

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY**CIRCULAR NO.SU/COM&MGT./C.B.C.&G.S./66/2021**

It is hereby inform to all concerned that, the syllabi prepared by the Board of Studies & recommended by the Dean, Faculty of Commerce & Management the **Academic Council at its meeting held on 01 November 2021 has accepted Syllabus for the MCA IInd Year III & IV Sem. with Bridge Course running in the affiliated colleges & University Campus from the academic Year 2021-2022 under the Faculty of Commerce & Management.**

This is effective from the Academic Year 2021-2022 & onwards as appended herewith.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.

REF.NO. SU/ MGT/2020-21/ 4551-61

Date:- 08-12-2021.

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*Deputy Registrar,
Academic Section
Syllabus unit.*

Copy forwarded with compliments to :-

- 1] **The Principals, affiliated concerned Colleges, Dr. Babasaheb Ambedkar Marathwada University.**
- 2] The Director, University Network & Information Centre, UNIC, with **a request to upload this Circular on University Website.**

Copy to :-

- 1] The Director, Board of Examination & Evaluation,
- 2] **The Section Officer, [Commerce Unit] Examination Branch,**
- 3] The Section officer, [Eligibility Unit],
- 4] **The Programmer [Computer Unit-1] Examinations,**
- 5] **The Programmer [Computer Unit-2] Examinations,**
- 6] The In-charge, [E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr. Babasaheb Ambekar Marathwada University.
- 7] Management Science Department,
Dr. Babasaheb Ambedkar Marathwada University
- 8] The Public Relation Officer,
- 9] The Record Keeper.

**DR. BABASAHEB AMBEDKAR
MARATHWADA UNIVERSITY,
AURANGABAD.**



Curriculum of
MASTER OF COMPUTER APPLICATION
TWO YEAR (MCA) PROGRAM
IIND YEAR III & IV SEMESTER
APPLICABLE FOR UNIVERSITY DEPARTMENT AND
AFFILIATED COLLEGES
under Choice Based Credit & Grading System

[Effective from the Academic Year 2021-22 & onwards]

[Signatures]
r.w.k. Sawade Mr Syedul Azam
Salve KL

Faculty of Commerce and Management Science

REGULATIONS SPECIFIC TO

M.C.A. PROGRAM

**(Applicable for University Department &
Affiliated Colleges)**



**Dr. Babasaheb Ambedkar Marathwada University,
Aurangabad.**

(With Effect from Academic Year 2021-22)

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

MCA PROGRAM (2 Years Degree)

(Choice Based Credit & Grade System)

M.C.A program prepares students to take up positions as system analysts, system designers, programmers and managers in any field related to information technology. The program, therefore, aims at imparting comprehensive knowledge with equal emphasis on theory and practice. The M.C.A. students are encouraged to spend a full semester working in the industry in the institute giving them insight into the workings of the IT world.

Rules and Regulations

1. Eligibility and Selection Criteria -

Passed BCA/ Bachelor Degree in Computer Science Engineering

or

Equivalent Degree. OR Passed B.Sc. / B.Com. / B.A. with Mathematics at 10+2 Level or at Graduation Level (with additional bridge Courses as per the norms of the Concerned University).

Obtained at least 50% marks (45% marks in case of candidates belonging to reserved category) in the qualifying Examination.

2. Duration

Duration of the MCA PROGRAM shall be 2 years/ 4 semesters.

3. Admission/Promotion Criteria

If candidate gets selected for MCA course through DTE admission process, he/she have to apply on the application form of the University provided with the prospectus. Once the candidate is admitted to the MCA course, he/she will be promoted to next semester with full carryon; subject to the registration of candidate in every consecutive semester. Dropout candidate will be allowed to register for respective semester in which he/she has failed, subject to the condition that his/her tenure should not exceed more than twice the duration of MCA course from the date of first registration at institute. The admission of concern candidate will automatically get cancelled if he/she fails to complete the course in maximum period.
(Four years)

4. Credits and Degrees

- A candidate who has successfully completed all the Foundation, Core, Elective courses and Project Work as prescribed for the MCA Course and Service courses as approved by the University with prescribed CGPA shall be eligible to receive the degree.
- One Credit shall mean one teaching period of one hour per week for one semester (of 15 weeks) for theory courses and two hours/week of practical for one semester.

5. Courses

The MCA programme comprises of

- I. Foundation Course: It may be of two kinds Compulsory Foundation Course for Knowledge Enhancement and Elective Foundation Course for value based education.
- II. Core Course: A core course is course that a candidate admitted to particular P.G. programme must successfully complete to receive the degree.
- III. Elective Course: Elective courses identified by the Departmental Committee of the department offering the programme. Means these courses given to the candidate as optional from which he/she has to opt for specialization. Whereas no elective course shall be offered unless a minimum of 10 students are registered.
- IV. Service Course: There shall be one/two service courses, one amongst the department of the School of Professional Studies and one amongst all university departments. The service courses will be offered in third and fourth semesters only.
- V. Each course shall include lectures/tutorials/laboratory of field work/seminar/practical training/assignments /mid-term and term end examinations/paper/report writing or review of literature and any other innovative practice etc., to meet effective teaching and learning needs.
- VI. Each course shall have a unique alphanumeric code. For eg.

MANC401	Computer Organization
Here, MAN	means Management Science
C	means MCA course
401	means Subject Code

VII. The University committee shall design the course structure including the detailed syllabus for this MCA programme. The committee shall have the freedom to introduce new courses and / or to modify / redesign existing courses and replace any existing course with a new course to facilitate better exposure and training for the candidates.

VIII. Attendance: A student must have 75% of mandatory attendance in each Course for appearing in the examination. In the event of Non-Compliance of Attendance criteria(75%), students will have to seek admission next year so as to complete the course. However Student having 65% attendances with medical certificate can apply to the H.O.D. for condonation of attendance.

6. Registration for Service Course

- i. The Student has to complete at least one service course of four credits in either Semester – III or Semester – IV and at a time student will be allowed to appear for only one service course.
- ii. The student will register the service course of his interest after the start of semester in the concerned department on official registration form. The teacher incharge of the respective course will keep the record of the students registered. Maximum 15 days period will be given from the date of admission for completion of registration procedure. The departmental committee shall follow a selection procedure to avoid overcrowding to particular course(s)
- iii. No student shall be permitted to register for more than one service course in semester.
- iv. University shall prescribe the maximum number of students in each course taking into account the teachers and physical facilities available in the department.
- v. The University may make available to all students a listing of all the courses offered in every semester specifying the credits, the prerequisites, a brief description or list of topics the course intends to cover, the instructor who is giving the courses, the time and place of the classes for the course. This information shall be made available on the University Website.
- vi. Normally no service course shall be offered unless a minimum of 10 students are registered.
- vii. The Student shall have to pay the prescribed fee per course per semester/year for the registration as decided by the University.

7. Grievance Redressal Scheme

University will provide the separate guidelines for Grievance Redressal Scheme.

8. Grade Awards

- i. The Degree of MCA will be of **116 Credits**.
- ii. In order to pass the examination following choice based credit and grading system (CBC&GS) will be followed. Ten point rating scale shall be used for evaluation of performance of the student to provide Letter Grade for each course and overall grade for this course. Grade points are based on the total number of marks obtained by him / her in all the heads of the examination of the course. These grade points and their equivalent range of the marks are shown separately in following:

Table – I: Ten Point grades and grade description

Sr.No.	Equivalent Percentage	Grade points for SGPA and CGPA	Grade	Grade Description
1.	90 – 100	9.00 – 10	O	Outstanding
2.	80 – 89.99	8.00 – 8.99	A++	Excellent
3.	70 – 79.99	7.00 – 7.99	A+	Exceptional
4.	60 – 69.99	6.00 – 6.99	A	Very Good
5.	55 – 59.99	5.50 – 5.99	B+	Good
6.	50 – 54.99	5.00 – 5.49	B	Fair
7.	45 – 49.99	4.50 – 4.99	C+	Average
8.	40.01 – 44.99	4.01 – 4.49	C	Below Average
9.	40	4.00	D	Pass
10.	Below 40	0.00	F	Fail

- iii. **Table – II: Classification for the degree is given as follows**

Classification	Overall letter grade
First Class with distinction	<i>A+ and above</i>
First Class	<i>A</i>
Higher Second Class	<i>B+</i>
Second Class	<i>B</i>
Pass	<i>C+ to D</i>
Fail	<i>F</i>

- iv. In the event of student registered for the examination (i.e. Internal Tests/End Semester Examination/Practical/Seminar/Project Viva-voce), non-appearance shall be treated as the student deemed to be absent in the respective course.
- v. Minimum D grade shall be the limit to clear /pass the course/subject. A student with F grade will be considered as 'failed' in the concerned course and he/she has to clear the course by reappearing in the next successive semester examinations.

- vi. Using table – I, Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) shall be computed. Results will be announced at the end of each semester and Cumulative Grade Card with CGPA will be given on completion of the course.

9. Computation of SGPA (Semester Grade Point Average) & CGPA (Cumulative Grade Point Average)

The computation of SGPA and CGPA will be as below:

- i. Semester Grade Point Average (**SGPA**) is the weighted average of points obtained by a student in a semester and will be computed as follows:

$$\text{SGPA} = \frac{\text{Sum}(\text{Course Credit} * \text{Number of Points in concern course gained by the student})}{\text{Sum}(\text{Course Credit})}$$

The SGPA for all four semesters will be mentioned at the end of every semester.

- ii. The Cumulative Grade Point Average (**CGPA**) will be used to describe the overall performance of a student in all semesters of the course and will be computed as follows:

$$\text{CGPA} = \frac{\text{Sum}(\text{All Four semester SGPA})}{\text{Total number of semesters}}$$

The SGPA and CGPA shall be rounded off to the second place of decimal.

10. Evaluation Scheme

- **Appearance for both Internal and External Evaluations (Examinations) is mandatory.**
- **Separate Passing for both Internal and External Evaluations (Examinations) of every course is compulsory.**
- **Minimum and Separate Passing Percentage for both Internal and External Evaluations (Examinations) is 40%.**

Theory course of 100 Marks will be divided in to Internal Examination (Sessional) of 40 Marks and Semester End Examination of 60 Marks **except Papers with Full Internal Assessment.**

Theory course of 50 marks will be divided in to internal Examination of 20 marks and semester end examination of 30 marks. (20+30=50).

Each Practical Course will be of 50 Marks (Internal + External) = (20 + 30=50).

a) For Theory Course

i. Internal Evaluation Scheme

There shall be weekly assessment in the form of Test/Assignment/Tutorials/seminars/Presentations/laboratory work /Field work/Project Work throughout the semester. Aggregation of these marks will be considered for the internal evaluation of 40/20 marks.

ii. Semester End Examination Evaluation Scheme

- English shall be the medium of instruction and examination.
- Examination shall be conducted at the end of each semester as per the academic calendar notified by University.
- The Semester End Examination theory question paper of 60 marks will have two parts **(10 + 50 = 60) Marks**

PART A will carry short question (fill in the blanks/multiple choice questions/match the columns/state true or false/answer in one sentence) as compulsory questions and it should cover entire syllabus (10 Marks).

PART B will carry 7 questions out of which there shall be at least one question from each unit, student will have to answer any 5 questions out of 7.

- The Semester End Examination theory question paper of 30 marks will have two parts **(05 + 25 = 30) Marks**

b) For Practical Course

i. Internal Evaluation Scheme

A student should complete lab assignments practically given by course teacher. However, in addition teacher can allot a mini project to students for better evaluation but assignments are compulsory. Internal evaluation for the practical will be considered for 20 Marks.

ii. External Evaluation Scheme

Under this roof, a student has to face practical examinations in which he/she has to complete the task on computer system (It may computer program or testing) given by External Examiner. Also student has to present seminar or viva-voce in front of External Examiner. External evaluation for the practical will be considered for 30 Marks.

c) For Mini Project –

i. Internal Evaluation –

All the students are divided among different teams & work under the guidance of the Faculty/guide. Internal Evaluation for the project will be of 40% marks that will be evaluated by the respective faculty/ guide depending upon presentation/review/performance during project/ report writing/field work/seminars etc.

iii. External Evaluation Scheme

Student has to present seminar/viva-voce/ demonstration of project in front of External Examiner. External evaluation for the project will be considered for 60% Marks.

d) Fourth Semester Project Evaluation Scheme

The Major project work should be carried out over the entire period of the final semester in an Industry. If the project is carried out in an Industry organization outside the campus, then a co-guide shall be there from Industry. Every student should do the Major Project individually. However students can opt for project in groups based on merits/requirements of the project and in consultation with the project guide. A guide will review the project periodically. At the end of the semester the candidate shall submit the Project report (two bound copies) duly approved by the guide and /Director H.O.D. of the Institute. The University will appoint external examiner for assessment of the project. The project will be assessed by the external examiner and the guide separately on the basis of the following criteria tentatively.

• Innovative Idea	15%
• Content	15%
• Preparation of Project Report	30%
• Presentation/Viva- voce	40%

If student failed to complete the project within scheduled time then he/she has to reappear and register freshly with new project topic after paying required fees for that semester.

11. Grade Card

The university under its seal shall issue to the students a grade card on completion of each semester.

Grade card shall contain the following:

- Title of the courses along with code taken by the student.
- The credits associated with and grades awarded for each course.
- The number of grade and grade point secured by the student.
- The total credits earned by the student in that semester.
- The SGPA of the student.
- The total credits earned by the student till that semester.
- The CGPA of the student (At the end of the IV semester).

12. Cumulative Grade Card

The grade card issued on completion of the programme shall contain the name of the programme, the department /school offered the programme, the titles of the courses taken, the credits associated with each course, grades awarded, the total credits earned by the student, the CGPA and the class in which the student is placed.

13. General Clause

It may be noted that beside the above specified rules and regulations all the other rules and regulations in force and applicable to semester system in Post-Graduate courses in Dr. Babasaheb Ambedkar Marathwada University will be applicable as amended from time to time by the University. The students shall abide by all such Rules and Regulations.

MCA Program Structure

Sem	Ref. No	Subject Title	Teaching Scheme			Credit	Marks		
			L	T	P		Int	Ext	Total
I	IC0001	Constitution of India	2	-	-	2	As per University Rules & Regulations		50
	MANC401	ASP.NET using C#	3	1	-	4	40	60	100
	MANC402	Mathematics and Probability	4		-	4	40	60	100
	MANC403	Advance Web Technology	3	1	-	4	40	60	100
	MANC404	Advance Operating System	3	1	-	4	40	60	100
	MANC405	Research Methodology	3		-	3	40	60	100
	MANC406	Yoga	2	-	-	2	50	--	50
	MANC407	Java	3	1	-	4	40	60	100
	MANC451	Advance Web Technology Lab	-	-	2	1	20	30	50
	MANC452	ASP.NET using C# Lab	-	-	2	1	20	30	50
	MANC453	Java Lab	-	-	2	1	20	30	50
		Total				30	370	480	850

Sem	Ref. No	Subject Title	Teaching Scheme			Credit	Marks		
			L	T	P		Int	Ext	Total
II	MANC408	Programming Using Python	3	1	-	4	40	60	100
	MANC409	Object Oriented Analysis & Design	3	1	-	4	40	60	100
	MANC410	DSS & MIS	2	-	-	2	50	--	50
	MANC411	Advances in Data structure & Algorithms	3	1	-	4	40	60	100
	MANC412	Advance DBMS	3	1	-	4	40	60	100
	MANC413	Software Testing	3	1	-	4	40	60	100
	MANC42X	Elective – I	2	-	-	2	20	30	50
	MANC454	Python Lab	-	-	2	1	20	30	50
	MANC455	Advances in Data Structure & Algorithms Lab	-	-	2	1	20	30	50
	MANC456	Advance DBMS Lab	-	-	2	1	20	30	50
	MANC457	Software Testing Lab	-	-	2	1	20	30	50
	MANC458	Mini Project	-	-	4	2	50	--	50
Total						30	400	450	850

Open Elective I

Elective Course	MANC421	Cloud Computing	2	20	30	50
	MANC422	Internet of Things (IOT)	2	20	30	50
	MANC423	Cyber Security	2	20	30	50
	MANC424	Entrepreneurship Development	2	20	30	50
	MANC425	Digital Marketing	2	20	30	50
	MANC426	IT & Disaster Management	2	20	30	50
	MANC427	GIS & Remote Sensing	2	20	30	50

Sem	Ref. No	Subject Title	Teaching Scheme			Credit	Marks		
			L	T	P		Int	Ext	Total
III	MANC501	Mobile Application Development Using Android	3	1	-	4	40	60	100
	MANC502	Web Development using PHP	3	1	-	4	40	60	100
	MANC503	Data Science using Python	3	1	-	4	40	60	100
	MANC504	Optimization Techniques	3	1	-	4	40	60	100
	MANC505	Advance Networking	3	1	-	4	40	60	100
	MANC52X	Elective – II	3	1	-	4	40	60	100
	MANC551	Android Lab	-	-	2	1	20	30	50
	MANC552	PHP Lab	-	-	2	1	20	30	50
	MANC553	Data Science using Python Lab	-	-	2	1	20	30	50
	MANC554	Mini Project	-	-	4	2	50	--	50
	MANC55X	Elective – II Lab	-	-	2	1	20	30	50
Total						30	370	480	850

Open Elective –II

Elective Course	MANC521	Advance JAVA	4	40	60	100
	MANC555	Advance JAVA Lab	2	20	30	50
	MANC522	Linux Admin & Server Config.	4	40	60	100
	MANC556	Linux Admin & Server Config. Lab	2	20	30	50
	MANC523	ASP.NET with MVC	4	40	60	100
	MANC557	ASP.NET with MVC LAB	2	20	30	50
	MANC524	Machine Learning Using R	4	40	60	100
	MANC558	Machine Learning Using R Lab	2	20	30	50

	Ref. No	Subject Title	Teaching Scheme			Credit	Marks		
			L	T	P		Int	Ext	Total
Sem IV	MANC506	Software Project Management	2	-	-	2	50	-	50
	MANC559	Seminar	-	2	-	2	50	-	50
	MANC560	Project	-	-		18	180	270	450
		Total				22	280	270	550

MCA Degree (Two Years Programme)			Marks		
	Credits		Int	Ext	Total
Course Total	112	--	1420	1680	3100
One Service Course	4	--	20	80	100
Grand Total	116	--	1440	1760	3200



SEMESTER - III

Subject Title :	Mobile Application Development Using Android		
Subject Ref. No.	MANC501	No. of Credits	: 04
Assignments/Sessional			: 40%
Semester Exam.			: 60%
Course Outcomes (COs)			
At the end of the course, students will be able to:			
CO-1	Write code for implementing concept of Android as different layouts, Services, components, activities		
CO-2	Design User interface using Menus, labels, text control, button control, toggle button, images etc.		
CO-3	Write the programs using concepts of JAVA + SQLite		
CO-4	Write the programs using concepts of JAVA + PHP + MYSQL.		
CO-5	Write programs for handling Bluetooth, camera, GPS services.		
CO-6	Design Android applications.		
Prerequisite :	Experience in Object Oriented programming language, Knowledge in XML format		
Unit -I :	1) Introduction To Mobile Apps I. Why we Need Mobile Apps II. Different Kinds of Mobile Apps III. Briefly about Android 2) Introduction Android I. History Behind Android Development II. What is Android? III. Pre-requisites to learn Android IV. Brief Discussion on Java Programming 3) Android Architecture I. Overview of Android Stack II. Android Features III. Introduction to OS layers 4) Deep Overview in Android Stack I. Linux Kernel II. Libraries III. Android Runtime IV. Application Framework V. Dalvik VM		



	5) Installing Android Machine I. Configuring Android Stack II. Setting up Android Studio III. Working with Android Studio IV. Using Older Android Tools
Unit –II :	1) Creating First Android Application I. Creating Android Project II. Debugging Application through DDMS III. Setting up environment IV. AVD Creation V. Executing Project on Android Screen 2) Android Components I. Activities II. Services III. Broadcast Receivers IV. Content Providers 3) Hello World App I. Creating your first project II. The manifest file III. Layout resource IV. Running your app on Emulator
Unit –III :	1) Building UI with Activities I. Activities II. Views, layouts and Common UI components III. Creating UI through code and XML IV. Activity lifecycle V. Intents VI. Communicating data among Activities 2) Advanced UI I. Selection components (GridView, ListView, Spinner) II. Adapters, Custom Adapters III. Complex UI components IV. Building UI for performance V. Menus VI. Creating custom and compound Views 3) Notifications I. Toast, Custom Toast II. Dialogs III. Status bar Notifications
Unit – IV :	1) Working with Database I. SQLite Introducing SQLite SQLiteOpenHelper and creating a database Opening and closing a database



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	Working with Inserts, updates, and deletes operations II. PHP + MySql Introduction to basic PHP & MySql Connectivity Using PHP code with Android Performing insert, delete, update, view operations on MySql Database
Unit - V :	1) Camera I. Taking pictures II. Media Recorder III. Rendering previews 2) Bluetooth I. Controlling local Bluetooth device II. Discovering and bonding with Bluetooth devices III. Managing Bluetooth connections IV. Communicating with Bluetooth 3) Location Based Services and Google Maps I. Using Location Based Services II. Finding current location and listening for changes in location III. Proximity alerts IV. Working with Google Maps i. Showing google map in an Activity ii. Map Overlays iii. Itemized overlays iv. Geocoder v. Displaying route on map
Reference Books :	1. <u>Android Application Development All-In-One for Dummies, 2ed 2015</u> by Barry Burd 2. <u>Android Application Development (With Kitkat Support), Black Book 2014</u> by Pradeep Kothari and Kogent Learning Solutions Inc. 3. <u>Head First Android Development: A Brain-Friendly Guide, 2nd Edition</u> by Dawn Griffiths and David Griffiths



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Subject Title	:	Android LAB		
Subject Ref. No.	:	MANC551	No. of Credits	: 1
			Internal	: 40 %
			External	: 60 %
Course Outcomes (COs)				
At the end of the course, students will be able to:				
CO-1	Write code for implementing concept of Android as different layouts, Services, components, activities			
CO-2	Design User interface using Menus, labels, text control, button control, toggle button, images etc.			
CO-3	Write the programs using concepts of JAVA + SQLite			
CO-4	Write the programs using concepts of JAVA + PHP + MYSQL.			
CO-5	Design Android applications.			
Content	:	Assignment based on the Android will be covered.		



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Subject Title :	Web Development Using PHP			
Subject Ref. No.	MANC502	No. of Credits	:	04
Assignments/Sessional	:			40%
Semester Exam.	:			60%
Course Outcomes (COs)				
At the end of the course, students will be able to:				
CO-1	Write code for implementing basic concept of PHP as loops, conditions, arrays, strings.			
CO-2	Connect the MySQL database with PHP for performing operations such as insert, update, delete, retrieve.			
CO-3	Implement the concepts of COOKIES and SESSION handling using PHP.			
CO-4	Write the programs using concepts of HTML + JAVASCRIPT + PHP + MYSQL.			
CO-5	Design the Web portals to fulfill the requirements.			
Prerequisite :	Students must have knowledge of HTML, JavaScript.			
Unit –I :	Introduction to PHP PHP Basics Conditions and Branches Loops Variables and Arrays Strings			
Unit –II :	Form Handling Dealing with functions Forms Super global variables Super global array A script to acquire user input Importing user input Accessing user input Combine HTML and PHP code Using hidden fields Redirecting the user File upload and scripts Delete a File			



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Unit –III :	Cookies , Sessions and Authentication Using Cookies in PHP Setting a cookie Accessing cookie Destroying Cookie HTTP Authentication Storing Username and Passwords Using Sessions Starting a session Ending a session Session Security
Unit – IV :	Database Operations with PHP Built-in Database Functions, Connecting to a MySQL, Selecting a Database, Building and Sending the Query to Database Engine, Retrieving , Updating and Inserting Data in database
Unit – V :	Classes And Objects Object oriented concepts Define a class Class attributes An Object Creating an object Object properties Object methods Object constructors and destructors Class constants Static method Class inheritance Abstract classes Final keyword Implementing Interface Object serialization Understanding Advance and New Checking for class and method existence Iterators
Reference Books :	1. <i>PHP and MySQL Web Development</i> by Luke Welling, and Laura Thomson 2. <i>PHP, MySQL, and JavaScript</i> by Robin Nixon 3. <i>PHP 6 and MySQL 5 for Dynamic Web Sites: Visual QuickPro Guide</i> by Larry Ullman 4. <i>PHP Cookbook</i> by Adam Trachtenberg, and David Sklar 5. <i>PHP Object – Oriented Solution</i> by David Powers 6. <i>Head First PHP & MySQL</i> by Lynn Beighley, and Michael Morrison 7. <i>Beginning PHP and MySQL From Novice to Professional, Third Edition</i> by W.J. Gilmore



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Subject Title	:	PHP LAB		
Subject Ref. No.	:	MANC552	No. of Credits	: 1
			Internal	: 40%
			External	: 60%
Course Outcomes (COs)				
At the end of the course, students will be able to:				
CO-1	Write code for implementing basic concept of PHP as loops, conditions, arrays, strings.			
CO-2	Connect the MySql database with PHP for performing operations such as insert, update, delete, retrieve.			
CO-3	Implement the concepts of COOKIES and SESSION handling using PHP.			
CO-4	Write the programs using concepts of HTML + JAVASCRIPT + PHP + MYSQL.			
CO-5	Design the Web portals to fulfill the requirements.			
Content	:	Assignment based on the PHP & supporting languages will be covered.		



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Subject Title	:	Data Science Using Python		
Subject Ref. No.	:	MANC503	No. of Credits	: 4
			Assignments / Sessional	40
			Semester Examination	60
Course Outcomes (COs)				
At the end of the course, students will be able to:				
CO-1	Use Python for Data Science and Machine Learning			
CO-2	Learn to use NumPy for Numerical Data, Pandas for Data Analysis, Matplotlib for Python Plotting			
CO-3	K-Means Clustering Logistic Regression			
Pre Requisite	:	Basics of Python, Probability, and Statistics		
Unit – I	:	Introduction: Basics of Python Revision, Basics of Probability, Statistics		
Unit – II	:	Introduction to Numpy: Numpy Arrays, Quick Note on Array Indexing, Numpy Array Indexing, Numpy Operations, Numpy Exercises Overview Numpy Exercises Solutions Introduction to Pandas: Series, DataFrames - Part 1, DataFrames - Part 2, DataFrames - Part 3, Missing Data, Groupby, Merging Joining and Concatenating, Operations, Data Input and Output		
Unit – III	:	Python for Data Visualization - Matplotlib: Matplotlib Part 1, Matplotlib Part 2, Matplotlib Part 3, Matplotlib Exercises Overview, Matplotlib Exercises - Solutions Introduction to Seaborn, Categorical Plots, Matrix Plots, Grids, Regression Plots, Style and Color, Seaborn Exercise Overview, Seaborn Exercise Solutions		
Unit – IV	:	Introduction of Machine Learning: Supervised Learning Overview, Evaluating Performance - Classification Error Metrics, Evaluating Performance - Regression Error Metrics, Machine Learning with Python Linear Regression Theory model_selection Updates for SciKit Learn, Linear Regression with Python Logistic Regression Theory, Logistic Regression with Python, KNN Theory KNN with Python		
Unit – V	:	Introduction to Tree Methods: Decision Trees and Random Forest with Python, SVM Theory Support Vector Machines with Python, K Means Algorithm Theory K Means with Python, Principal Component Analysis PCA with Python		
Text Books	:	Python for Data Science, Ben Chan Published by Notion Press available on Flipkart Python for Data Science For Dummies John Paul Mueller Luca Massaron		
E BOOKS	:	Python Data Science Handbook: Essential Tools for Working with Data by Jake VanderPlas O'Reilly Publications		
MOOC	:	https://www.udemy.com/course/python-for-data-science-and-machine-learning-bootcamp/		



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Subject Title	:	Data Science Using Python Lab		
Subject Ref. No.	:	MANC553	No. of Credits	: 1
			Assignments / Sessional	20
			Semester Examination	30
Course Outcomes (COs)				
At the end of the course, students will be able to:				
CO-1	Use Python for Data Science and Machine Learning			
CO-2	Learn to use NumPy for Numerical Data, Pandas for Data Analysis, Matplotlib for Python Plotting			
CO-3	K-Means Clustering Logistic Regression			

As per necessity of Data Science using Python Theory



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Subject Title	Optimization Techniques		
Subject Ref. No.	MANC504	No. of Credits	4
		Assignments / Sessional	40
		Semester Examination	60
Course Outcomes (COs)			
At the end of the course, students will be able to:			
CO-1	apply the techniques used in operations research to solve real life problem in industry		
CO-2	Develop a report that describes the model and the solving technique, analyse the results and propose recommendations in language understandable to the decision-making processes in Management Engineering(Transportation /Assignment / replacement Models).		
CO-3	Formulate Nonlinear and Linear Programming Model		
CO-4	Formulation and solution of network problems using graph optimization algorithms		
CO-5	Construct linear integer programming models and discuss the solution techniques to solve the integer programming models using branch-and-bound method.		
CO-6	Study and develop game theory, practical use of game theory in real life, types of game theory.		
Course Objective	The main objective of this course to learn research methodologies, defining hypothesis and its analytical methods. The content also help to solve many real-time problems of operation research such as assignment, transportation, queuing, Linear programming and network problems also.		
Prerequisites	Statistical Basic, discrete Mathematics and Data Structure		
Unit I	Linear Programming Application areas of Linear Programming Linear Programming – The Graphical method – Graphical Solution methods of Linear Programming problem, Maximization Linear Programming problem, Maximization Problem.		
Unit II	Linear Programming – Simplex Method – Phase I and Phase II of the Simplex Method, The Revised Simplex method, Primal and Dual Simplex Method, Simplex		



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	Algorithm for maximization case, Simplex Algorithm for minimization case – Two phase method and the Big –M method. Transportation Problem and its solution, Assignment Problem and its solutions by Hungarian Method.
Unit III	PERT & CPM Basic differences between PERT and CPM. , Arrow Networks, time estimates, earliest, expected time, latest – allowable, occurrences time, Forward Pass Computation, Backward Pass Computation, Representation in Tabular Form Critical Path, Probability of meeting scheduled date of completion, Calculation on CPM network. Various floats for activities, Critical path updating projects. Operation time cost tradeoff Curve project, Time cost – tradeoff Curve- Selection of schedule based on Cost Analysis, Crashing the network
Unit IV	Integer Programming, Gomory Cutting Plane Methods – Branch and Bound , Queuing Theory. Game theory.
Unit V	Replacement of items that deteriorates. Replacement of items that fails suddenly, Individuals and Group Replacement- Policy, INVENTORY THEORY: Inventory Model Building, Single item deterministic Model, Inventory Control Models without strategies and Inventory, Control Models with shortages.
Text Book	Research Methodology methods and Techniques by C.R. Kothari Operation Research J.K. Sharma Operations Research Kanti Swarup, Gupta P.K. and ManMohan. Operation Research - By Hira Gupta S.Chand publication
Reference Books	Comprehensive Statistical Methods, P.N. Arora, SummetArora, S. Arora Operation Research , A.M. Nataranjan , P. BalaSubramani, A. Tamilaraji



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Subject Title	:	Advance Networking
Subject ref. No.	:	MANC505
	No. of credits	: 4
	Assignment/Sessionals	: 40%
	Semester Exam	: 60%
Course Objectives	:	CO1: Build an understanding of the fundamental concepts of computer networking. CO2: Understand and explain the concept of Data Communication and networks, layered architecture and their applications. CO3: Enumerate the layers of the OSI model and TCP/IP. CO4: Familiarize the student with the taxonomy and terminology of advance concepts of computer networking. CO5: Familiarity with the basic of internet and various important terms associated with it.
Pre Requisite	:	NA
Unit-I Introduction to Networking:	:	Hardware Architecture:- Topologies, Media, Devices Transmission Techniques:-Twisted Pair, Coaxial Cable, Fiber Optics, Wireless Transmission Switching: - Circuit Switching, Message Switching, Packet Switching
Unit-II Common Network Architecture:	:	Connection oriented N/Ws, Connectionless N/Ws Local Area Networks: Components & Technology , Access Technique Transmission Protocol & Media
Unit-III Reference Models:	:	The OSI Reference Model: Protocol Layering, TCP/IP Model, OSI vs TCP/IP
Unit-IV Broad Band Networks	:	Integrated Service Digital Networks (ISDN), Broad Band ISDN, ATM, ATM Traffic Management, Introduction to very small Aperture Terminal(VSAT)
Unit-V Network Applications :	:	Hyper Text Transfer Protocol (HTTP) HTTP communications: - HTTP request, Request Headers, Responses, Status Code, Error Status Code Email : Sending & Receiving Emails, Email Addressing, Message Structure MIME – Multipurpose Internet Mail Extensions SMTP – Simple Mail Transfer Protocol with Examples Mail Exchangers – Delivering a message, Mail Boxes POP – Post Office Protocol IMAP – Internet Message Access Protocol FTP – File Transfer Protocol Telnet – Remote Communication Protocol Proxy Server, Proxy Web Servers
Text Books	:	1. Tanenbaum, Andrew, Computer Networks, PHI 2. Forouzan Behrouz A., Tata Mcgraw Hill
Additional Reference Books	:	1. Norton Peter, Complete Guide To Networking



OPEN ELECTIVE - II

Subject Title	Advance JAVA		
Subject Ref. No.	MANC521	No. of Credits	4
		Assignments / Sessional	40
		Semester Examination	60
Course Outcomes (COs)			
At the end of the course, students will be able to:			
CO-1	Develop Swing-based GUI application & understand the real application of Collections in Software Development		
CO-2	Develop the server side programming using Servlet		
CO-3	Connect the server side database and its implementation in client server terminology using JDBC		
CO-4	Develop client/server application and TCP/IP socket programming using Networking Technology		
CO-5	Develop component-based Java software using JavaBeans		
CO-6	Develop distributed applications using Remote Method Invocation		
Course Objective	This subject is essential for providing knowledge and hands on experience over the issues of managing data on web, developing powerful GUI based friendly user interface, server side programming and developing applications for communication over network using object oriented fundamentals.		
Prerequisites	Concepts of OOPs and Core JAVA		
Unit I	SWINGS : introduction , JApplet , JFrame, Jcomponent , Labels, TextFields, Buttons, Check Boxes, Radio Buttons, Combo Boxes, Tabbed Panes, Scroll		



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	Panes, Tree, Tables, Generic Programming : class, methods bounds for type variable , generic code and the virtual machine, translating generic expressions and methods, calling legacy code, restrictions and limitations , Inheritance rules for Generic type, wildcard types , reflection and generic
Unit II	COLLECTION: collection interfaces , concrete collections : Linked List, Array List, Hash Sets, Tree Sets. NETWORKING : introduction, Socket Overview, Client/Server, InetAddress class, TOP-UP socket : Socket, Server Socket, Datagrams, Address identifiers , URL connection
Unit III	JDBC: Overview, who and why JDBC, JDBC architecture JDBC API, Types of JDBC Drivers, JDBC basic –java Database connectivity steps, Test JDBC driver Installation, Test JDBC connection, JDBC driver name and version, JDBC create table JDBC insert Data into SQL Tables, JDBC select data, JDBC update Data.
Unit IV	SERVLETS: What is servlets, advantages servlets over traditional CGI , Basic structure of servlets, A simple servlets generating plain text, computing, and installing the servlet, running servlet interface and life cycle. Request and response Objects, Request onto, , A servlet that Generates HTML, Simple HTML building utilities, cookies , The servlet cookies API, generating cookies , reading cookies from client , some minor cookies utilities, session tracking , the session tracking API, associating the information with a session
Unit V	JAVA RMI :overview, The RMI architecture , Operation on an RMI distributed system summary, Note on code mobility, writing RMI services , writing a RMI client , developing of RMI.
Text Book	1. Core Java Vol 2 Advanced Features by Cay Horstmann, Gary Cornell 2. Head First Java by Kathy Sierra & Bert Bates 3. The Complete Reference –J2EE Jim Keogh
Reference Books	1. Swing a Beginner's Guide by Herbert Schildt 2. An Introduction to object-oriented programming with JAVA by C. Thomas WU



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	3. Graphic JAVA Mastering the JFC-David Geary
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Subject Title	Advance JAVA Lab		
Subject Ref. No.	MANC555	No. of Credits	1
		Assignments / Sessional	20
		Semester Examination	30
Course Outcomes (COs)			
At the end of the course, students will be able to:			
CO-1	Develop Swing-based GUI application & understand the real application of Collections in Software Development		
CO-2	Develop the server side programming using Servlet		
CO-3	Connect the server side database and its implementation in client server terminology using JDBC		
CO-4	Develop client/server application and TCP/IP socket programming using Networking Technology		
CO-5	Develop component-based Java software using JavaBeans		
CO-6	Develop Distributed Applications using Remote Method Invocation		
Course Objective			
Prerequisites			
Unit I	1.	WAP to create Login Validation form using JButton , JLabel, JPasswordField and ActionListener & KeyPressedListeners	
	2.	WAP to create Arithmetic operation GUI form using JButton , JLabel &	



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	ActionPerformed Listener
3.	WAP to demonstrate the use of JTextArea control with its methods.
4.	WAP to create JCheckBox and implement ItemListener interface
5.	WAP to create an application of multiple JCheckBox with ItemListener
6.	WAP to demonstrate the use of JRadioButton control with JOptionPane & ActionListener Interface
7.	WAP to create JOptionPane with showMessageDialog, showInputDialog, showConfirmationDialog.
8.	WAP to create a JScrollBar with AdjustmentListener
9.	WAP to create a note application using JMenuBar, JMenu, JMenuItem & ActionListener
10.	WAP to create JPopupMenu with MouseListener & ActionListener
11.	WAP to create JCheckBoxMenuItem & JSeparator using ActionListener
12.	WAP to create JProgressBar & JScrollBar with all methods.
13.	WAP to create JTable, JTree & JSlider with all methods.
14.	WAP to create JColorChooser with ActionListener.
15.	WAP to demonstrate use of JFileChooser control in Swing
16.	WAP to demonstrate all LayoutManagers in swing
17.	Demonstration of other controls available in swing
18.	WAP to create JDBC Connection Type-1 (JDBC-ODBC bridge driver)
19.	WAP to create JDBC Connection Type-2 (Native-API driver (partially java drive
20.	WAP to create JDBC Connection Type-3 (Network Protocol driver (fully java driver)
21.	WAP to create JDBC Connection Type-4 (Thin driver (fully java driver)
22.	WAP to implement Statement Interface in JDBC. (Insert, Delete, update and Display the records from oracle table)
23.	WAP to implement PreparedStatement Interface in JDBC. (Insert, Delete, update and Display the records from oracle table)



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	24.	WAP JDBC program to write & read a BLOB and CLOB to Table
	25.	WAP to demonstrate the CollableStatment Interface to retrieve the procedure for IN parameter
	26.	WAP to demonstrate the CollableStatment Interface to retrieve the procedure for OUT parameter
	27.	WAP to demonstrate the CollableStatment Interface to retrieve the procedure for INOUT parameter
	28.	WAP to demonstrate the CollableStatment Interface to retrieve the function from SQL.
	29.	WAP to demonstrate how to get primary key value(Auto generated keys) from inserted queries using JDBC
	30.	WAP for CallableStatement statement with batch execution.
	31.	WAP to execute SQL cursor using CallableStatement Interface.
	32.	WAP to demonstrate the batch update using Statement Interface.
	33.	WAP to demonstrate the batch update using PreparedStatement Interface.
	34.	Write an example for scrollable result set with read only mode.
	35.	WAP to get JDBC Connection object using properties file.
Unit II		
	36.	WAP to print a Welcome Message in servlet using Servlet Interface
	37.	WAP to print a Welcome Message in servlet using GenericServlet class
	38.	WAP to print a Welcome Message in servlet using HttpServlet Class
	39.	WAP to retrieve the Client Input Data in Servlet using getParameter()
	40.	WAP to retrieve the Client Input Data in Servlet using getParameterValues()
	41.	WAP to retrieve the Client Input Data in Servlet using getParameterNames()
	42.	WAP to demonstrate the application of ServletConfig Interface.
	43.	WAP to demonstrate the application of ServletContext Interface.
	44.	WAP to connect servlet to database.
	45.	WAP to create login Application using JDBC concept.
	46.	WAP that demonstrate the implementation of RequestDispatcher Interface..



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	47.	WAP to demonstrate the difference between forward() & sendRedirect() method
	48.	WAP to demonstrate the difference types of attributes in Servlet i.e. request scope, session scope & application scope.
	49.	WAP to demonstrate how session tracking can be achieve by Cookies
	50.	WAP to create a Login & Logout application using Cookies.
	51.	WAP to demonstrate how session tracking can be achieve by Cookies
	52.	WAP to create a Login & Logout application using Cookies.
	53.	WAP to demonstrate how session tracking can be achieve by Hidden Form Field
	54.	WAP to create a Login & Logout application using Hidden Form Field.
	55.	WAP to demonstrate how session tracking can be achieve by URL rewriting
	56.	WAP to demonstrate how session tracking can be achieve by HttpSession.
	57.	WAP to create a Login & Logout application using HttpSession.
	58.	WAP to demonstrate CRUD implementation in Servlet.
Unit III		
	59.	WAP to add the elements in collection object.
	60.	WAP to demonstrate all methods of Collections class.
	61.	WAP to demonstrate the use of Enumeration Cursor in Collection.
	62.	WAP to perform all operations of ArrayList & iterate it.
	63.	WAP to demonstrate the use of ListIterator Cursor in Collection.
	64.	WAP to perform all operations of ArrayList & iterate it.
	65.	WAP to perform all operations of LinkedList & iterate it.
	66.	WAP to perform all operations of Stack & iterate it.
	67.	WAP to perform all operations of Vector & iterate it.
	68.	WAP to perform all operations of LinkedHashSet & iterate it.
	69.	WAP to perform all operations of TreeSet & iterate it.
	70.	WAP to perform all operations of Queue & PriorityQueue and iterate it.
	71.	WAP to perform all operations of Deque & ArrayDeque and iterate it.
	72.	WAP to perform all operations of Map Interface & iterate it.



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	73.	WAP to perform all operations of HashMap Interface & iterate it.
	74.	WAP to perform all operations of LinkedHashMap Interface & iterate it.
	75.	WAP to perform all operations of TreeMap Interface & iterate it.
	76.	WAP to perform all operations of Hashtable Interface & iterate it.
	77.	WAP to perform natural sorting using Comparable Interface.
	78.	WAP to perform customize sorting using Comparator Interface.
Unit IV		
	79.	WAP to create a URL.
	80.	WAP to create a File URL.
	81.	WAP to create a URL object with all properties.
	82.	WAP to get URL Properties.
	83.	WAP to get URL object with relative path .
	84.	WAP to read URL content, encode & decode URL content.
	85.	WAP to get machine IP address, IP address of host, host name by IP address, machine host name .
	86.	WAP to get all IP address of a Host
	87.	WAP to create Connection Oriented client server application using ServerSocket & Socket
	88.	WAP to create Connection Oriented client server chatting application using ServerSocket & Socket
	89.	WAP to create Connection less client server application using DatagramSocket & DatagramPocket
Unit V		
	90.	WAP to create RMI application using Remote
Text Book		
Reference Books	1.	



Subject Title	Linux Administration and Server Config		
Subject Ref. No.	MANC522	No. of Credits	4
		Assignments Sessional	/ 40
		Semester Examination	End 60
Course Outcomes (COs) At the end of the course, students will be able to:			
CO-1	Understanding the basic set of commands and utilities in Linux/UNIX systems.		
CO-2	Learn the important Linux library functions and system calls		
CO-3	Understand the inner workings of Linux operating systems		
CO-4	Design Live Servers.		
Pre Requisite	Operating System Concepts, Windows Platform		
Unit – I	Introduction: Basic Linux System Concepts, GNU, Free Software, and Open Source Software, Open Source Software Licenses, Distributions of Linux O.S, Installing Ubuntu, The GNOME Desktop, Linux Commands		
Unit – II	Managing the basics: User Administration, Linux File-System Administration, File Permissions, and Networking Management.		
Unit – III	Software Installation: The Package Management, Vi/Vim Editor, Regular Expressions. Open SSH Server, VNC Server, Installation of Python.		
Unit – IV	Server Configuration: FTP Server, NFS Server, Samba Server, HTTP/Apache Server, DNS Server, DHCP Server, Mail Server, And Database Server: MySQL.		
Unit – V	Maintenance : Backing Up and Restoring Files, Security and Firewall, Monitoring		
Text Books	1. "Ubuntu Server Guide" by UBUNTU LTD. 2. "Introduction to Linux", A Hands on Guide by Machtelt Garrels 3. "GNU/Linux Advanced Administration", by Josep Jorba Esteve and Remo Suppi Boldrito		



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Additional Reference Books	1. Managing Linux® Systems with Webmin™ System Administration and Module Development by Jamie Cameron
Web Reference	https://www.ubuntupit.com/27-best-linux-tutorial-books-need-download-now/

Subject Title	Linux Admin & Server Config. Lab		
Subject Ref. No.	MANC556	No. of Credits	1
		Assignments / Sessional	20
		Semester End Examination	30
Course Outcomes (COs)			
At the end of the course, students will be able to:			
CO-1	Understanding the basic set of commands and utilities in Linux/UNIX systems.		
CO-2	Learn the important Linux library functions and system calls		
CO-3	Understand the inner workings of Linux operating systems		
CO-4	Design Live Servers.		



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Subject Title	:	ASP.NET with MVC		
Subject ref. No.	:	MANC523		
		No. of credits	:	4
		Assignment/Sessionals	:	40%
		Semester Exam	:	60%
Course Objectives	:	C01: Build an understanding of the fundamental concepts of MVC C02: Understand and explain the integration of SQL Server with MVC C03: Enumerate about forms and its implementation. C04: Familiarize the student with Razor and it's working. C05: Familiarity with the project deployment.		
Pre Requisite	:	Asp.Net using C#		
Unit-I Introduction to Framework of MVC	:	MVC architecture, Why MVC, Life cycles - Application and Request, IIS, Installing IIS, routing, Authentication and its types, Authorization, difference between authentication and authorization.		
Unit-II SQL Server	:	Entity Framework using NuGET Package management, Validations, database seeding, query objects, performance optimization.		
Unit-III Forms	:	Introduction, The Markup, edit form, labels, update data, saving data.		
Unit-IV Razor	:	ASPX and Razor, Why Razor, Razor basics, implementation of Razor views, partial view, Razor syntax, dataannotations, keys- introduction		
Unit-V Web API	:	Overview of JQuery, Using JQuery, Optimizing JQuery code, Single Page Applications.		
Text Books	:	1. ASP.NET MVC 5- Adam Freeman		
Additional Reference Books	:	1. Pro ASP.NET MVC 5- Jon Gallway, Brad Wilson, Allen, David Matson		



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Subject Title	:	ASP.NET with MVC LAB		
Subject ref. No.	:	MANC557		
		No. of credits	:	1
		No. of periods per week	:	2
		Assignment/Sessionals	:	40%
		Semester Exam	:	60%
Course Objectives	:	CO1: Build an understanding of the fundamental concepts of MVC CO2: Understand and explain the integration of SQL Server with MVC CO3: Enumerate about forms and its implementation. CO4: Familiarize the student with Razor and it's working. CO5: Familiarity with the project deployment.		
Pre Requisite	:	Asp.Net using C#		
Unit-I	:	Installing IIS and Making first application in ASP.NET MVC		
Unit-II	:	NuGET Package management, Validations, database seeding,		
Unit-III	:	The Markup, edit form, labels, update data, saving data.		
Unit-IV	:	ASPX and Razor, Razor views, partial view, Razor syntax, data annotations		
Unit-V	:	Overview of JQuery, Using JQuery		
Text Books	:	1.ASP.NET MVC 5- Adam Freeman		
Additional Reference Books	:	2. Pro ASP.NET MVC 5- Jon Gallway, Brad Wilson, Allen, David Matson		



Subject Title :	Machine Learning Using R			
Subject Ref. No.	MANC524	No. of Credits	:	04
Assignments/Sessional			:	40%
Semester Exam.			:	60%
Course Outcomes (COs)				
At the end of the course, students will be able to:				
CO-1	Understanding Machine Learning with its Techniques.			
CO-2	Understand the Basics of Fundamentals of R.			
CO-3	Understand the loading retrieval techniques of Data.			
CO-4	Covers how to use different functions in R.			
Prerequisite :				
Unit –I :	Introduction to Machine Learning : The origin of Machine Learning , Uses and Abuses of ML, Ethical Consideration, How do Machines Learn ?, Abstraction and Knowledge representation, Generalization, Assessing Success of Learning, Steps to Apply Machine Learning to your Data.			
Unit –II :	Introduction to R Programming : What is R ? ,R Studio,R Command Prompt, R script Files, Comments. Handling packages in R: Installing R package, Few Commands to get Started: Installed.packages(), PackageDescription(),help(),Find.package(),Library()-I/O			
Unit –III :	Decision Making and Loops in R Language: R-DataTypes,R Variables, R Operators, R Decision Making Statements, R Loops.			
Unit – IV :	Functions and Data-Structure in R Language: Vector, List, Data Frames, Matrices and Arrays			
Unit – V :	Loading and Handling Data : Loading and Handling with Database using R , Getting and Setting the working Directory, R CSV files, R Excel files			
Reference Books :	1.R Programming for Beginners: Sandip Rakshit 2.Machine Learning with R : Brett Lantz 3.Data Analytics using R : Seema Acharya			



Subject Title	:	Machine Learning Using R Lab			
Subject Ref. No.	:	MANC558	No. of Credits	:	1
			Internal	:	40 %
			External	:	60 %
Course Outcomes (COs)					
At the end of the course, students will be able to:					
CO-1	Enable to build programming Logic and thereby developing skills in programming.				
CO-2	Demonstrate the use of basics functions.				
CO-3	Learn to understand new data sets.				
Content	:	Assignment based on the topics will be covered.			

Subject Title	:	Mini Project			
Subject Ref. No.	:	MANC554	No. of Credits	:	2
			Internal	:	100 %
Content	:	Mini Projects needs to be performed.			



SEMESTER - IV

Subject Title	:	Software Project Management	
Subject ref. No.	:	MANC506	
	No. of credits	:	2
	No. of periods per week	:	2
	Internal	:	100%
Course Objectives	:	CO1: Build an understanding of the fundamental concepts of SPM. CO2: Understand and explain the concept of Project estimation and various methods to evaluate it. CO3: Enumerate Quality testing and its importance.	
Pre Requisite	:	NA	
Unit-I Project Management Framework	:	Overview of project Management Project Organization Planning a s/w project Project management life cycle Risk management Identification of Risks Risk Analysis Risk Planning & Monitoring	
Unit-II S/w Project Estimation	:	Project Estimation Different methods of estimation (COCOMO model, Delphi cost estimation etc.) Function point analysis Project Management Tools & Techniques PERT & Gantt Charts	
Unit-III Software Quality Management & Testing	:	Quality Assurance & Standards Quality Planning Quality control Role of testing in Software development Testing Procedure Defect Management	
Text Books	:	1. Software Engineering Roger S. Pressman 2. Software Engineering concepts Richard Fairley	
Additional Reference Books	:	2. Software Project management Edwin Bennatan 3. Software Project Management S.A. Kelkar 4. Software Engineering IAN Sommerville	



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Subject Title	:	Seminar			
Subject Ref. No.	:	MANC559	No. of Credits	:	2
			Internal	:	100 %
Content	:	Seminars will be covered.			

Subject Title	:	Project			
Subject Ref. No.	:	MANC560	No. of Credits	:	18
			Internal	:	40 %
			External	:	60 %
Content	:	Major Projects needs to be performed.			

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad MS
(Faculty of Commerce & Management)
Master of Computer Applications
Bridge Course
Applicable from Academic Year 2020-21

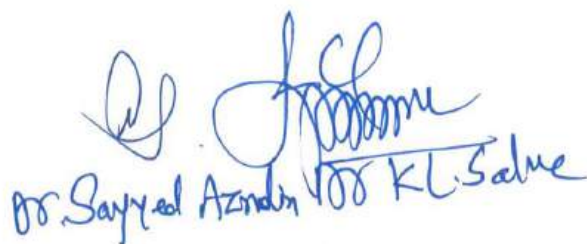
A bridge course can be considered as supplementary knowledge that would be provided for imparting basic knowledge about the courses that would be taught to students, further in the MCA programme. Such an endeavor for students admitted to the MCA programme would be of at most benefit and keep them in good stead for successful completion the MCA programme.

The bridge course has been designed also for those students who have completed their graduation in streams other than Computer Science and Information Technology and will admit to MCA (2 Year's) Course.

The bridge course for the above students so that they will get well prepared and have adequate knowledge to handle the "real" and more difficult post graduate level courses. The bridge course for MCA programme has focused on: Foundations of Computer Theory, Basics of Software Engineering and Object Oriented Programming.

Rules and Regulations

1. The bridge course would be conducted before commencement of MCA First Semester.
2. Successful completion of the bridge course is mandatory for the award of MCA degree and would be as per regulations laid down by University Authorities from time to time.
3. The students graduated in Computer Science and IT (i.e. BCA, BSc. in Computer Science, BSc in IT or Equivalent) can attend the bridge course for betterment of MCA Course.
4. The student's performance of said bridge course would be evaluated at Department/Institute Level
5. The successful student will get Certificate based on his/her performance from the resp. Department/Institute.


Dr. Sayyed Azhar Dr. K.L. Salve

Master of Computer Applications (2 Year's)

Subject Title Bridge Course Paper

Subject Ref. No. : BRICO-1

Course Objective :

1. To acquire basic knowledge of Computer Technology to bridge the gap.
2. To learn the basic concepts of programming, software engg, networking, web technology, dbms, and algorithms.

Unit – I	: Introduction to Computer: What is Computer? Basics of Computers, input and output devices (Monitor, Keyboard, Mouse, CPU, Printers etc), How to start and shutdown the computer system, Memory; Primary, Secondary, RAM, ROM, Compact Disc, Pen Drive, Hard Disk, OS Windows 10 for Beginners, Windows, OS components and the controls,	05Hrs
Unit – II	: C Programming: Types of operators: Arithmetic, Relational, Logical, Compound Assignment, Increment and decrement, Conditional or ternary, Bitwise and Comma operators. Precedence and order of evaluation. Statements and Expressions. Data Concepts: Variables, Constants, data types like: int, float char, double and void. Qualifiers: short and long size qualifiers, signed and unsigned qualifiers. Declaring variables, Scope of the variables according to block, Hierarchy of data types. Data Input and Output functions: Formatted I/O: printf(), scanf(). Character I/O format: getchar(), putchar(). Iterations: Control statements for decision making: (i) Branching: if statement, else... if statement, switch statement. (ii) Looping: while loop, do..while, for loop. (iii) Jump statements: break, continue and goto. Arrays: (One and multidimensional), declaring array variables, initialization of arrays, accessing array elements.	05Hrs
Unit – III	: Software Engineering: Types of systems: Information System, System Development Life cycle, Role & Skills of system Analyst, Models: 1) Waterfall, 2) Prototyping, 3) Spiral (including WIN-WIN Spiral) 4) RAD 5) Group Based Approach: JAD 6) Object Oriented methodology HTML: Introduction To HTML, WWW, W3C, web publishing, Common HTML, Tags Physical & Logical, Some basic tags like <body> , changing background color of page, text color etc., Text formatting tags, <p> , <hr> tags, Ordered & Unordered Lists Tags, Inserting image, Links: text, image links, image mapping , Tables , Frames, Form Introduction with text box, text area, buttons, List box, radio, checkbox etc. CSS: Introduction To Style sheet, types of style sheets- Inline, External, Embedded CSS, text formatting properties, CSS Border, margin properties, Positioning Use of classes in CSS, color properties, use of <div>&	05Hrs
Unit – IV	: Fundamentals of Algorithms: Notion of an algorithm. Pseudo-code conventions like assignment statements and basic control structures Fundamentals of Flowchart: Symbols, Structure	05Hrs
Unit – V	: Concept of OOP using C++/Java: Procedure Oriented Programming, Object Oriented Programming (OOP), Basic Concept of OOP, Benefits of OOP.	05Hrs
Unit – VI	: Introduction of Networking: Data Communication, Networks, Internet, Intranet, Protocols, OSI & TCP/IP Models, Addressing. Wired LAN – LLC, MAC, Ethernet, Connecting Devices – Repeaters, Hubs, Bridges, Two& Three layer Switches, Routers, Gateways, Backbone networks. Introduction of DBMS: Overview of database management system, limitations of data processing environment, database approach, data independence, three level of abstraction, DBMS structure. Entity Relation Model, Relational Structure, Concurrency Control: Concept of a transaction, ACID properties,	05Hrs
Text Books	: Fundamental of Computer –P.K.Sinha Let us C by Yashwant Kanetkar, BPB. Programming in ANSI C (Third Edition) : E Balagurusamy, TMH. Software Engineering , R. Pressman, Pearson Edition Beginning HTML and CSS (English) (Paperback) by Rob Larsen Algorithms in C (Third Edition): Robert Sedgewick , Pearson Education Asia. Networking Complete by Sybex Inc. and Sybex Inc. Introduction to database Systems, C.J.Date, Longman, <i>Pearson Education</i> .	

