision tree construction algorithm, CART, ID3, C4.5, CHAID, Decision tree construction with presorting, rain Forest, approximate methods, Boat, Pruning Technique

Data mining using NN, web mining, temporal and spatial data mining.

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-206Image Processing

Elements of Visual Perception, A Simple Image Formation Model, Basic Concepts in Sampling and Quantization, Representing Digital Images, Spatial and Gray-level Resolution, Zooming and Shrinking Digital Images,Some Basic Relationships Between Pixels, Linear and Nonlinear Operations.

Image Enhancement in the Spatial Domain: Some Basic Gray Level Transformations, Histogram Processing,Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

Image Enhancement in the Frequency Domain: Introduction to the Fourier Transform and the Frequency Domain, Smoothing Frequency-Domain Filters, Sharpening FrequencyDomain, Filters, Homomorphic Filtering.

Image Restoration: A Model of the Image degradation/Restoration process, Noise Models, Restoration in the Presence of Noise Only–Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Inverse Filtering,Minimum Mean Square Error (Wiener) Filtering,Constrained Least Square Filtering, Geometric Mean Filter.

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-301Cloud Computing

Introduction: Business and IT perspective, Cloud and virtualization, Cloud services requirements, cloud and dynamic infrastructure, cloud computing characteristics, cloud adoption.

Cloud models: Cloud characteristics, Measured Service, Cloud models, security in a public cloud, public verses private clouds, cloud infrastructure self-service.

Cloud at a service: Gamut of cloud solutions, principal technologies, cloud strategy, cloud design and implementation using SOA, Conceptual cloud model, cloud service demand.

Cloud solutions: Cloud ecosystem, cloud business process management, cloud service management, cloud stack, computing on demand, cloud sourcing.

Cloud offerings: Cloud analytics, Testing under cloud, information security, virtual desktop infrastructure, Storage cloud.

Cloud management: Resiliency, Provisioning, Asset management, cloud governance, high availability and disaster recovery, charging models, usage reporting, billing and metering.
Cloud virtualization technology: Virtualization defined, virtualization benefits, server virtualization, Hypervisor management software, Logical partitioning, VIO server, Virtual infrastructure requirements. Storage virtualization, storage area networks, network attached storage, cloud server virtualization, virtualized data center.

Cloud and SOA: SOA journey to infrastructure, SOA and cloud, SOA defined, SOA defined, SOA and IAAS, SOA based cloud infrastructure steps, SOA business and IT services.

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-302Artificial Intelligence

Definition of AI, Application of AI, knowledge-based systems, representation of knowledge organization and acquisition of knowledge

Introduction of prolog, variable, object, domain, clauses, recursion basic list manipulation function, predicates, input, output, local variables, iteration, recursion, arrays, database in prolog, rule order, goal order, cut trial prolog query.

Syntax, semantics of propositional logic, syntax and semantics of FOPL, conversion to clausal form, inference rule, resolution principles, non-deductive inference methods, representation using rules, truth maintenance system, predicate completion and circumscription, modal and temporal logics

Bayesian probabilistic inference, possible word representation, Dempster-Shafer Theory, Ad-Hoc methods, Expert system, natural language processing, machine learning

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-303Programming in ASP.NET

Introduction to .NET Framework: Genesis of .NET – Features of .NET–.NET binaries –Microsoft Intermediate Language – Meta Data –.NET types and .NET name spaces – CommonLanguage Runtime – Common Type System – Common LanguageSpecification –.NET Applications using command line compiler and visual studio .NET IDE.

Basics of ASP.NET: Introducing ASP .NET – Creating and deploying ASP .NETapplications – Web forms – web controls – working with events – rich web controls –custom web controls – validation controls – debugging ASP.NET pages.

Advanced ASP.NET: ASP.NET configuration – Business objects – HTTP Handlers –Caching in ASP.NET – ASP.NET security – localizing ASP.NET applications – deployment projects

Building Web Services: Introduction to web services – web services infrastructure – SOAP – building a web service – deploying and publishing web services – finding web services – consuming web services

ADO.NET: Basics of ADO.NET – Changes from ADO – Data Table – Data Views – DataSet – Data Relation Type – ADO.NET Managed Providers – OLEDB and SQL ManagedProviders – OLEDB Data Adapter Type.

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-304Information & Network Security

Introduction to Cryptography: Introduction To Security: Attacks, Services & Mechanisms, Security, Attacks, Security Services

Conventional Encryption: Classical Techniques, Conventional Encryption Model, and Steganography, Classical Encryption Techniques.

Modern Techniques: Simplified DES, Block Cipher Principles, DES Standard, DES Strength,Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operation.

Conventional Encryption Algorithms: Triples DES, Blowfish, International Data EncryptionAlgorithm, RCS, CAST-128, RC2 Placement & Encryption Function, Key Distribution,Random Number Generation, Placement of Encryption Function.

Public Key Encryption: Public-Key Cryptography: Principles of Public-Key Cryptosystems,RSA Algorithm, Key Management, Fermat's &Euler's Theorem, Primality, The Chinese Remainder Theorem.

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)

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-305BIG DATA

What is big data, why big data, data, data storage and analysis, comparison with other systems, rational database management system, grid computing, volunteer computing, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies

Introduction to HADOOP – open source technologies, cloud and big data, mobile business intelligence, crowd sourcing analytics, inter and trans-firewall analytics.

Introduction to NoSQL, aggregate data models, aggregates, key-value and document data models, relationships, graph databases, schema less databases, materialized views, distribution models, shading, version, map reduce, partitioning and combining, composing map-reduce calculations.

Basics of HADOOP, Data format, analyzing data with HADOOP, scaling out, HADOOP streaming, HADOOP pipes design of HADOOP distributed file system (HDFS), HDFS concepts, Java interface, data flow, HADOOP I/O, data integrity, compression, serialization, Avro, file-based data structures.

MAPREDUCE applications, MapReduce workflows, unit tests with MR Unit, test data and local tests, anatomy of MapReduce job run, classic Map-reduce, YARN, failures in classic Map-reduce and YARN, job scheduling, shuffle and sort, task execution, MapReduce types, input formats, output formats

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-306Grid Computing

Introduction: Grid Computing & Key Issues – Applications – Other Approaches – Grid Computing Standards – Pragmatic Course of Investigation.

Grid Benefits & Status of Technology: Motivations – History of Computing, Communications and Grid Computing – Grid Computing Prime Time – Suppliers and Vendors – Economic Value – Challenges.

Components of Grid Computing Systems and Architectures: Basic Constituent Elements-A Functional View – A Physical View – Service View.

Grid Computing Standards-OGSI: Standardization – Architectural Constructs – Practical View – OGSA/OGSI Service Elements and Layered Model – More Detailed View.

Standards Supporting Grid Computing-OGSA: Functionality Requirements – OGSA Service Taxonomy – Service Relationships – OGSA Services – Security Considerations.

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-401Web Programming

Cascading Style Sheets, **i**ntroduction, levels of style sheets, style specification formats, selector forms, property value forms, font properties, list properties, color, alignment of text, the box model, background images, the and tags, conflict resolution.

Overview of JavaScript, object orientation and JavaScript, syntactic characteristics, primitives, operations, and expressions, screen output and keyboard input, control statements, object creation and modification, arrays, functions, constructors, pattern matching using regular expressions, errors in scripts.

JavaScript execution environment, the Document Object Model, elements access in JavaScript, events and event handling, handling events from body elements, handling events from text box and password elements, the DOM2 event model, the navigator object, DOM tree traversal and modification, positioning elements, moving elements, element visibility, changing colors and fonts, dynamic content, stacking elements, locating the mouse cursor, reacting to a mouse click, slow movement of elements, dragging and dropping elements.

Browser Management and Media Management,classes, constructors, object-oriented techniques in JavaScript,object constructor and prototyping,sub classes and super classes –JSON – jQueryand AJAX.

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca–402 Mobile Application Development

Introduction to mobile communication and computing: Introduction to mobile computing, Novel applications, limitations and GSM architecture, Mobile services, System architecture, Radio interface, protocols, Handover and security. Smart phone operating systems and smart phones applications

Fundamentals of Android Development: Introduction to Android., The Android 4.1 Jelly Bean SDK, Understanding the Android Software Stack, Installing the Android SDK, Creating Android Virtual Devices, Creating the First Android Project, Using the Text View Control, Using the Android Emulator, The Android Debug Bridge (ADB), Basic Widgets Understanding the Role of Android Application Components, Event Handling , Displaying Messages Through Toast, Creating and Starting an Activity, Using the Edit ext Control.

The Android Debug Bridge (ADB), basic widgets understanding the role of Android Application Components, event handling, displaying messages through toast, creating and starting an activity, using the Edit ext Control Building Blocks for Android Application Design, Laying Out Controls in Containers, utilizing resources and media

Using Selection Widgets and Debugging Displaying and Fetching Information Using Dialogs and Fragments Advanced, Android Programming: Internet, Entertainment, and Services, Implementing drawing and animations, displaying web pages and maps, communicating with SMS and emails, creating and using content providers: creating and consuming services, publishing android applications

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-403Machine Learning

Introduction
Definition of learning systems, Goals and applications of machine learning, designing a learning system: training data, concept representation, function approximation, well posed learning problems, perspective & issues in machine learning

Concept Learning
The concept learning task, Concept learning as search through a hypothesis space General-to-specific ordering of hypothesis. FIND-S, candidate elimination algorithm

Decision Tree Learning
Introduction, Decision tree representation, appropriate problems for decision tree learning, basic decision tree algorithm, hyperspace search in decision tree learning, issues in decision tree learning

Bayesian Learning
Probability theory and Bayes rule. Naive Bayes learning algorithm, Parameter smoothing, Generative vs. discriminative training, Logistic regression, Bayes nets and Markov nets for representing dependencies

Instance Based &Unsupervised Leaning
Introduction, K-nearest neighbour learning, case based learning, radial basis functions learning from unclassified data. Clustering, HierarchicalAgglomerative Clustering, K-means partitional clustering, Expectation maximization (EM) for soft clustering, Semi-supervised learning with EM using labeled and unlabeled data

Duration: 3 hours	Max Marks: 80 Min Marks: 32

2Ymca-404Soft Computing & Applications

Basic of neural Networks, inference and learning, classification of models, association of models, optimization and self-organization models, definition of learning, supervised and unsupervised learning. AI learning, neural network learning, knowledge based neural network, rule based, decision tree based, constraint based neural network.

Incremental learning, symbolic methods, neural network approaches, applications of neural networks, neural networks as mathematical models, expert system heuristic, hierarchical models, hybrid, parallel, control network discovery, symbolic methods, neural network methods.

Genetic Algorithm, evolutionary programming, classifier system, genetic programming parse tree, mathematical foundation of GA variant of GA (Hybrid and fuzzy GA enhancement of genetic programming application

MANUAL FOR PREPARATION OF DISSERTATION THESIS

1. GENERAL

The manual is intended to provide broad guidelines to the MCA – Lateral Entry candidates in the preparation of the thesis. In general, the thesis shall report, in an organized and scholarly fashion, an account of original research work of the candidate leading to the discovery of new facts or techniques or correlation of facts already known (analytical, experimental, hardware oriented, etc.)

2. NUMBER OF COPIES TO BE PREPARED

At least four copies are to be prepared, one each for External Examiner, Guide, Departmental Library and self. The copies should be submitted to the Controller of Examination through the Head of the Department before the due date.

3. ARRANGEMENT OF CONTENTS OF THESIS

The sequence in which the thesis material should be arranged and bound should be as follows:

1. Title page
2. Bonafide Certificate
3. Abstract
4. Acknowledgement
5. Table of Contents
6. List of Tables
7. List of Figures
8. List of Symbols, Abbreviations or Nomenclature (Optional)
9. Chapters
10. References
11. Appendices

The Tables and Figures shall be introduced in the appropriate places.

4. PAGE DIMENSIONS AND MARGIN

The thesis should be prepared on good quality white paper preferably not lower than 80gsm. Standard A4 size paper should be used for preparing the copies. The final thesis should have the following page margins:

Top edge	: 30 to 35 mm
Left side	: 35 to 40 mm
Bottom edge	: 25 to 30 mm
Right side	: 20 to 25 mm

Tables and figures should conform to the margin specifications. Large size figures should be photographically or otherwise reduced to the appropriate size before insertion.

5. MANUSCRIPT PREPARATION

The headings of all items 2 to 11 listed in section 3 should be typed in capital letters without punctuation and centered 50mm below the top of the page. The text should commence 4 spaces below this heading.

5.1 Title Page – A specimen copy of the title page is given in Appendix 1.

5.2 Bonafide Certificate – A specimen copy of the bonafide certificate is given in Appendix 2.

5.3 Abstract – Abstract should be an essay type of narrative not exceeding 600 words, outlining the problem, the methodology used for tackling it and a summary of the findings.

5.4 Acknowledgement – It should be brief and preferably should not exceed one page when typed double spacing.

5.5 Table of Contents – The table of contents should list all material following it as well as any material which precedes it. The title page, bonafide certificate and acknowledgement will not find a place among the items listed in the table of contents. One and a half spacing should be adopted for typing the matter under this head.

5.6 List of Tables – The list should use exactly the same captions as they appear above the tables in the text. One and a half spacing should be adopted for typing the matter under this head.

5.7 List of Figures – The list should use exactly the same captions as they appear below the figures in the text. One and a half spacing should be adopted for typing the matter under this head.

5.8 List of Symbols, Abbreviations and Nomenclature – One and a half spacing should be adopted for typing the matter under this head. Standard symbols and abbreviations should be used.

5.9 Chapters – The chapters may be broadly divided into 3 parts:

i. Introductory chapter,
ii. Chapters developing the main theme of the thesis,
iii. Results, Discussions and Conclusions.

The main text will be divided into several chapters and each chapter may be further divided into several divisions and sub-divisions.

- Each chapter should be given an appropriate title.
- Tables and figures in a chapter should be placed in the immediate vicinity ofthe reference where they are cited.
- Footnotes should be used sparingly. They should be typed single space and placed directly underneath in the very same page which refers to the material they annotate.

5.10 List of References – When works of other researchers are used either directly or indirectly the origin of the material thus referred to as appropriate places in the thesis should be indicated. A paper, a monograph or a book may be designated by the name of the first author followed by the year of publication, placed inside brackets at the appropriate place of reference. The citation may assume any one of the following forms:

Examples of citation

i. An improved algorithm has been adopted in literature (Tsychiya 1980)
ii. Jankins and Walts (1968) have dealt at length with this principle.
iii. The problem of mechanical manipulators has been studied by Shin et al (1984) and certain limitations of the method used has been pointed out by Shin et al (1984 a)

The listing should be typed 4 spaces below the heading REFERENCES inalphabeticalorder in single spacing left-justified. The reference material should be listed in the alphabetical order of the first author. The name(s) of the author(s) should beimmediately followed by the year and other details. A typical illustrative list is given below.

REFERENCES

1. Ariponnammal S. and Natarajan S. (1994) 'Transport Phonomena of Sm Sel-x Asx', Pramana Journal of Physics, Vol. 42, No.5, pp.421-425.
2. Barnard R.W. and Kellogg C. (1980) 'Applications of Convolution Operators to Problems in Univalent Function Theory', Michigan Mach. J., Vol 27, pp 81-94.
3. Jankins G.M. and Walts D.G. (1968) 'Spectral Analysis and its Applications', Holder Day, San Francisco.
4. Shin K.G. and McKay N.D. (1984) 'Open Loop Minimum Time Control of Mechanical Manipulations and its Applications', Proc. Amer. Contr. Conf., San Diego, CA, pp.1231-1236.

5.11 Appendices – Appendices are provided to give supplementary information, which if included in the main text may serve as a distraction and cloud the central theme under discussion.

- Appendices should be numbered using Arabic numerals, e.g. appendix 1, Appendix 2, etc.
- Appendices, tables and references appearing in appendices should be numbered and referred to at appropriate places just as in the case of chapters.

5.12 Tables and Figures – The word table means tabulated data in the body of the thesis as well as in the appendices. All other material used in the body of the thesis and appendices such as charts, graphs, maps, photographs and diagrams may be designated as figures.

- A table or figure including caption should be accommodated within the prescribed margin limits and appear on the page following the page where their first reference is made.
- Tables and figures half page or less in length may appear on the same page along with the text. However, they should be separated from the text both above and below by triple spacing.
- All tables and figures should be prepared on the same paper or material used for the preparation of the rest of the thesis.
- Two or more small tables or figures may be grouped if necessary in a single page.
- Photographs, if any, should be included in colourxerox form or as colour printouts of scanned images. More than one figure can be included in a page.

6. TYPING INSTRUCTIONS

6.1 General Uniformity of the font (say, Times New Roman) in the entire thesis shall be observed. A sub-heading at the bottom of a page must have atleast two full lines below it or else it should be carried over to the next page. The last word of any page should not be split using a hyphen. Double spacing should be used for typing the bonafide certificate and acknowledgement. One and a half spacing should be used for typing the general text. Single spacing should be used for typing:

i. Long Tables
ii. Long quotations
iii. Foot notes
iv. Multiline captions
v. References All quotations exceeding one line should be typed in an indentedspace - the indentation being 15mm from either margins.

6.2 Chapters:

The format for typing chapter headings, division headings and sub division headings areexplained through the following illustrative examples.

Chapter heading: CHAPTER 1
INTRODUCTION
Division heading: 1.1 OUTLINE OF THESIS
Sub-division heading: 1.1.2. Literature review

The word CHAPTER without punctuation should be centered 50mm down from the top of the page. Two lines below, the title of the chapter should be typed centrally in capital letters. The text should commence 4 lines below this title. The division and sub-division captions along with their numberings should be left-justified. The typed material directly below division or sub-division heading should commence 2 spaces below it. Within a division or sub-division paragraphs are permitted. Every paragraph should commence 3 spaces below the last line of the preceding paragraph.

7. NUMBERING INSTRUCTIONS

7.1 Page Numbering

All page numbers (whether Roman or Arabic) should be typed without punctuation on the upper right hand corner 20mm from top with the last digit inline with the right hand margin. The preliminary pages of the thesis (such as title page, acknowledgement, table of contents, etc.) should be numbered in lower case Roman numerals. The title page will be numbered as (i) but this should not be typed. The page immediately following the title page shall be numbered (ii)and it should appear at the top right hand corner as already specified. Pages of main text, starting with Chapter 1 should be consecutively numbered using Arabic numerals.

7.2 Numbering of Chapters, Divisions and Sub-8 Divisions. The numbering of chapters, divisions and sub-divisions should be done using Arabic numerals only and decimal notation should be used for numbering the divisions and sub-divisions within a chapter. For example, sub-division 4 under division 3 belonging to Chapter 2 should be numbered as 2.3.4. The caption for the sub-division should immediately follow the number assigned to it. Every chapter beginning with the first chapter should be serially numbered using Arabic numerals.

7.3 Numbering of Tables and Figures Tables and figures appearing anywhere in the thesis should bear appropriate numbers. The rule for assigning such numbers is illustrated through an example. Thus, if a figure in Chapter 3, happens to be the fourth then assign Fig. 3.4 to that figure. Identical rules apply for tables except that the word Fig. is replaced by the word Table. If figures (or tables) appear in appendices then figure 3 in Appendix 2 will be designated as Fig. A2.3. A table may be continued into the next page, but no line should be drawn underneath an

unfinished table. The top line of the table continued into the next page should, for example, read Table 2.1 (continued) placed centrally and underlined.

7.4 Numbering of Equations: Equations appearing in each chapter or appendix should be numbered serially, the numbering commencing afresh for each chapter or appendix. Thus, for example, an equation appearing in Chapter 2, if it happens to be the eighth equation in that chapter should be numbered (2.8) thus: … (2.8) while referring to this equation in the body of the thesis it should be referred to as Eqn. 2.8.

8. BINDING SPECIFICATIONS

The thesis should be bound using flexible cover of thick white or blue art paper. The cover should be printed in black letters and the text for printing should be identical to what has been prescribed for the title page.

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