TEACHING AND EXAMINATION SCHEME

Master of Computer Applications (2 Years)

W.E.F. 2020 - 2021

(Choice Based Credit System)

Semester I

Paper Name (Theory)		Lec	Tut	Ex Hrs	Max Marks		Credits
					Sess	Sem Ex	
Core Paper							
2Ymca-101	Open Source Technology	5	1	3	20	80	4
2Ymca-102	Database Technology	5	1	3	20	80	4
2Ymca-103	C Programming	5	1	3	20	80	4
2Ymca-104	Computer Graphics	5	1	3	20	80	4
2Ymca-105	Java Programming	5	1	3	20	80	4
2Ymca-106	Computer Networks	5	1	3	20	80	4
				TOTAL	**120**	**480**	**24**

Paper Name (Practical)		Pr Hrs	Ex Hrs	Max Marks	Credits
2Ymca-107	Lab-Open Source	4	3	50	**2**
2Ymca-108	Lab-Database Technology	4	3	50	**2**
2Ymca-109	Lab-C Programming & Computer Networks	4	3	50	**2**
2Ymca-110	Lab-Java Programming & Computer Graphics	4	3	50	**2**
2Ymca-111	Anandam*				**2**
			TOTAL	**200**	**32**

Total of Theory & Practical Marks& Credits	**800**	**32**

*Anandam credit is not counted in Grade Point Average

Semester II

Paper Name (Theory)		Lec	Tut	Ex Hrs	Max Marks		Credits
					Sess	Sem Ex	
Core Paper							
2Ymca-201	Programming in Python	5	1	3	20	80	**4**
2Ymca-202	Programming in .NET	5	1	3	20	80	**4**
2Ymca-203	Software Engineering	5	1	3	20	80	**4**
2Ymca-204	Web Development	5	1	3	20	80	**4**
2Ymca-205	Data Warehouse & Data Mining	5	1	3	20	80	**4**
2Ymca-206	Image Processing	5	1	3	20	80	**4**
				TOTAL	**120**	**480**	**24**

Paper Name (Practical)		Pr Hrs	Ex Hrs	Max Marks	Credits
2Ymca-207	Lab-Python	4	3	50	**2**
2Ymca-208	Lab-.NET & Web Development	4	3	50	**2**
2Ymca-209	Lab-Data Mining	4	3	50	**2**
2Ymca-210	Lab-Image Processing	4	3	50	**2**
2Ymca-211	Anandam*				**2**
			TOTAL	**200**	**32**

Total of Theory & Practical Marks & Credits	**800**	**32**

*Anandam credit is not counted in Grade Point Average

TEACHING AND EXAMINATION SCHEME

Master of Computer Applications (2 Years)

W.E.F. 2021 - 2022

(Choice Based Credit System)

Semester III

Paper Name (Theory)		Lec	Tut	Ex Hrs	Max Marks		Credits
					Sess	Sem Ex	
Core Paper							
2Ymca-301	Cloud Computing	5	1	3	20	80	4
2Ymca-302	Deep Learning	5	1	3	20	80	4
2Ymca-303	Programming in ASP.NET	5	1	3	20	80	4
2Ymca-304	BIG DATA	5	1	3	20	80	4
2Ymca-305	Grid Computing	5	1	3	20	80	4
Elective							
2Ymca-306a	Information & Network Security	5	1	3	20	80	4
2Ymca-306b	Theory of Computation						
				TOTAL	**120**	**480**	**24**

Paper Name (Practical)		Pr Hrs	Ex Hrs	Max Marks	Credits
2Ymca-307	Lab-ASP.NET	4	3	50	**2**
2Ymca-308	Lab-Deep Learning	4	3	50	**2**
2Ymca-309	Lab-BIG DATA	4	3	50	**2**
2Ymca-310	Lab-Grid Computing	4	3	50	**2**
2Ymca-311	Anandam*				**2**
			TOTAL	**200**	**32**

Total of Theory & Practical Marks & Credits	**800**	**96**

*Anandam credit is not counted in Grade Point Average

Semester IV

Paper Name (Theory)		Lec	Tut	Ex Hrs	Max Marks		Credits
					Sess	Sem Ex	
Core Paper							
2Ymca-401	Web Programming	5	1	3	20	80	4
2Ymca-402	Mobile Application Development	5	1	3	20	80	4
2Ymca-403	Machine Learning	5	1	3	20	80	4
2Ymca-404	Industrial Dissertation	5	1	3	40	160	8
Elective							
2Ymca-405a	Data Science with R	5	1	3	20	80	4
2Ymca-405b	Spatial Database Management System						
				TOTAL	**120**	**480**	**24**

Paper Name (Practical)		Pr Hrs	Ex Hrs	Max Marks	Credits
2Ymca-406	Lab-Web Programming	4	3	50	2
2Ymca-407	Lab-Mobile Application Development	4	3	50	2
2Ymca-408	Lab-Data Science & Machine Learning	4	3	50	2
2Ymca-409	Seminar	4	3	50	2
2Ymca-410	Anandam*				2
			TOTAL	**200**	**32**

Total of Theory & Practical Marks & Credits	**800**	**32**

*Anandam credit is not counted in Grade Point Average

Scheme of Examination

(For M. C. A. {2 Years} – Choice Based Credit System)

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) / Vocational / BSC (Maths/Bio) / (B.A. or B.Com with Math as one of the subjects in graduation) with at least 50% marks in aggregate. Admission is strictly on the basis of merit.

Scheme of Examination
For M. C. A. (2 Years)

Reg. 17 (b)

The examination for the Master of Computer Applications (2 Years) 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.(2 Years): BCA/BSC (CS)/BSC (IT) / Vocational / BSC (Maths/Bio) / (B.A. or B.Com with Math as one of the subjects in graduation)with at least 50% 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 then for the passing marks, i.e. 25% 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.

Anandam Curriculum:

The Anandam curriculum aims to instill the joy of giving in young people, turning them into responsible citiztens who will build a better society.

1. Students will be expected to
    - Do at least one act of individual service each day
    - Record this act of service in a dedicated Register/Personal Diary (PD)
    - Share this Register/Personal Diary in the 30-minute Anandam time slot dedicated by the college
    - Undertake one group service project or 64 hours every term (outside college hours)
    - Upload the report on the group project on the Anandam platform
    - Participate in a sharing and presentation on the group service in the discussion sessions held once a month
2. Inputs from the College
    - Faculty will review every student's Register/PD to see it they recorded an act of goodness for that day
    - The act of goodness will not be evaluated – just if it was recorded or not
    - The faculty will mentor the group service projects. They will strive to mobilize the required resources and support for the group service projects.
    - Mentos to guide and review the student's activities on a regular basis
    - There will be one Anandam coordinator to monitor the program in every college/university/teaching unit

3. Evaluation

    In order to be eligible for the credits, the students are expected to complete a minimum of 32 entries (40%) per semester/in six months in their Register/Personal Diaries. In order to be eligible for the special awards, all the group members are expected to have completed a minimum of 48 entries (60%) per semester/in six months of the same.

Time available per semester:

- Register/Personal Diary: A minimum of 32 entries (40%) and a maximum of 80.
- Project Participation: 2 hours X 8 days X 4 months = 64 hours

	Project 1 (Semester 1)	**Project 2 (Semester 2)**
Two Credits	Total: 64 hours Grading = 32 hours: C grade >32 to <= 44: B grade >44 to <= 54: A grade >54 to <= 64: O grade	
Two Credits		Total: 64 hours Grading = 32 hours: C grade >32 to <= 44: B grade >44 to <= 54: A grade >54 to <= 64: O grade

The grading awarded to a student will be shown in mark sheet but will not be considered in the overall percentage of the semester.

Grade Points awarded in the mark sheet based on marks obtained in theory and practical

Grade	Mark m out of 100	Grade Points	Grade	Mark m out of 100	Grade Points
O+	m ≥ 95	10	E	36 ≤ m < 45	4
O	85 ≤ m < 95	9	F	m < 36	3
A	75 ≤ m < 85	8			
B	65 ≤ m < 75	7			
C	55 ≤ m < 65	6			
D	45 ≤ m < 55	5			

Award of Class

CGPA	**Class**
CGPA < 4	Fail
4 < CGPA < 5	Pass
5 < CGPA < 6	II Class
6 < CGPA < 7	I Class
CGPA > 7	Distinction

Duration: 3 hours	Max Marks: 80

2Ymca-101Open Source Technology

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

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,

Files and Directories – File Concept, File types, File system Structure, file metsdata – Inodes, kernel support for file, system calls for file I/O operations – open, create, read, write, close, Iseek, dup2, file status information – sata family, file and record locking – fcntifuction, file permissions – chmod, fchmod, file ownership – chown, Ichown, fchown, links – soft links and hard links – symlink, link, unlink.

Directories – Creating, removing and changing Directories – mkdir, rmdir,chdir, obtaining current working directory – getcwd, Directory contents, Scanning Directories – opendir, readdir, closedir, rewinddir functions.

Process – process concept, Process environment – environment list, environment variables, getenv, setenv, system call interface for process management – fork, vfork, exit, wait, waitpid, exec family,

Shell programming with Bourne again shell (bash) – Introduction, shell respnsibilites, pipes and Redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shall variables, command substitutions, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, fictions, debugging shell scripts.

Duration: 3 hours	Max Marks: 80

2Ymca-102 Database Technology

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.

Entity-Relationship Model, entity, entity set, attributes, tuples, domains, keys, super and candidate key, overview of hierarchical, network and relational models, comparison of network, hierarchical and relational models, file organization

Relational Model: Storage organization for relations, relational algebra, set operators, relational operators, decomposition of relation schemes, functional dependencies, 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

2Ymca-103 C Programming

Overview of C Language: 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,

Duration: 3 hours	Max Marks: 80

2Ymca-104 Computer Graphics

Note: Practical will be done in MATLAB

Interactive graphics, passive graphics, advantage of interactive graphics, classification of application

Point, line, DDA algorithm, Bresenham's line algorithm, circle generating algorithm, polynomial and spline curves algorithms, clipping operation, point, line, Cohen-Sutherland line clipping

2D transformation, matrix representation of 2D, composite transformation, translation, rotation, scaling, general pivot-point rotation, general fix scaling, reflection, shear, affine transformations and transformation functions

Parallel projection, perspective projection, visible line identification, depth cueing, surface rendering, mashes, splines, 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

2Ymca-105Java Programming

Introducing Data Types and Operators

Java's Primitive Types, Literals, Variables, operators, Type conversion in Assignments, Cast, Operator Precedence, Expressions.

Program Control Statements

Input characters from the Keyword, if statement, Nested ifs, if-else-if Ladder, Switch Statement, Nested switch statements, for Loop, Enhanced for Loop, While Loop, do-while Loop, Use break, Use continue, Nested Loops**.**

Introduction to Classes, Objects and Methods

Class Fundamentals, Reference Variables and Assignment, Methods, Using Parameters, Constructors, Parameterized Constructors, The new operator.

More Data Types and Operators

Arrays, Multidimensional Arrays, Alternative Array Declaration Syntax, Assigning Array References, Using the Length Member, The Bitwise operators.

String Handling

String Fundamentals, The String Constructors, Three String-Related Language Features, The Length() Method, Obtaining the characters within a string, String comparison, using indexOf() and last IndexOf(), Changing the case of characters within a string, String Buffer and String Builder, Method Overloading, Overloading Constructors, Recursion

Inheritance

Inheritance Basics, Member Access and Inheritance, Constructors and Inheritance, Using super to Call Super class constructors, Using super to Access Super class Members, Creating a Multilevel Hierarchy,

Interfaces

Interface Fundamentals, Creating an Interface, Implementing an Interface, Using Interface References, Implementing Multiple Interfaces, Interfaces can be extended

Packages

Package Fundamentals, Packages and Member Access, Importing Packages, Static Import

Exception Handling

The Exception Hierarchy, Exception Handling Fundamentals, using Multiple catch clauses, Catching subclass Exceptions, try blocks can be nested, Throwing an Exception

Multithreaded Programming

Multithreading fundamentals, The Thread Class and Runnable Interface, Creating Thread, Creating Multiple Threads, Determining When a Thread Ends, Thread Priorities, Synchronization, Thread Communication using notify(), wait() and notifyAll(), suspending, Resuming and stopping Threads.

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.

Duration: 3 hours	Max Marks: 80

2Ymca-106 Computer Networks

Introduction to Data communications and networking, protocols, standards and architecture, topology, transmission mode, OSI model, time and frequency domain, Fourier analysis concept. Encoding digital to digital conversionMultiplexing, 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

Basics of NS2 - About NS2 and NAM, Purpose and Installation, Background and architecture, OTcl and C++ interfaces, Trace files and formats, Protocol support for NS2, Simulation object, Basic Syntax, Node creation, Finish procedure, Running NS2 and NAM, Invoking external commands within NS2, Nodes & Agents, Working of NS2 commands

Wired networks- Creating links, Sending traffic through NS2 links, Setting link parameters, Routing protocol support, Scenarios

Wireless networks - Additional parameters, Setting node positions, GOD object and Topography, Protocol support, Scenarios

Duration: 3 hours	Max Marks: 80

2Ymca-201 Programming in Python

Python Basics: Keywords, Identifiers, Indents, Input Output Basic Syntax, Variable, Dynamic Typing, Data Types (Mutable and Immutable), Built-in Conversion Methods.

Operator: Arithmetic, Comparison, Logical, Identity, Membership.

Control Statements: Conditional (If , If- else, Elsif, Nested if-else), Looping (While, For, Nested loops), Break, Continue, Pass, range().

Array: Introduction, Creation, Traverse, Insertion, Deletion, Search, Update.

String: Introduction, Types, Escape Sequences, Formatting, Built-in Methods : Capitalize, Upper, Lower, Title, Find, Count, isAlpha(), isDigit(), isLower, isUpper, Basic Operations : Accessing, Updating, Concatenation.

List & Tuple: Introduction, Accessing, Operators, Built-in Methods (Len, Max, Min, Append, Insert, Remove, Pop, Reverse, Sort, List), Basic Operations (Updating, Delete, Concatenation, Indexing, Slicing), Regular Expressions, List as a stack, List as a Queue.

Set: Introduction, Accessing, Built-in Methods (Add, Update, Clear, Copy, Discard, Remove), Operations (Union, Intersection, Difference).

Dictionary: (Single Dimensional) Introduction, Accessing, Updating, Deleting, Viewing values in dictionaries, Built-in Methods (Len, Max, Min, Pop, Clear, Items, Keys, Values, Update), Sorting and Looping, Nested Dictionaries.

Function: Defining, Calling, Function Arguments (Required, Keyword, Default, Variable Length) Anonymous Functions, Global and Local Variables, Recursion, lambda function.

Modules: Introduction, Importing Module, Built-in Modules (Math, Statistics, Random), dir (),

Package: Creating, Installing, Importing Modules from the Package.

Errors & Exception: Introduction of Errors & Exceptions, Error Types, Exception Handling - Introduction, Try, Except, Else, Finally, Raising Exceptions, Invoked Functions.

File Input-Output: Opening and Closing files, File Modes, Reading and Writing files, File Types, File Position, Rename, Delete Files, Dictionary methods.

Tuples: Creating, Utility, Accessing values, updating, deleting, basic operations, Assignment, returning multiple values, nested values.

Duration: 3 hours	Max Marks: 80

2Ymca-202 Programming in .NET

.NET Framework features & architecture, CLR, Common Type System, MSIL, Assemblies and class libraries, 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.

Duration: 3 hours	Max Marks: 80

2Ymca-203 Software Engineering

Concepts of Software Engineering, Software Characteristics, components applications, software Metrics and Models

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. Agile Development, Agility Principles Adaptive Software Development (ASD), Scrum, Dynamic Systems Development Method (DSDM), Crystal, Feature Driven Development (FDD), Lean Software Development (LSD), Agile Modeling (AM), Agile Unified Process (AUP)

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. Web Application Design and Development,

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

Testing & Reliability: Testing Fundamentals, Test case design, Functional Testing, Structural Testing, Test Plan activities during testing, Unit System , Integration Testing. Concept of Software Reliability

Duration: 3 hours	Max Marks: 80

2Ymca-204 Web Development

Basics of PHP: Introduction to PHP, what does PHP do? ,history of PHP , language basics ,data types , variables , expressions and operators , flow control statements , including code , embedding PHP in web pages.

Functions & Strings: Calling a function, defining a function, variable scope, function parameters, return values, variable functions, anonymous functions. Strings: Accessing individual characters, cleaning strings, encoding and escaping, comparing strings, manipulating and searching strings, regular expressions.

Arrays & Objects: Indexed vs. associative arrays, identifying elements of an array, storing data in arrays, multidimensional arrays, extracting multiple values, converting between arrays and variables, traversing arrays, sorting. Objects: Creating an object, accessing properties and methods, declaring a class, introspection.

MySQL Overview: Introduction, connecting to and disconnecting from the server , Entering queries , Creating and using a database , Creating and selecting a database , creating a table , loading data into a table , Retrieving information from a table , selecting all data , selecting particular rows , selecting particular columns , sorting rows , date calculations , working with NULL values , pattern matching , counting rows , using more than one tables.MySQL databases in PHP: Introduction, connecting to a MySQL database, querying the database, Retrieving and displaying the results, modifying data, deleting data.

Duration: 3 hours	Max Marks: 80

2Ymca-205 Data 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, Dynamic Itemset counting, FP-tree growth, , Incrementallearning

Clustering Techniques, k-Medoid algorithm, Hierarchical, categorical clustering algorithm, Decision tree, best split, splitting indices and criteria, decision tree construction algorithm, CART, ID3, rain Forest, Pruning Technique

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

Duration: 3 hours	Max Marks: 80

2Ymca-206 Image Processing

Note: Practical will be done in MATLAB

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

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

Duration: 3 hours	Max Marks: 80

2Ymca-301 Cloud 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.

Duration: 3 hours	Max Marks: 80

2Ymca-302 Deep Learning

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

Syntax, semantics of propositional logic, syntax and semantics of FOPL, conversion to clausal form, inference rule, resolution principles

Bayesian probabilistic inference, possible word representation, Dempster-Shafer Theory, Expert system, natural language processing

Introduction to Deep learning, Backpropagations algorithm, initialization, deep neural network, introduction of generative adversarial network, Markov decision process,RNN Basics, Advance RNN, LSTN, GRU, Bi directional neural network, shallow neural network.

Implementation with MATLAB: Heuristic search 8puzzle problem, missionaries and cannibals problems, water-jug problem, linear problem, block word problem, hill climbing methods and other AI related problems.

Duration: 3 hours	Max Marks: 80

2Ymca-303 Programming in ASP.NET

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

2Ymca-304 BIG 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.

Duration: 3 hours	Max Marks: 80

2Ymca-305Grid Computing

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

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

2Ymca-306a Information & 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, Key Distribution,Random Number Generation, Placement of Encryption Function.

Public Key Encryption: Public-Key Cryptography: Principles of Public-Key Cryptosystems,RSA Algorithm

Duration: 3 hours	Max Marks: 80

2Ymca-306b Theory 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.

Push down stack memory machine: Elements of PDM, Push down automata, finite automata vs. PDA, PDA accepting CFLs, DPDA vs. NPDA, Equivalence of CFG and PDA

Parsing Techniques: Parsing, top down parsing, bottom-up parsing, automatic construction of bottom up parsers

Duration: 3 hours	Max Marks: 80

2Ymca-401 Web Programming

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

2Ymca–402 Mobile Application Development

Introduction to mobile communication and computing: Introduction to mobile computing, Novel applications, Mobile services, System architecture, protocols, Handover and security.

Fundamentals of Android Development: Introduction to Android., The Android 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.

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, Implementing drawing and animations, displaying web pages, communicating with SMS and emails, creating and using content providers: creating and consuming services, publishing android applications

Duration: 3 hours	Max Marks: 80

2Ymca-403 Machine Learning

Introduction: Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning.

Concept Learning: Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias.

Decision Tree Learning: Decision tree representation, Basic decision tree learning algorithm,

Artificial Neural Networks: Introduction, Neural Network representation, Backpropagation algorithm.

Bayesian Learning: Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS error hypothesis, ML for predicting probabilities, Naive Bayes classifier, Bayesian belief networks

Evaluating Hypothesis: Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis

Instance Based Learning: Introduction, k-nearest neighbor learning, locally weighted regression, radial basis function, cased-based reasoning

Duration: 3 hours	Max Marks: 80

2Ymca-405aData Science with R

Introduction to Regression Analysis, types of regression analysis, nonlinear regression, cross validation, principal component analysis, factor analysis, classification its types, linear, logistics , regression, support vector machine, k-nearest neighbour, Naïve Bayes classification, decision tree classification, random forest classification, evaluating classifier model, introduction clustering, clustering methods, association rules, Appriori algorithm

Introduction- Basic elements of R, data input and output, objects, attributes, number , vectors , array, matrix, lists,Reading data from files , controls statements, loops , functions, R scripts, data science overviews, data visualisation using graphics in R, GGplot 2, File format of graphics output, introduction to hypotheses, types of hypothesis, data sampling, confidence and significance level, hypothesis tests, parametric test, non-parametric test,

Duration: 3 hours	Max Marks: 80

2Ymca-405bSpatial Database Management System

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

Introduction to GIS, history, definition, hardware and software, raster based GIS, data acquisition, nature of spatial data, geo-referencing.

GIS functionality, data models, raster, vector, object oriented, coordinate system and geo-coding, data structures

Introduction to ArcView, creating maps, adding tabular data, choosing map projection, attribute features, aggregating data, creating and editing spatial data.

Introduction to VBA / .NET, data types, string, numbers, geo-coding, script writing, loops, interacting with views and themes, graphics, creating layout.

Spatial data overview, data mining primitives, generalization and specialization, spatial rules, classification algorithms, classification, clustering algorithms.

MANUAL FOR PREPARATION OF DISSERTATION THESIS

1. GENERAL

The manual is intended to provide broad guidelines to the MCA (2 Years)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 Symbols, Abbreviations or Nomenclature (Optional)
8. Chapters
9. References
10. 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 SmSel-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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