UNIVERSITY OF PUNE

GANESHKHIND, PUNE – 411 007

FACULTY OF MANAGEMENT

MASTER OF COMPUTER APPLICATIONS (MCA)

REVISED SYLLABUS & COURSE STRUCTURE

CHOICE BASED CREDIT SYSTEM 2013 (CBCS 2013)

MCA I effective from AY 2013-14
MCA II effective from AY 2014-15
MCA III effective from AY 2015-16

MCA (Part I) From Academic Year 2013-2014
MCA (Part II) From Academic Year 2014-2015
MCA (Part III) From Academic Year 2015-2016

(I)   Introduction:

1. The name of the programme shall be Master of Computer Application (M.C.A) Integrated.

2. The knowledge and skills required planning; designing and build Complex Application Software Systems are highly valued in all industry sectors including business, health, education and the arts. The basic objective of the education of the Masters programme in Computer Application (M.C.A) is to provide to the country a steady stream of the necessary knowledge, skills and foundation for acquiring a wide range of rewarding careers into the rapidly expanding world of the Information Technology.

3. The Job Opportunities are:
   - Many graduates begin their career as a junior programmer and, after some experience, are promoted as system analysts. Other seek entrepreneurial role in the computer world as independent business owners, software authors, consultants, or suppliers of systems and equipments. Career opportunities exist in such areas as management software and hardware sales, technical writing, training others on computer, consulting, software development and technical support.
   - Application areas include transaction processing (such as order processing, airline reservations, banking system), accounting functions, sales analysis, games, forecasting and simulation, database management, decision support and data communications.

4. Specific elective courses to be offered in functional areas have to depend on student preferences, faculty availability and needs of the user systems in the region in which the educational institution is located

5. The M.C.A program is a mix of computer-related and general business courses. The computer related courses use microcomputers to introduce standard techniques of programming; the use of software packages including word processors, spreadsheets and databases; system analysis and design Tools. The general business courses include the functional areas of management like accounting, sales, purchase, inventory, and production. The course would emphasis the study and creation of business applications, rather than more programming Inclusion of projects in each semester improves student's technical orientation, understanding of IT environment and domain knowledge. It will build right platform for students to become successful Software professional. This would emphasize on domain knowledge of various areas, which would help the students to build software applications on it. The students are exposed to system development in the information-processing environment, with special emphasis on

Management Information Systems and Software Engineering for small and medium computer systems. Inclusion of Business Management Labs will help students to acquire thorough knowledge of management practices in organization. Subjects such as ERP, Information Security, Business Intelligence will work as new application domains. Major focus is also given on Mobile technologies so that student can choose Mobile Technologies as their career options. Also, exposure to microcomputer technology, micro-based systems design and micro applications software, including network and graphical user interface systems is provided. Advanced Internet and Web technology includes variety of new technologies. Soft skills techniques are covered in every semester, which will lead to overall personality development of the student and that will help them in their placement activities and to sustain in the organization successfully.

6. The M.C.A. Integrated programme will be a full-time three years Master's Degree Course of Computer Applications.

7. The new Curricula would focus on learning aspect from three dimensions viz. Conceptual Learning, Skills Learning and Practical / Hands on.

8. The inclusion of projects at each semester ensures the focus on applying the skill learnt at respective levels. It will enhance student's capability to work on various technologies, creativity. It will make appropriate platform for students to work in IT Industry. It will also improve documentation, Coding, Design standards in students. Inclusion of project for subject such as Mobile Computing will definitely improve student's innovativeness and creativity. Student's technical orientation, eagerness will be enhanced.

9. The Institutes should organize placement programme for the M.C.A students, by interacting with the industries and software consultancy houses in and around the region in which the educational Institution is located.

10. At the end of the syllabus various certifications possible for each Semester is given in the list. Students should try to do maximum certifications in their learning phase only to make their resume rich.

11. Ordinarily, in each class, not more than 60 students will be admitted.

(II) (A) Eligibility for Admission:
The eligibility criteria for admission for the MCA course will be as decided by the Competent Authority (Director, Technical Education-Government of Maharashtra, &/or AICTE, New Delhi)
1. A candidate who has either passed with minimum 45% of marks in the aggregate (40% in case of candidate who is domiciled in Maharashtra and belongs to the reserved categories i.e. S.C., S.T., D.T., N.T., O.B.C., S.B.C.) **or**
appeared at the final year examination of a post 10+2 course of minimum three years duration leading to an award of Bachelor's Degree, in any discipline by the Association of Indian Universities or has passed with minimum 45% of marks in the aggregate (45% in case of candidate who is domiciled in Maharashtra and belongs to the reserved categories) or appeared at an examination considered equivalent there to would be treated as eligible

for Common Entrance Test(CET). Also the candidate must have passed mathematics/Business Mathematics & Statistics paper for 10+2 or graduation Level and Passed the CET conducted by Director of Technical Education MS with nonzero score for that year OR Passed the CET conducted by State level MCA Association with non-zero score for that year, Or Passed the AIMCET exam for that year.

2. However, a candidate would not be treated as eligible for admission to the MCA programme unless he/she passes his/her qualifying examination with requisite percentage on or before 30th September of the concerned academic year and also passes in the CET.

Generally, candidate passing all the papers that are generally covered over a period of minimum three years in one sitting are not considered eligible. Likewise, candidates possessing the qualifying degree although with requisite percentage of marks, whose duration is less than three years, are not considered eligible.

(B) Reservation of Seat:

The percentage of seat reserved for candidates belonging to backward classes only from Maharashtra State in all the Government Aided, Un-aided Institutions/Colleges and University Departments is as given below:

a)	Scheduled caste and Scheduled caste convert to Buddhism	13.0%
b)	Scheduled Tribes including those living outside specified areas	10.5%
c)	Vimukta Jain	(14 as specified)
d)	Nomadic Tribes (NT1)(28 before 1990 as specified)	2.5%
e)	Nomadic Tribes (NT2)(Dhangar as specified)	2.5%
f)	Nomadic Tribes (NT3)(Vanjari as specified)	2.5%
g)	Other Backward Class	19.0%
	Total	50.0%

1. Candidate claiming to belong to categories mentioned against (e),(f) and (g) above will have to furnish certificate from appropriate authority that the candidate's parents do not belong to Creamy Layer as per the relevant orders of the Government.
2. If any of the (a) to (g) categories mentioned above does not get the required number of candidates for the percentage laid down in a University area, the seats so remaining vacant shall be filled in from among the candidates of remaining reserved categories with reference to the inter-se-merit of all candidates belonging to the reserved categories from the same University area. However, the total reservation shall not exceed 50%. After doing so the seats remaining vacant shall be filled in with reference to inter-se-merit of all the candidates from the same University area.

(C) Selection Basis:
The selection would be done as per the guidelines given by the Director of Technical Education Maharashtra State time to time.

(III) Number of Lectures and Practical:

Lectures and Practical should be conducted as per the scheme of lectures and practical indicated in the course structure.

Practical Training and Project Work:

At the end of the sixth semester of study, a student will be examined in the course" Project Work".

1. Project work may be done individually or in groups in case of bigger projects. However if project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to see the progress of individual modules is independent of others.
2. Students should take guidance from an internal guide and prepare a Project Report on "Project Work" in 2 copies to be submitted to the Director of the Institute by 30th April. Whenever possible, a separate file containing source-code listings should also be submitted. Every student should also submit at least 4 typed copies of their project synopsis. Their respective Institutes should forward one copy of this synopsis to each of the external panel members, in advance of the project viva dates.
3. The Project Synopsis should contain an Introduction to Project, which should clearly explain the project scope in detail. Also, Data Dictionary, DFDs, ERDs, File designs and a list of output reports should be included.
4. The project Work should be of such a nature that it could prove useful or be relevant from the commercial/management angle.
5. The project report will be duly accessed by the internal guide of the subject and marks will be communicated by the Director to the University along with the marks of the internal credit for theory and practical to be communicated for all other courses.
6. The project report should be prepared in a format prescribed by the University, which also specifies the contents and methods of presentation.
7. The major project work carry 200 marks for internal assessment and 300 marks for external viva. The external viva shall be conducted by a minimum of two external examiners. The mini project work would be departmental.
8. Project work can be carried out in the Institute or outside with prior permission of the Institute.
9. Project viva-voce by the University panel will be conducted in the month of April-May.

(V) Assessment:

In total 160 credits represent the workload of a year for MCA program.
Total credits=160, 1 credit = 15 lecture Hrs,   100 Marks   SUBJECT= 4 CREDITS

Semester – I	27 credits
Semester – II	27 credits
Semester – III	27 credits
Semester – IV	27 credits
Semester – V	27 credits
Semester – VI	25 credits

Credit hours are based on the number of "contact hours" per week in class, for one term; formally, Semester Credit Hours. One credit will represent 12 to 15 teaching hours depending on technical and management subjects.

The final total assessment of the candidate is made in terms of an internal (concurrent) assessment and an external (university) assessment for each course. In total the internal(concurrent) to external(university) marks ratio is maintained 50 : 50.

In general

1. For each paper, 30% marks will be based on internal assessment and 70% marks for semester and examination (external assessment), unless otherwise stated.
2. The division of the 30 marks allotted to internal assessment of theory papers is on the basis of tutorial paper of 15 marks and seminars, presentations and attendance of 15 marks.
3. The marks of the mini project would be given on the basis of internal assessment of the project, project viva and project report.
4. The marks of the practical would be given on internal practical exam & oral.
5. The internal marks will be communicated to the University at the end of each semester, but before the semester and examinations. These marks will be considered for the declaration of the results.

(VI) Examination:

Examinations shall be conducted at the end of the semester i.e. during November and in May. However supplementary examinations will also be held in November and May.

(VII) Standard of Passing:

1. Every candidate must secure atleast Grade D in Concurrent Evaluation as well as University Examination as separate heads of passing for each course. Internal as well as external examination will be held in November and May.

Conversion of Marks to Grade Points & Grades: The marks shall be converted to grade points and grades using Table I below.

Table I: Points Grading System

Sr. No.	Marks	Grade	Grade Point
1	100 – 75	O – Outstanding	06
2	74 – 65	A – Very Good	05
3	64 -55	B – Good	04
4	54 – 50	C – Average	03
5	49 – 45	D – Satisfactory	02
6	44 – 40	E – Pass	01
7	39 – 0	F – Fail	00

(VIII) Reassessment of Internal Marks:

In case of those who have secured less than passing percentage of marks in internal i.e. less than 40%, the institute will administer a separate internal test. The results of which may be conveyed to the University as the Revised Internal Marks.

In case the result of the revised internal test is lower than the original marks then the original marks will prevail. In short, the rule is higher of the two figures should be considered.

However, the institute will not administer any internal test, for any subject for those candidates who have already secured 40% or more marks in the internal examination.

(IX) Backlog:

Candidates can keep terms for any semester of M.C.A., irrespective of the number of subjects in which he/she has failed in the previous MCA semester examinations.

(X) Board of Paper Setters /Examiners:

For each Semester and examination there will be one board of Paper setters and examiners for every course. While appointing paper setter /examiners, care should be taken to see that there is at least one person specialized in each unit course.

(XI) Class:

The performance of a student will be evaluated in terms of two indices, viz.

a) *Semester Grade Point Average (SGPA)* which is the Grade Point Average for a semester
b) *Cumulative Grade Point Average (CGPA)* which is the Grade Point Average for all the completed semesters at any point in time.

Semester Grade Point Average (SGPA): At the end of each semester, SGPA is calculated as the weighted average of GPI of all courses in the current semester in which the student has passed, the weights being the credit values of respective courses.

SGPA = Grade Points divided by the summation of Credits of all Courses.

$$SGPA = \frac{\sum \{C * GPI\}}{\sum C} \text{ for a semester.}$$

Where GPI is the Grade and C is credit for the respective Course.

Cumulative Grade Point Average (CGPA): Cumulative Grade Point Average (CGPA) is the grade point average for all completed semesters. CGPA is calculated as the weighted average of all GPI of all courses in which the student has passed up to the current semester.

Cumulative Grade Point Average (CGPA) for the Entire Course

$$SGPA = \frac{\sum \{C * GPI\}}{\sum C} \text{ for all semesters taken together.}$$

Where GPI is the Grade and C is credit for the respective Course.

Award ofGrade Cards: The University of Pune under its seal shall issue to the learners a grade card on completion of each semester. The final Grade Card issued at the end of the final semester shall contain the details of all courses taken during the entire programme for obtaining the degree.

Final Grades: After calculating the SGPA for an individual semester and the CGPA for entire programme, the value shall be matched with the grade in the Grade Points & Descriptors Table as per the Points Grading System and expressed as a single designated GRADE (as per Table II) such as O,A, B, etc....

Table II: Grade Points & Descriptors

Sr. No.	Marks	Grade	Grade Point
1	100 – 75	O – Outstanding	06
2	74 – 65	A – Very Good	05
3	64 -55	B – Good	04
4	54 – 50	C – Average	03
5	49 – 45	D – Satisfactory	02
6	44 – 40	E – Pass	01
7	39 – 0	F – Fail	00

The description of the final grades shall be as follows:

O: Outstanding (Excellent Analysis of the topic - 75% and above)
Accurate knowledge of the primary material, wide range of reading, logical development of ideas, originality in approaching the subject. Neat and systematic organization of content, elegant and lucid style.
A: Very Good (Excellent Analysis of the topic - 65 to 74 %)
Accurate knowledge of the primary material, acquaintance with seminal publications, logical development of ideas. Neat and systematic organization of content, effective and clear expression.
B : Good (Good Analysis and treatment of the topic - 55 to 64 %)
Basic knowledge of the primary material, logical development of ideas. Neat and systematic organization of content, effective and clear expression.
C : Average (Some important points covered – 50 to 54%)
Basic knowledge of the primary material, logical development of ideas. Neat and systematic organization of content, good language or clear expression.
D: Satisfactory (Some points discussed – 45 to 49%)
Basic knowledge of the primary material, some organization of content, acceptable language or expression.
E: Pass (Any two of the above – 40 to 44%)
F: Fail (None of the above – 0 to 39%)

A student who secures grade E or above in a course is said to have completed /earned the credits assigned to the course. A student who completed the minimum credits required for the MCA programme shall be declared to have completed the programme.

NOTE:

The Grade Card for the final semester shall indicate the following, amongst other details:

a)   Grades for concurrent and university evaluation, separately, for all courses offered by the student during the entire programme along with the grade for the total score.

b)   SGPA for each semester.

c)   CGPA for final semester.

d)   Total Marks Scored out of Maximum Marks for the entire programme, with break-up of Marks Scored in Concurrent Evaluation and University Evaluation.

e)   Marks scored shall not be recorded on the Grade Card for intermediate semesters.

f)   The grade card shall also show the 10-point scale and the formula to convert GPI, SGPA, and/or CGPA to percent marks.

(XII) Medium of Instruction:

The medium of Instruction will be English.

(XIII)   Clarification of Syllabus:

It may be necessary to clarify certain points regarding the course. The syllabus Committee should meet at least once in a year to study and clarify any difficulties from the Institutes.

(XIV)   Revision of Syllabus:

As the computer technology is changing very fast, revision of the syllabus should be considered every 3 years.

(XV)   Teaching and Practical Scheme:

Total credits=160, 1 credit = 15 lecture Hrs,   100 Marks SUBJETCT= 4 CREDITS

University of Pune

Syllabus for Masters of Computer Application

For Academic Year 2012-2013

Semester I					
Sr. No.	Subject Code	Subject Title	Internal	External	Credits
1	IT11	Computer Organization	30	70	4
2	IT12	C Programming	30	70	4
3	IT13	Software Engineering	30	70	4
4	BM11	Principles and Practices of Management and Organizational Behavior	30	70	4
5	BM12	Business Process Domains with Cost and Financial Accounting	70		3
6	MT11	Discrete Mathematics	30	70	4
7	IT11P	Mini project using C	70		2
8	SS1L	Soft Skill – Word Power, Business English	30		1
9	BM12L	Business Process Domains with Cost and Financial Accounting	30		1
		Total	**350**	**350**	**27**

Semester II					
Sr. No.	Subject Code	Subject Title	Internal	External	Credits
1	IT21	Object Oriented Programming with C++	30	70	4
2	IT22	Database Management System	30	70	4
3	IT23	Operating system Concepts	30	70	4
4	BM21	Management Information System and Business Intelligence	30	70	4
5	IT24	Enterprise Resource Planning	30	70	4
6	BM22	Soft Skills	70		2
7	IT21L	Mini Project using C++	50		2
8	IT22L	Mini Project based on RDBMS Concept	50		2
9	SS2L	Soft Skill – Group Discussion	30		1
		Total	**350**	**350**	**27**

Semester III					
Sr. No.	Subject Code	Subject Title	Internal	External	Credits
1	IT31	Web Technologies	30	70	4
2	IT32	Data Communication And Computer Networks	30	70	4
3	IT33	Data Structure using C++	30	70	4
4	IT34	Advanced Database management System	30	70	4
5	IT35	Object Oriented Analysis And Design	30	70	4
6	MT31	Research Methodology and Tools	70		2
7	IT31P	Mini Project based on Web Technology	50		2
8	IT31L	Mini Project based on Data Structure concept	50		2
9	SS3L	Soft Skill – Technical Writing	30		1
		Total	**350**	**350**	**27**

Semester IV					
Sr. No.	Subject Code	Subject Title	Internal	External	Credits
1	IT41	Java Programming	30	70	4
2	IT42	Mobile Computing	30	70	4
3	IT43	Information Security And Audit	30	70	4
4	IT44	Design And Analysis of Algorithm		70	3
5	MT41	Optimization Technique	30	70	4
6	EC41	Elective - I	70		2
7	IT41L	Java Lab	50		2
8	IT41P	Mini Project Using Mobile Computing	50		2
9	SS4L	Soft Skill – Presentation Skill	30		1
10	EC41L	Business Scenario – Elective Lab	30		1
		Total	**350**	**350**	**27**

Semester V					
Sr. No.	Subject Code	Subject Title	Internal	External	Credits
1	IT51	Software Testing And Quality Assurance	30	70	4
2	IT52	Software Project Management	30	70	4
3	IT53	Emerging Trends in Information Technology	30	70	4
4	IT54	Advanced Development Technology		70	3
5	IT55	Advanced Internet Technology	30	70	4
6	EC51	Elective - II	70		2
7	IT51P	Mini project using AIT And ADT	50		2
8	IT51L	Case Tools Lab	50		2
9	SS5L	Soft Skill – Interview Skill	30		1
10	EC51L	Advance Technology – Elective Lab	30		1
		Total	**350**	**350**	**27**

Semester VI					
Sr. No.	Subject Code	Subject Title	Internal	External	Credits
1	IT61P	Project	**250**	**250**	**25**

Note : Elective subject choice is based on Cafeteria approach which encourages and allows students to choose elective subjects from across specializations. The list below offers wide ranging choice for students to opt for courses based on their aptitude and their career goals.

Elective Group Code	Elective Group	Course Code	Course title
EC01	Business Intelligence	EC0101	Data Warehousing and BIG DATA
		EC0102	Data Mining
		EC0103	Business Intelligence Tools
		EC0104	Applications of Business Intelligence
EC02	Cloud Computing	EC0201	Virtualization
		EC0202	Cloud Computing Concepts
		EC0203	Cloud Solutions
		EC0204	Microsoft Azure Platform
EC03	Data Analysis	EC0301	Introduction to Statistics
		EC0302	Introduction to MS-Excel

		EC0303	Data Analysis using MS-Excel
		EC0304	Introduction to SPSS
EC04	Embedded Systems	EC0401	Introduction to Electronics
		EC0402	Embedded System Design and Implementation
		EC0403	Communication in Embedded Systems
		EC0404	Wireless Communication
EC05	Game Programming	EC0501	Introduction to Computer Graphics
		EC0502	Game Programming using Scratch
		EC0503	Game Programming using Flash
		EC0504	Game Programming using VC++
EC06	High Performance Computing	EC0601	Introduction to Parallel Processing
		EC0602	Programming with FORTRAN
		EC0603	Numerical Methods
		EC0604	Supercomputing in India
EC07	Information Security	EC0701	Ethical Hacking
		EC0702	Applications Information Security
		EC0703	Network Security
		EC0704	Digital Forensics
EC08	Linux Environment	EC0801	Linux Desktop Environment
		EC0802	Shell Programming
		EC0803	Linux System Administration
		EC0804	Linux Network Administration
EC09	Mobile Computing	EC0901	HTML5
		EC0902	JavaScript Programming
		EC0903	Mobile Computing Technologies
		EC0904	Android
EC10	Multimedia Computing	EC1001	Introduction to Multimedia Computing
		EC1002	Adobe Photoshop
		EC1003	Adobe Flash
		EC1004	Management of Digital Audio and Video
EC11	Net-Centric Computing	EC1101	HTML5
		EC1102	JavaScript Programming
		EC1103	AJAX Programming
		EC1104	Web Services
EC12	System Programming	EC1201	System Programming using C Language
		EC1202	System and Device Driver Programming
		EC1203	Embedded and Real-Time Operating Systems
		EC1204	System Programming using VC++
EC13	Mainframe Computing	EC1301	IBM Mainframe
		EC1302	COBOL
		EC1303	DB2
		EC1304	AS/400
EC14	Information Systems	EC1401	Enterprise Resource Planning
		EC1402	E-Commerce
		EC1403	Recommender System
		EC1404	Knowledge Management
EC15	Advanced Operating Systems	EC1501	Embedded Operating System
		EC1502	Real Time Operating System
		EC1503	Distributed Operating System
		EC1504	Mobile Operating System
EC16	Advanced Wireless Communication	EC1601	Wireless Networks and Mobile Systems
		EC1602	Mobile Ad-hoc Networks
		EC1603	Secure Wireless Communications

		EC1604	Programming Mobile Devices
EC17	Open Source Technologies	EC1701	Linux Operating System
		EC1702	Perl Scripting
		EC1703	PHP
		EC1704	Ruby
EC18	Distributed Computing	EC1801	GUI Programming in Java
		EC1802	Networking in Java
		EC1803	Developing Web Applications in Java
		EC1804	Java Web Services
EC19	Advanced Computer Networks	EC1901	Advanced Networking
		EC1902	Wireless Networks & Communication
		EC1903	Network Security
		EC1904	Network Hacking