

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY**CIRCULAR NO.SU/Commerce&Management/MCA/48/2022**

It is hereby inform to all concerned that, on the recommendation of the Dean, Faculty of Commerce & Management, the Hon'ble Vice-Chancellor in his emergency powers under Section-12(7) of the Maharashtra Public Universities Act, 2016 has accepted New Syllabus **MCA (Two Year) Master of Computer Science** under Choice Based Credit & Grading System on behalf of the Academic Council to be applied from the Academic Year 2022-2023 and onwards.

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

University Campus,
Aurangabad-431 004.

REF.NO. SU/ COMMERCE/2022-23/

Date:- 30-11-2022.

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*Deputy Registrar,
Academic Section
Syllabus unit.*

Copy forwarded with compliments to :-

- 1] **Director, Dept. of Management Science, 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, [B.Com. 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] The Public Relation Officer,
- 8] The Record Keeper.

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



Curriculum of
MASTER OF COMPUTER APPLICATION
TWO YEAR (MCA) PROGRAM
1ST AND IIND YEAR
I TO IV SEMESTER
APPLICABLE FOR UNIVERSITY DEPARTMENT
under Choice Based Credit & Grading System

[Effective from the Academic Year 2022-23 & onwards]

Faculty of Commerce and Management Science

REGULATIONS SPECIFIC TO

M.C.A. PROGRAM

**(Applicable for University Department
of Management Science)**



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**Dr. Babasaheb Ambedkar Marathwada University,
Aurangabad.
(With Effect from Academic Year 2022-23)**

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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 systems 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 alphanumerical code.

For eg.

MANC401 ASP.NET – I

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 Semester – III 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 **120 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.

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- 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:

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

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.

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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:

- a. Title of the courses along with code taken by the student.
- b. The credits associated with and grades awarded for each course.
- c. The number of grade and grade point secured by the student.
- d. The total credits earned by the student in that semester.
- e. The SGPA of the student.
- f. The total credits earned by the student till that semester.
- g. The CGPA of the student (At the end of the IVth 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 credit 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.

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MCA Program Structure

SEMESTER -I

Sem	Ref. No	SubjectTitle	Teaching Scheme			Credit	Marks		
			L	T	P		Int	Ext	Total
I	IC0001	Constitution of India	2	-	-	2	As per University Rules		50
	MANC401	ASP.NET - I	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	2	-	-	2	20	30	50
	MANC405	Research Methodology	2	-	-	2	20	30	50
	MANC406	Programming Using Python	3	1	-	4	40	60	100
	MANC407	Java	3	1	-	4	40	60	100
	MANC451	ASP.NET – I Lab	-	-	2	1	20	30	50
	MANC452	Advance Web Technology Lab	-	-	2	1	20	30	50
	MANC453	Python Lab	-	-	2	1	20	30	50
	MANC454	Java Lab	-	-	2	1	20	30	50
			Total			30	330	520	850

SEMESTER -II

Sem	Ref. No	Subject Title	Teaching Scheme			Credit	Marks		
			L	T	P		Int	Ext	Total
II	MANC42X	Elective – I	3	1	-	4	40	60	100
	MANC408	Object Oriented Analysis &Design	3	1	-	4	40	60	100
	MANC409	Advances in Data structure & Algorithms	3	1	-	4	40	60	100
	MANC410	Advance DBMS	3	1	-	4	40	60	100
	MANC411	Software Testing	3	1	-	4	40	60	100
	MANC42X	Elective – II	3	1	-	4	40	60	100
	MANC454	Advances in Data Structure & Algorithms Lab	-	-	2	1	20	30	50
	MANC455	Advance DBMS Lab	-	-	2	1	20	30	50
	MANC456	Software Testing Lab	-	-	2	1	20	30	50
	MANC457	Mini Project	-	-	4	2	50	--	50
	MANC45X	Elective – I LAB	-	-	2	1	20	30	50
			Total			30	370	480	850

Open Elective -I

Sr.No	Ref. No	Subject Title	Teaching Scheme			Credit	Marks		
			L	T	P		Int	Ext	Total
1.	MANC421	Advance JAVA	3	1	-	4	40	60	100
	MANC458	Advance JAVA Lab	-	-	2	1	20	30	50
2.	MANC422	Data Science using Python	3	1	-	4	40	60	100
	MANC459	Data Science using Python Lab	-	-	2	1	20	30	50
3.	MANC423	ASP.NET - II	3	1	-	4	40	60	100
	MANC460	ASP.NET - II LAB	-	-	2	1	20	30	50

Open Elective - II

Sr.No	Ref. No	Subject Title	Teaching Scheme			Credit	Marks		
			L	T	P		Int	Ext	Total
1.	MANC424	Blockchain Technology	3	1	-	4	40	60	100
2.	MANC425	Internet of Things (IOT)	3	1	-	4	40	60	100
3.	MANC426	Cyber Security	3	1	-	4	40	60	100

SEMESTER -III

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	Cloud Computing	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 - III	3	1	-	4	40	60	100
	MANC551	Android Lab	-	-	2	1	20	30	50
	MANC552	PHP Lab	-	-	2	1	20	30	50
	MANC553	Cloud Computing Lab	-	-	2	1	20	30	50
	MANC554	Mini Project	-	-	4	2	50	--	50
	MANC55X	Elective - III Lab	-	-	2	1	20	30	50
		Total				30	370	480	850

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Open Elective –III

Sr.No	Ref. No	Subject Title	Teaching Scheme			Credit	Marks		
			L	T	P		Int	Ext	Total
1.	MANC521	Data Mining using SQL	3	1	-	4	40	60	100
	MANC555	Data Mining using SQL Lab	-	-	2	1	20	30	50
2.	MANC522	Linux Admin & Server Config.	3	1	-	4	40	60	100
	MANC556	Linux Admin & Server Config. Lab	-	-	2	1	20	30	50
3.	MANC523	Statistical Analysis and DS project	3	1	-	4	40	60	100
	MANC557	Statistical Analysis and DS project LAB	-	-	2	1	20	30	50

SEMESTER -IV

Sem	Ref. No	Subject Title	Teaching Scheme			Credit	Marks		
			L	T	P		Int	Ext	Total
IV	*MANC506	Software Project Management	4	-	-	4	100	-	100
	*MANC507	Entrepreneurship Development	4	-	-	4	100	-	100
	MANC559	Seminar	-	4	-	4	100	-	100
	MANC560	Project	-	-	-	18	180	270	450
		Total				30	480	270	750

MCA Degree (Two Years Programme)			Marks		
	Credits		Int	Ext	Total
Course Total	120	--	1560	1740	3300
One Service Course	4	--	20	80	100
Grand Total	124	--	1580	1820	3400

*The teaching, learning process for subject MANC506 – Software Project Management and MANC507 – Entrepreneurship Development of MCA- IV sem will be conducted in ONLINE mode only.



Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (MS)

Semester-I

Subject Title	Constitution of India			
Subject Ref. No.	IC001	No. of Credits	:	2
		No. of Periods / Week	:	2
		Internal + External	:	50
	Syllabus will be provided by the authorities.			

Subject Title	ASP.NET - I			
Subject Ref. No.	MANC 401	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	Describe basic concepts of ASP.NET and identify components of a form.
CO-2	Use various validation controls on respective objects on the form.
CO-3	Establish connectivity with back end using ADO.Net.
CO-4	Implement stored procedures in ASP.NET.
CO-5	Describe use of Authentication services in ASP.NET.
CO-6	Create a mini-project using controls learnt.

Prerequisites	Before attending this course, students must have:
	The ability to create HTML or DHTML, including: • Tables • Images • Forms Programming experience using Visual Basic .NET, including: • Declaring variables • Using loops Using conditional statements

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Unit I	Overview of the Microsoft .NET Framework, Using Microsoft Visual Studio .NET, Introduction to the .NET Framework, Overview of ASP.NET, Creating a Microsoft ASP.NET Web Form, Adding Code to a Microsoft ASP.NET Web Form Using Code-Behind Pages, Adding Event Procedures to Web Server Controls
Unit II	Validating User Input Overview of User Input Validation, Using Validation Controls, Page Validation Creating User Controls Adding User Controls to an ASP.NET Web Form, Creating User Controls
Unit III	Accessing Relational Data Using Microsoft Visual, Studio .NET Overview of ADO.NET, Creating a Connection to the Database, Displaying a DataSet in a List-Bound Control Accessing Data with Microsoft ADO.NET Introduction to Using ADO.NET, Connecting to a Database, Accessing Data with DataSets, Using Multiple Tables, Accessing Data with Data Readers
Unit IV	Calling Stored Procedures with Microsoft ADO.NET, Overview of Stored Procedures, Calling Stored Procedures, Reading and Writing XML Data Overview of XML Architecture in ASP.NET, XML and the DataSet Object, Working with XML Data, Using the XML Web Server Control, Securing a Microsoft ASP.NET Web Application
Unit V	Web Application Security Overview Working with Windows-Based Authentication Working with Forms-Based Authentication Overview of Microsoft Passport Authentication
Text Books	1. Programming ASP.NET By Jesse Liberty, Dan Hurwitz, Publisher: O'Reilly Media
Reference books	1. ASP. NET: a beginner's guide By Dave Mercer, Publisher McGraw-Hill Companies



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Subject Title	Mathematics and Probability		
Subject Ref. No.	MANC402		
		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	To extend student's logical and mathematical maturity & ability to deal with abstraction and to introduce most of the basic terminologies used in computerscience courses and application of ideas to solve practical problems.		
CO-2	To understand the basic concepts of combinatorics, graph theory and to familiarizethe applications of algebraic structures.		
CO-3	To understand the concepts and significance of lattices and boolean algebra whichare widely used in computer science and engineering.		
CO-4	To provide a foundation in probability theory in order to solve applied problemsand to prepare for more advanced courses in probability.		
CO-5	To learn various distributions, Sampling Distributions that helps to enhance the quality of research approach.		
Course	In this subject student will learn Logic, Relations and Functions, Algebraic Functions,		
Objective	Graph Theory and Trees will be introduced in this course. Students will be able to calculate permutations and combinations to then find the probability of a compound event or to solve a problem.		
Prerequisites	Prerequisites for this course is student should have basic knowledge of abstract algebra and permutation and combination		
Unit I	LOGIC AND PROOFS: Propositional logic – Propositional equivalences – Predicates and quantifiers – Nested quantifiers – Rules of inference – Introduction to proofs – Proof methods and strategy. COMBINATORICS: Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications.		

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Unit II	GRAPHS AND GRAPH MODELS – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths. ALGEBRAIC SYSTEMS – Semi groups and monoids – Groups – Subgroups – Homomorphism's – Normal subgroup and cosets – Lagrange's theorem – Definitions and examples of Rings and Fields.
Unit III	LATTICES AND BOOLEAN ALGEBRA: Partial ordering – Posets – Lattices as posets – Properties of lattices – Lattices as algebraic systems – Sub lattices – Direct product and homomorphism – Some special lattices – Boolean algebra.
Unit IV	Probability : Sample Space , Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence and Product Rules, Bayes' Rule. Random Variables and Probability Distributions : Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions, Joint Probability Distributions. Mathematical Expectation: Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables 127, Chebyshev's Theorem.
Unit V	Discrete Probability Distributions: Binomial, Multinomial, Hypergeometric Distributions, Negative Binomial and Geometric Distributions, Poisson Distribution and the Poisson Process. Continuous Probability Distributions : Continuous Uniform Distribution, Normal Distribution, areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial, Gamma and Exponential Distributions, Chi-Squared Distribution. Sampling Distributions and More Graphical Tools : Random Sampling and Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Sampling Distribution of S^2, t-Distribution , F-Distribution.
Text Book	1. Swapan Kumar Sarkar, "A text book of Discrete Mathematics", S. Chand Publication 2. Discrete Mathematical Structures for Computer Science by Kolman B and Bushy R, Prentice – Hall of India 1998 3. A Basic Course in Probability Theory by Rabi Bhattacharya & Edward C. Waymire 4. Probability and Random Variables: A Beginner's Guide by David Stirzaker
Reference Books	1. Discrete Mathematics by C L Liu- Tata McGraw Hill Publishing house 2000 2. Discrete Mathematical Structures with applications to Computer Science by Tremblay and Manohar, Prentice – Hall of India 1997



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Subject Title	Advance Web Technology			
Subject Ref. No.	MANC403	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	Design WebPages using basic HTML tags & forms.			
CO-2	Apply different CSS to WebPages.			
CO-3	Write basic script in JavaScript to perform different functionalities.			
CO-4	Validate the forms input depending upon different events.			
CO-5	Write simple programs using jQuery & AJAX.			
CO-6	Design website using Dream Viewer tool.			
Prerequisites	Student should know the basic programming concepts.			
Unit I	HTML & Forms 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. HTML 5 Introduction , form elements – date, dateTime, email, number, range, tel, color, URL, datetimelocal, month , week, time, placeholder attribute, autofocus attribute, required attributes , HTML audio , video			
Unit II	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>&			
Unit III	JavaScript Intro to script, types, intro of JavaScript, JavaScript identifiers, operators, control & Looping structure, Intro of Array, Array with methods, Math, String, Date Objects with methods User defined & Predefined functions, DOM objects, Window Navigator, History, Location. Event handling & Validations on Forms – JavaScript Handling Events on Button, Textbox, radio button, checkbox, drop down box, text area etc. Form Validation – numeric, alphanumeric, alphabets and any combination of these.			



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	Disabling the keys on the keyboard, regular expression
Unit IV	jQuery Introduction to jQuery, Syntax Overview Anatomy of a jQuery Script, Creating first jQuery script Traversing the DOM, Selecting Elements with jQuery, Refining & Filtering Selections, Selecting Form Elements Working with Selections - Chaining, Getters & Setters CSS, Styling, & Dimensions
Unit V	Manipulating Elements - Getting and Setting Information about Elements, Moving, Copying, and Removing Elements, Creating New Elements Manipulating Attributes, Utility Methods Events - Connecting Event to Elements, Namespacing Events, Event handling, Triggering Event handlers, Event Delegation JQuery Effects -hide/show, fade, slide, animate, callback, stop Interactions - Draggable, Droppable, Resizable, Selectable, Sortable Widgets - Accordion, DatePicker, Menu, Tabs Plugins - Using readymade plugins, Create a basic plugin, Writing Plugins
Text Books	- HTML, DHTML, JavaScript, Perl & CGI Ivan Bayross - HTML & CSS : The Complete reference, Fifth Edition By Thomas Powell
Reference books	<u>Html, Xhtml, And Css Bible (English) 5th Edition (paperback)</u> by Schafer, Steven <u>HEAD FIRST HTML AND CSS, 2/ED (UPDATED FOR HTML)</u> by ROBSON <u>Beginning HTML and CSS (English) (Paperback)</u> by Rob Larsen <u>Learn to Code HTML and CSS (English) (Paperback)</u> by Howe - JavaScript Bible (English) 7th Edition by <u>Danny Goodman Michael Morrison Paul Novitski Tia GustaffRayl</u> - JavaScript Programming: Pushing the Limits (English) 1st Edition By (2013)Jon Raasch - Head First JavaScript (2007) By michael Morrison <u>JavaScript: The Definitive Guide</u> (2011) by Flanagan, David - Introducing HTML5 - Bruce Lawson, Remy Sharp - AngularJS - Brad Green, Shyam Seshadri - Learning jQuery - Jonathan Chaffer, Karl Swedberg - Professional Ajax, 2nd Edition Wrox Press - Internet Technology at work Hofstetter fred, TMH.
Web references	<u>www.w3school.com</u> <u>www.tutorialpoint.com</u>



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Subject Title	:	Advance Operating System		
Subject Ref. No.	:	MANC404	No. of Credits	: 2
			Assignments / Sessional	: 20
			Semester Examination	: 30
Course Outcomes (COs)				
At the end of the course, students will be able to:				
CO-1		Demonstrate understanding of design issues of advanced operating systems and compare different types of operating systems		
CO-2		Analyze design aspects and data structures used for file subsystem, memory subsystem and process subsystem of Linux OS		
CO-3		Differentiate between threads and processes and compare different processor scheduling algorithms		
CO-4		Master concepts of memory management including virtual memory & Master system resources sharing among the users		
Pre Requisite	:	Working knowledge of C programming, Basic Computer Architecture-Concepts., Basic algorithms and data structure concepts.		
Unit – I	:	Introduction: Functions of operating systems, Design approaches: layered, kernel based and virtual machine approach, types of advanced operating systems (NOS, Multiprocessor OS, Mobile OS, RTOS, Cloud OS)		
	:	Process Management: Process Concept, Process Control Block, Process Schedule CPU Scheduling: Scheduling Concept, Scheduling Criteria, Scheduling algorithm Process Synchronization & Deadlock: Synchronization concept, Synchronization Requirement, Critical Section Problem, Monitors, Deadlock concepts, Deadlock prevention & avoidance, Deadlock Detection, Deadlock Recovery		
Unit – II	:	Memory Management: Memory Management Techniques, Contiguous & Non Contiguous allocation, Logical & Physical Memory, Conversion of Logical to Physical address, Paging, Segmentation, Segment with paging Virtual Memory Concept, Demand paging, Page Replacement algorithm, Allocation of Frames, Page fault.		
Unit – III	:	Distributed Operating system concepts: Goals, Distributed Computing Models, Hardware Concepts, Software Concepts, Architecture of DOS. Design Issues: Transparency, Flexibility, Scalability, Reliability, Performance, fault tolerance Mobile OS: Architecture, Android OS, iOS, Virtual OS, Cloud OS and their design issues		
Text Books	:	1. The Design of the UNIX Operating System, PHI, by Maurice J. Bach. 2. Distributed Computing 2 nd Edition, Mahajan and Seema Shah, Oxford. 3. Advanced Concepts in Operating Systems, Mukesh Singhal, Niranjana G Shivaratri. 4. Mobile Computing by Rajkamal, 1 st edition, Oxford.		
Additional Reference Books		1. William Stallings, "Operating Systems Internals & Design Principles", Pearson Education, 6th Ed., 2016.		



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Subject Title	Research Methodology			
Subject Ref. No.	MANC405	No. of Credits	:	2
		Assignments / Sessional	:	20
		Semester Examination	:	30
Course Outcomes (COs) At the end of the course, students will be able to: CO-1 Understand the role and importance of research.. CO-2 Study the concepts & cycle of the research process. CO-3 Identify the sampling methods of Research process CO-4 To apply various statistical methods to test the Hypothesis.				
Course Objective	To equip the students with the basic understanding of the research methodology and to provide an insight into the application of modern analytical tools and techniques for the purpose of management decision making.			
Pre Requisite	NA.			
Unit – I	Introduction to Research: Scope, Objectives, Motivation, significance, Types, Research Applications, Research Methodology.			
Unit – II	Research Problem: Components of a Problem, Conditions for selecting Problem , Research Problem identification; Problem Formulation and Statement of Research Objectives; Techniques of defining research Problem			
Unit – III	Research designs & Sample Design: Features, Significance, Introduction to Types-exploratory, descriptive & experimental research designs; Sample Design: Steps in sample design, types- Probability & Non Probability sample design.			
Unit – IV	Data collection: Methods –Primary Data & Secondary Data, Survey methods, selection of an appropriate data collection method, conditions before using secondary data, Questionnaire design.			
Unit – V	Data Processing: Editing, Coding, classification, Tabulation, Analysis of Data; Introduction to SPSS, ANOVA, Research Proposal; Research process			
Text Books	1. Research methodology methods & techniques by C.R. Kothari 2. Statistical methods: Dr. S.P. Gupta-sultan Chand & sons New Delhi. 3. Research methodology by Gupta 4. Research methodology in social science by Giridhari 5. Management Research Methodology by K.N. Krishnaswamy, Appa Iyer Sivakumar and M. Mathirajan. 6. Management Research by Andrews, F.M. and S.B. Withey Social Indicators of Well Being. Plenum Press. NY, Bennet, Roger 7. Survey Methods by Fowler, Floyd J. Jr., 8. Exploring Research by Salkind, Neil J.,			



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Subject Title	:	Programming using Python			
Subject Ref. No.	:	MANC406	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 principles python programming.				
CO-2	Write clear and effective python code.				
CO-3	Create applications using python programming.				
CO-4	Access database using python programming.				
CO-5	Develop web applications using python programming.				
CO-6	Develop and use Web Services using python.				
Pre Requisite	:	Working knowledge of C/C++ programming, Basic algorithms and data structure concepts.			
Unit – I	:	Introduction to Python Programming Language : Strengths and Weaknesses, IDLE, Dynamic Types, Naming Conventions, String Values, String Operations, String Slices, String Operators, Numeric Data Types, Conversions, Built In Functions			
Unit – II	:	Data Collections and Language Component: Introduction, Control Flow and Syntax, Indenting, The if s tatement, Relational Operators, Logical, Operators, True or False, Bit Wise Operators, The while Loop, breakand continue, The for Loop, Lists, Tuples, Sets, Dictionaries, Sorting Dictionaries, Copying Collections.			
Unit – III	:	Object and Classes : Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, File Organization Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes			
Unit – IV	:	Functions and Modules : Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope ,Functions - "First Class Citizens", Passing Functions to a Function, Mapping Functions in a Dictionary, Lambda, Modules			
Unit – V	:	I/O and Error Handling In Python : Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, ,Reading Data From a File, Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories, Metadata, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions			
Text Books	:	Learning Python, 4th Edition by Mark Lutz Programming Python, 4th Edition by Mark Lutz			

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Subject Title	JAVA		
Subject Ref. No.	MANC407		
		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	Write, compile, and execute Java programs that may include basic data types and control flow constructs using J2SE or other Integrated Development Environments (IDEs) such as Eclipse, NetBeans, and JDeveloper		
CO-2	demonstrate the use of good object-oriented design principles including encapsulation ,information hiding, Inheritance , Full Abstraction and Partial Abstraction		
CO-3	Create GUI Application using Applet & HTML		
CO-4	Implement the Multithreading Concept with real time application		
CO-5	Control & Maintain Run-Time Exception occurred during web based software development		
CO-6	Maintain the file using File handling concepts and provide the ability to inspect & modify the runtime behavior of application using Reflection		
Course Objective	This subject helps to clarify the programming concepts in JAVA language. This		
	language covers all the techniques of developing the JAVA programs. The course structure of JAVA programming Languages is help to develop web based applications and APPs for Android Mobiles		
Prerequisites	Fundamentals of Computer System , operating system , C and C++ Language		
Unit I	Java Fundamentals , J2SE, J2EE, J2ME, Features of Java , OOPs concepts, benefits of JAVA, Hardware / Software requirement, Support system and Environment of JAVA, System Variable, Environment Variable, Path and Class Path. JAVA API. Application of More JAVA, application with two classes , program structure , tokens, statements installing and configuration JAVA , implementing JAVA program, JAVA virtual M/C Architecture and different alias with functionality, command line arguments, program style, keywords , data types, Operators, Decision Making and Branching , looping Statement . Predefined classes (Scanner, Date, Random)		
Unit II	Class objects and methods: class definition,class types-Bean Class, POJO class, Factory Class, Singleton Class, Runtime class, Inner Class. methods, fields declaration.Object, ways to create an object and operations on it. Garbage Collector. constructor , overloading , static members , nesting methods , Inheritance, overloading , Final class and Methods , array string and vector, Interfaces : definition , implementation , accessing Interface Variables , Packages : introduction, uses , creating , accessing adding a class to package hiding class		



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Unit III	Multithreaded Programming : Introduction , creating threads stopping and blocking a threads , Life cycle of a thread, its exceptions priority, synchronization, Managing Errors and Exception : types of error , exception , syntax of exception Handling , multiple catch statement, throwing our own exception Applet Programming : Introduction , preparing to write Applets building Applets code, creating an executable Applet , designing a web page , applet tag, adding Applet Tag, running applet more HTML tags , event handling
Unit IV	AWT programming : introduction , create JAVA application using AWT, creating JAVA Applet using AWT , execute applet, execute applet in browse, message in the status bar, get HTML and AREA size , window and event, Graphic Programming : introduction, Graphic class, lines and rectangles, circle, ellipse, arcs poly, line graphs, using control loops in Applets , Bar charts , Text Field, Label , button , check box layouts , text area, scroll list , selection control, scrollbar, menu, dialog.
Unit V	Managing Input / Output Files in JAVA : streams, streams classes, Byte streams classes , reading and writing characters , bytes, Random Access Files , Interactive I/p and o/p, Reflection API- class identification, interface identification, parent class information and methods information.
Text Book	Programming with Java A Primer, E.Balaguruswamy Tata McGraw Hill Companies, Core Java, Dietel and Dietel
Reference Books	The complete reference JAVA2, Herbert schildt. TMH, Java Programming John P. Flynt Thomson 2nd, Java Programming Language Ken Arnold Pearson , Big Java, Cay Horstmann 2nd edition, Wiley India Edition

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Subject Title	ASP.NET – I Lab			
Subject Ref. No.	MANC451	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	Write Simple programs using C#.			
CO-2	Use calendar control and Treeview control in forms.			
CO-3	Using various validation controls on objects on the forms.			
CO-4	ImplementDatagridcontrol,databindingandconnectivityusingC#.Net.			
CO-5	Learn to use hyperlink control on Forms.			
CO-6	Create a minor project using ASP.NET and SQL Server.			
Prerequisites	HTML and VB.net			
Unit I	Simple application using web controls A Finding factorial Value B Money Conversion C Quadratic Equation D Temperature Conversion E Login control			
Unit II	States of ASP.NET Pages, Adrotator Control, Calendar Control A Display messages in a calendar control BDisplay vacationinacalendarcontrol CSelected dayin a calendar controlusing style DDifference betweentwocalendardates Treeview control A Treeview control and datalist B Treeview operations			
Unit III	Validation controls Query textbox and Displaying records Display records by using database Datalist link control Databinding using dropdownlist control Inserting record into a database			
Unit IV	Deleting record into a database Databinding using datalist control Datalist control templates Databinding using datagrid Datagrid control template			
Unit V	Datagrid hyperlink Datagrid button column Datalist event Datagrid paging Creating own table format using datagrid			
Text Books	ProgrammingASP.NET ByJesseLiberty, Dan Hurwitz, Publisher: O'ReillyMedia Visual Basic .NET Programming Black Book By Steven Holzner Publisher: Dreamtech Press ASP. NET: abeginner's guide By DaveMercer, Publisher McGraw-HillCompanies			



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Subject Title	Advance Web Technology LAB			
Subject Ref. No.	MANC452	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	Design WebPages using basic HTML tags & forms.			
CO-2	Apply different CSS to WebPages.			
CO-3	Write basic script in JavaScript to perform different functionalities.			
CO-4	Validate the forms input depending upon different events.			
CO-5	Write simple programs using jQuery & AJAX.			
CO-6	Design website using Dream Viewer tool.			
Content	:	Assignment based on the HTML, JAVASCRIPT, JQuery, AJAX will be covered.		

Subject Title	Python Lab			
Subject Ref. No.	MANC453	No. of Credits	:	1
		Internal	:	20
		External	:	30
Content	:	Assignment containing on basis of python programming .		

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Subject Title	JAVA LAB			
Subject Ref. No.	MANC454	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	Design the fundamentals of object oriented application, and have the ability to apply them			
CO-2	Identify, formulate and solve problems by using object oriented programming			
CO-3	Use APIs (Application Programmer Interfaces) and design/program APIs			
CO-4	Implement Inheritance , Association and Abstraction using OOPs concepts			
CO-5	Maintain the Exceptions in Software Development & Design GUI using AWT controls			
CO-6	Develop Webpage using Applet & Implement multithreading concept in real application			
Course Objective	This subject helps to clarify the programming concepts in JAVA language. This language covers all the techniques of developing the JAVA programs. The course structure of JAVA programming Languages is help to develop web based applications and APPs for Android Mobiles			
Prerequisites	Fundamentals of Computer System , operating system , C and C++ Language			
Unit I	Java Fundamentals			
	1.	Practical demo on JDK installation, Path setting , Classpath Setting , Run program on Console, MyEclipse		
	2.	WAP a to demonstrate the primitive data types with their default values.		
	3.	WAP a to demonstrate the Looping and decision statements in Java.		
	4.	WAP a to demonstrate the function of Predefined class Scanner .		
	5.	WAP a to demonstrate the function of Predefined class Date .		
	6.	WAP a to demonstrate the function of Predefined class Random .		



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Unit II	Class objects and methods	
	7.	WAP a program to demonstrate the use of Static member and static method
	8.	WAP a program to demonstrate the use of Static member, static block and static method
	9.	WAP a program to demonstrate the use of this, Instance Initializer block
	10.	WAP a program to demonstrate the application of Inheritance using IS-A relation & Has-A relation.
	11.	WAP a program to demonstrate the application of constructors in Inheritance concept using IS-A relation & Has-A relation.
	12.	WAP to implement static binding in JAVA.
	13.	WAP to implement dynamic binding in JAVA.
	14.	WAP to demonstrate the use of super keyword in inheritance.
	15.	WAP to demonstrate the use of final keyword with instance variable , with method and with class name.
	16.	WAP to demonstrate the implementation of an Array & Vector in Java and its access methods using enhance for a& Enumeration
	17.	WAP to demonstrate all Access Modifiers in JAVA. Default, public, private & protected.
	18.	WAP that demonstrate the applications of abstract class and interface in JAVA
	19.	WAP that demonstrate the applications of package in JAVA
	20.	WAP that demonstrate how to import package, class and how to access the static members and methods of class in JAVA
Unit III	Multithreaded Programming	
	21.	WAP to demonstrate the implementation of Multi Threading using Thread Class.
	22.	WAP to demonstrate the implementation of Multi Threading using Runnable Interface.
	23.	WAP to demonstrate the implementation of sleep() & join() methods with Multi-Threading.
	24.	WAP to demonstrate the application of Daemon thread in java.
	25.	WAP to demonstrate the application of Synchronized thread for Mutual Exclusion in java.
	26.	WAP to manage the ArithmeticException in Java.
	27.	WAP to manage the NullPointerException in Java.
	28.	WAP to manage the NumberFormatException in Java.
	29.	WAP to manage the ArrayIndexOutOfBoundsException in Java.



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	30.	WAP to management nested Exceptions
	31.	WAP to demonstrate a Simple Applet Functionality in JAVA.
	32.	WAP to demonstrate various shapes availLabel in Graphics class which can be implements in JAVA Applet.
	33.	WAP to demonstrate the Applet with FontSize, Font, Color.
	34.	WAP to implement Mutli threading in Applet.
	35.	WAP to configure the components in HTML file and fetch it in Applet & manipulate.
	36.	WAP to configure the number in HTML file and print its table in Applet.
	37.	WAP to create Random Circles in Applet using Random Class and Multi Threading.
	38.	WAP to create Random Circles in different colors in Applet using Random Class and Multi Threading.
Unit IV	AWT programming	
	39.	WAP a program to Create a Frame by using Inheritance and Association
	40.	WAP to demonstrate the BorderLayout Layout Manager
	41.	WAP to demonstrate the GridLayout Layout Manager
	42.	WAP to demonstrate the FlowLayout Layout Manager
	43.	WAP to demonstrate the BoxLayout Layout Manager
	44.	WAP to demonstrate the CardLayout Layout Manager
	45.	WAP a program to validate Login Page using TextField & Button
	46.	WAP to create a Calculator in awt
	47.	WAP to enter two numbers and print its addition using Label, Button & TextField
	48.	WAP to perform All Arithmetic Operations on two numbers and print its addition using Label, TextField & Button ActionListener Interface
	49.	WAP to add Checkbox & Label. And apply ItemListener Interface application on it.
	50.	WAP to add CheckboxGroup & Label. And apply ItemListener Interface application on it.
	51.	WAP to add Choice & Label. And apply ActionListener on it
	52.	WAP to add List & Label. And apply ActionListener on it
	53.	WAP a create four Buttons and Two Lists and write code of each Button click to perform different operations
	54.	WAP to demonstrate Canvas Implementation.



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	55.	WAP to create Scrollbar application using Label.
	56.	WAP to create MenuBar using Menu and MenuItem application using Label.
	57.	WAP to create MenuBar using Menu and MenuItem application using Label and apply ActionListener Interface
	58.	WAP to demonstrate the Use of Dialog Box.
	59.	WAP to enter two numbers in Dialog Box and perform Addition on it
	60.	WAP to demonstrate the Use of ActionListener on Different Components.
	61.	WAP to demonstrate the Use of MouseListener.
	62.	WAP to demonstrate the Use of ItemListener on Difference Components.
	63.	WAP to demonstrate the Use of KeyListeners .
	64.	WAP to demonstrate the Use of WindowsListeners.
	65.	WAP to demonstrate the Use of Adapter Classes .
	66.	WAP to implement WindowCloseEvent .
	67.	WAP to implement Awt control in Applet
	68.	WAP to implement Awt control & Multi Threading concept in Applet
	69.	WAP program to implement Awt control , Multi Threading & Exception concept in Applet
Unit V	Managing Input / Output Files in JAVA	
	70.	WAP to write & read a character to File.
	71.	WAP to write & read a string to File.
	72.	WAP to write & read the data from&to File using BufferedOutputStream & BufferedInputStream
	73.	WAP to read the data from two files and writes into another file using FileStreams and SequenceStreams.
	74.	WAP to demonstrate the use of Write & Reader classes.
	75.	WAP to demonstrate the use of FileWrite & FileReader classes.
	76.	WAP to demonstrate the use of CharArrayReader & CharArrayWritr classes.
		Reflection in JAVA
	77.	WAP to demonstrate the use of newInstance() method
	78.	WAP to demonstrate the use of javap tool.
	79.	Few program of Refection Concepts



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Semester-II

Open Elective –I

Subject Title	Advance JAVA		
Subject Ref. No.	MANC421	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 Panes, Tree, Tables, GenericProgramming : class, methods bounds for type variable , generic code and the virtual machine, translating generic expressions and methods, calling legacy		



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	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 indetifiers , 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 3. Graphic JAVA Mastering the JFC-David Geary

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Subject Title		Advance JAVA Lab		
Subject No.	Ref.	MANC458	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, JTextField ,JPasswordField and ActionOperformed & KeyPressedListeners		
	2.	WAP to create Arithmetic operation GUI form using JButton , JLabel & ActionOperformed 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 a application of multiple JCheckBox with ItemListener		
	6.	WAP to demonstrate the use of JRadioButton control with JOptioPane & ActionListener Interface		
	7.	WAP programto create JOptionPane with showMessageDialog, showInputDialog, showConfirmationDialog.		



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	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 withMouseListener & 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)
	24.	WAP JDBC program to write & read a BLOB and CLOB to Table
	25.	WAP to demonstrate the CallableStatement Interface to retrieve the procedure for IN parameter
	26.	WAP to demonstrate the CallableStatement Interface to retrieve the procedure for OUT parameter
	27.	WAP to demonstrate the CallableStatement Interface to retrieve the procedure for INOUT parameter
	28.	WAP to demonstrate the CallableStatement 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.



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	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..
	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 demonstrate the use of Iterator WAP to perform all operations of ArrayList & iterate it. Iterator Cursor in Collection.



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	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.
	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 & DatagramPacket
Unit V	90.	WAP to create RMI application using Remote
Text Book		



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Subject Title	:	Data Science Using Python		
Subject Ref. No.	:	MANC422	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.	:	MANC459	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	:	ASP.NET – II		
Subject ref. No.	:	MANC423		
			No. of credits	: 4
			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 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, data annotations, 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 - II LAB
Subject ref. No.	:	MANC460
		No. of credits : 1
		No. of periods per week : 2
		Assignment/Sessionals : 20
		Semester Exam : 30
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, dataannotaions
Unit-V	:	Overview of JQuery, Using JQuery
Text Books	:	2. ASP.NET MVC 5- Adam Freeman
Additional Reference Books	:	2. Pro MASP.NET MVC 5- Jon Gallway, Brad Wilson, Allen, David Matson

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Subject Title :	Object Oriented Analysis And Design		
Subject Ref. No.	MANC408	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	Design UML diagrams as Class, sequence, use case, activity, component, deployment, state.		
CO-2	Understand object oriented methodologies.		
CO-3	Generate the documentation associated with SDLC using UML.		
Prerequisite :	Students must have knowledge of Software development life cycle.		
Unit -I :	1A) Basics of Software Engineering: Software Engineering, Development Models , SSAD and OOAD. Why Object –Orientation? 1B) Object Oriented Methodologies Object Oriented Design -Booch Object Modeling Techniques - Rumbaugh Object – Oriented Analysis - Cood Yourdon Object – Oriented Software engineering – Ivar Jacobson Unified Approach		
Unit -II :	Object-Oriented Systems Development Process 2.1 Rational Unified Process - Four Major phases:- Inception ,Elaboration, Construction, Transition Requirements Engineering Problem analysis. Understanding Stockholders need Type of requirements. Use-case Model: Writing Requirements		
Unit -III :	Analysis 3.1 Behavioral Analysis 3.2 Domain Analysis or Business Object Analysis 3.3 Use-case Driven Object Oriented analysis The UML approach. 3.3.1 Develop use-case Model 3.3.2 Use-case Description 3.3.3 Documentation 3.3.4 Activity Diagram 3.4 Identify the classes. 3.4.1 Introduction to different approaches for identifying classes 3.4.2 "Noun Phrase" approach OR 3.4.3 "Conman Class Pattern" approach Or		



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	3.4.4 "CRC" approach Or 3.4.5 Use case Driven Approach. 3.5 Containment and Composition 3.6 Aggregation 3.7 Inheritance, Subtypes and IS-A Hierarchies. 3.8 Association and Link Relationships. 3.9 Diagramming System Events.
Unit - IV :	Design Phases 4.1 Translating Analysis Concept into Design. 4.2 Optimizing classes and Objects: The Multi-tiered Architecture View 4.3 Mapping System functions to objects. 4.4 Objects-to-Object Visibility. 4.5 Collaboration Diagram 4.6 Sequential Diagram 4.7 Specification Class Diagram 4.8 State Transition Diagram 4.9 Designing the Data Access layer. 4.10 Design User Interface layer 4.11 Designing System Interfaces, Controls and Security.
Unit - V :	Implementation 5.1 Component diagram 5.2 Deployment diagram Patterns 5.3 Benefits of patterns. 5.4 Using patterns During Analysis. 5.5 Using Pattern During Design
Text Books :	1. Object Oriented Analysis and Design with Applications - Grady Booch., Benjamin / Cummings , 1994. 2. Object - Oriented Modeling and Design - J Rumbaugh, M Blaha, W .Premerlani
Reference Books :	1. Principles of Object- Oriented Software Development - Anton Eliens , Addison Wesley. 2. Object Oriented System Development - Ali Bahrami McGRAW-HILL International Edition. 3. Object-Oriented Software Engineering - Ivar Jacobson Pearson Education INC 4. Applying UML And Pattern - Craig Larman Pearson Education INC 5. UML Distilled - Martin Fowler Pearson Education INC 6. The Unified Modeling Language User Guide - Grady Booch, James Rumbaugh, Ivar Jacobson-Pearson Education INC 7. The Unified Modeling Language Reference Guide - Grady Booch, James Rumbaugh, Ivar Jacobson-Pearson Education INC 8. Design Object- Oriented Software - Rebecea Wrifs - Brock. Brian Wilkerson, Lauren Wiener 9. Object Oriented Analysis and Design - Bennett , Simon McGraw Hill. 10. Designing Flexible Object Oriented System with UML - Charless Richter, Techmedia 11. Instant UML - Muller - Apress LP 12. UML Instant - Thomas A Pendar - Wiley Publication 13. UML in Nutshell

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Subject Title	: Advances in Data Structure and Algorithm			
Subject Ref. No.	: MANC409	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	To introduce the concepts of Abstract data Type implement linear data structures such as stacks, queues and lists and their applications using Programming Language			
CO-2	To implement various search data structures such as hashing, binary search trees, AVL trees, B+ trees and B*-trees using programming languages			
CO-3	To implement graph theory concept (Minimum Spanning Tree) in Civil Network Planning, Computer Network Routing Protocol and summarize searching and sorting techniques			
CO-4	Ability to analyze the performance of algorithms.			
CO-5	Ability to choose appropriate algorithm design techniques for solving problems			
Pre Requisite	: C & C++ Programming Languages			
Unit – I	: Introduction To Data Structure : Introduction, Data Definition, Data Object, Data Types, Built-in Data Type, Derived Data Type, Data Structure, Implementation of Data Structure Array : Array as Data Structure, Storage Representation of Arrays, Applications of Arrays, Polynomial Representation Using Arrays, Addition of Two Polynomial, Multiplication of Two Polynomial, Sparse Matrices, Addition of Sparse Matrices, Transpose of a Sparse Matrix Stack : Introduction, Definition, Operation on Stack, Static & Dynamic Implementation of a Stack, Application of Stack, Recursion, Infix, Prefix & Postfix expression, Matching Parentheses in an expression Queue: Introduction, Definition of a Queue, Operation on a Queue, Static & Dynamic Implementation of Queue, Types of Queue, Circular Queue, Priority Queue, DEQueue, Application of Queue, Job Scheduling, Reversing Stack using Queue			
Unit – II	: Linked List : Introduction, Drawback of Sequential Storage, Concept of Linked List, Implementation of Linked List, Operation of Linked List, Creating a List, Displaying a List, Inserting an element in the List, Deleting an element, Other Operation & Applications, Reversing a Linked List, Concatenation of Two Lists, Representation of Polynomial, Circular Linked List & Operation, Doubly Linked List & Operation, Doubly Circular Linked List & Operation, Difference between an array and Linked list, Generalized Linked List, Tree : Tree Terminology, Binary Tree, Binary Tree Representation, Binary Search Tree (BST), Creating a BST, Binary Search Tree Traversal, Preorder Traversal, Inorder Traversal, Postorder Traversal Binary Threaded Tree : AVL tree, B tree, introduction to B tree, insertion in B tree, deletion from B tree, introduction to B+, B* tree, Expression Tree, Threaded Binary Tree			



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Unit - III	: Graph : Introduction, Graph Representation, Adjacency Matrix, Adjacency List, Graph Traversals, Depth First Search, Breadth First Search. Searching and Sorting : Insertion Sorting , Selection Sorting , Bubble Sorting , Shell Sorting , Merge Sorting, Quick Sorting , Divide and Conquer Sorting, Radix sorting , Heap Sorting , Binary Tree Sort. Binary Search, Hashing and Rehashing, Extendible Hashing, Storage
Unit - IV	: Introduction : Running time analysis -- asymptotic notation, big-oh, theta, big-omega. Worst case and average case complexity Divide and Conquer : Master Theorem, Karatsuba Technique for Long Multiplication, Chinese Remainder Theorem, recall of merge sort and its recurrence.
Unit - V	: Greedy Algorithms : Greedy choice, optimal substructure property, minimum spanning trees -- Prims and Kruskals, Knapsack Problem Dynamic Programming : Multistage Graph, 0/1 Knapsack Problem Networks : Ford Fulkerson Max Flow Algorithm
Text Books	: 1. C & Data Structure Balagurusamy, 2. Data Structure through C in depth Shrivastava&Shrivastava , 3. Data Structure through C Y.P. Kanetkar 4. Introduction to Algorithms, 3Ed. (International Edition) (MIT Press) by T Cormen (Author), C Leiserson (Author), R Rivest (Author), C Stein (Author). 5. Computer Algorithms, by Horowitz, Sahni, and Rajasekaran, Silicon Press
Reference Book	: 1. Data Structure Seymour Liptsuz, Data Structure Tannebaum , 6. Data structure and program design in c R.L.Kruse

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Subject Title :	Advanced DBMS			
Subject Ref. No.	MANC410	No. of Credits	:	04
		No. of Periods/Week	:	04
		Assignments/Sessional	:	40
		Semester Exam.	:	60
Course Objective	Keen stress on the Advanced concepts of distributed and object oriented databases is focused on for effective understanding of the subject			
Prerequisite :	NA			
Unit -I :	Introduction Database and Need for DBMS, Characteristics of DBMS, Database Users, 3-tier architecture of DBMS (its advantages over 2-tier), Data Models, Views of data-schemas and instances.			
Unit -II :	Transaction and Concurrency Control Concept of transaction, ACID properties' Serializability, States of transaction, Concurrency control, Locking techniques, Time stamp based protocols, Granularity of data items, Deadlock.			
Unit -III :	Relational Model and Relational Database design Relational data model & relational algebra, Relational model concept, Relational model constraints, Relational Algebra, Relational database language Data definition in SQL, Views and Queries in SQL, Specifying constraints and Indexes in SQL, Specifying constraints management systems, Normalization.			
Unit - IV :	Data warehousing Data Marts, Getting data into the warehouse, Extraction, Transformation, Cleansing, Loading, Summarization, Meta data, Data warehousing & ERP, Data warehousing & KM, Data warehousing & CRM			
Unit - V :	Object Databases Systems Introduction, User-defined ADTs, Structured types, Object, object identity and references, Inheritance, Database design for ORDBMS, New Challenges in implementing ORDBMS, Storage & access methods, Query processing & Optimization			
Text Books :	Database system concept, Korth Fundamentals of Database Systems, Elmasri Navathe Database Management Systems, Bipin Desai			
Reference Books :	1. Raghu Ramakrishnan, Johannes Gerhke, "Database Management Systems" McGraw Hill. 2. Decision support & database system -Efreem G. Mallach. 3. Datawarehousing fundamental - Paulraj Ponniah Wiley. 4. Introduction to data mining with case studies - G.K. Gupta. 5. Data Warehousing (OLAP) S. Nagabhushana New Age.			



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Subject Title	Software Testing			
Subject Ref. No.	MANC411	No. of Credits	:	4
		Assignments / Sessional	:	40
		Semester Examination	:	60
Course Objective	After completing this course students will be able to: · Understand the different types of testing , testing life cycle ,test casewriting etc.			
Pre Requisite	Students must have knowledge of Software development life cycle.			
Unit - I	Introduction Fundamentals of Testing 1.1 What is Testing? 1.1.1 Typical Objectives of Testing 1.1.2 Testing and DebuggingWhy is Testing Necessary? Testing's Contributions to Success 1.2.2 Quality Assurance and Testing 1.2.3 Errors, Defects, and Failures 1.2.4 Defects, Root Causes and Effects 1.3 Seven Testing Principles 1.4 Test Process 1.4.1 Test Process in Context 1.4.2 Test Activities and Tasks 1.4.3 Test Work Products 1.4.4 Traceability between the Test Basis and Test Work Products 1.5 The Psychology of Testing 1.5.1 Human Psychology and Testing 1.5.2 Tester's and Developer's Mind-set			
Unit - II	Testing Throughout the Software Development Lifecycle 2.1 Software Development Lifecycle Models 2.1.1 Software Development and Software Testing 2.1.2 Software Development Lifecycle Models in Context 2.2 Test Levels 2.2.1 Component Testing 2.2.2 Integration Testing 2.2.3 System Testing 2.2.4 Acceptance Testing 2.3 Test Types 2.3.1 Functional Testing 2.3.2 Non-functional Testing 2.3.3 White-box Testing 2.3.4 Change-related Testing 2.3.5 Test Types and Test Levels 2.4 Maintenance Testing 2.4.1 Triggers for Maintenance 2.4.2 Impact Analysis for Maintenance			
Unit - III	3 Static Testing 3.1 Static Testing Basics 3.1.1 Work Products that Can Be Examined by Static Testing 3.1.2 Benefits of Static Testing 3.1.3 Differences between Static and Dynamic Testing			



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	3.2 Review Process 3.2.1 Work Product Review Process 3.2.2 Roles and responsibilities in a formal review 3.2.3 Review Types 3.2.4 Applying Review Techniques 3.2.5 Success Factors for Reviews
Unit - IV	4 Test Techniques 4.1 Categories of Test Techniques 4.1.1 Choosing Test Techniques 4.1.2 Categories of Test Techniques and Their Characteristics 4.2 Black-box Test Techniques 4.2.1 Equivalence Partitioning 4.2.2 Boundary Value Analysis 4.2.3 Decision Table Testing 4.2.4 State Transition Testing 4.2.5 Use Case Testing 4.3 White-box Test Techniques 4.3.1 Statement Testing and Coverage 4.3.2 Decision Testing and Coverage 4.3.3 The Value of Statement and Decision Testing 4.4 Experience-based Test Techniques 4.4.1 Error Guessing 4.4.2 Exploratory Testing 4.4.3 Checklist-based Testing
Unit - V	5 A] Test Management 5.1 Test Organization 5.1.1 Independent Testing 5.1.2 Tasks of a Test Manager and Tester 5.2 Test Planning and Estimation 5.2.1 Purpose and Content of a Test Plan 5.2.2 Test Strategy and Test Approach 5.2.3 Entry Criteria and Exit Criteria (Definition of Ready and Definition of Done) 5.2.4 Test Execution Schedule 5.2.5 Factors Influencing the Test Effort 5.2.6 Test Estimation Techniques 5.3 Test Monitoring and Control 5.3.1 Metrics Used in Testing 5.3.2 Purposes, Contents, and Audiences for Test Reports 5.4 Configuration Management 5.5 Risks and Testing 5.5.1 Definition of Risk 5.5.2 Product and Project Risks 5.5.3 Risk-based Testing and Product Quality 5.6 Defect Management 5B] Tool Support for Testing 5.7 Test Tool Considerations



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	5.7.1 Test Tool Classification 5.7.2 Benefits and Risks of Test Automation 5.7.3 Special Considerations for Test Execution and Test Management Tools 5.8 Effective Use of Tools 5.8.1 Main Principles for Tool Selection 5.8.2 Pilot Projects for Introducing a Tool into an Organization 5.8.3 Success Factors for Tools One Automated Testing Tool Demonstration will be covered.
Text Books	A. Software Engineering by R. Pressmen – 6th Ed B. Software Engineering by Sommerville C. Introducing Software Testing by Louise Tamres D. Effective Methods for software Testing by William Perry E. Software Testing in Real World by Edward Kit F. Software Testing Techniques by Boris Beizer

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Open Elective –II

Subject Title	BLOCKCHAIN TECHNOLOGY			
Subject Ref. No.	MANC424	No. of Credits	:	4
		Assignments / Sessional	:	40
		Semester Examination	:	60
Course Objective	This course cover both the conceptual as well as application aspects of Blockchain. This includes the fundamental design and architectural primitives of Blockchain, the system and the security aspects, along with various use cases from different application domains.			
Pre Requisite				
Unit – I	Introduction to Blockchain Problems with centralized systems Centralized Vs Decentralized Vs Distributed Blockchains and Public Ledgers Historical Perspectives- Cryptography , hash functions , time stamp, hash tree			
Unit – III	Bitcoin and Blockchain What is Bitcoin? Bitcoin Value proposition Technology behind bitcoin Bitcoin Transaction Lifecycle Bitcoin 2.0 Smart contracts Contracts in centralised platforms- crowd funding			
Unit – IV	The Architectural Principals – The Block in Blockchain Structure of Block Transactions in a Block The Blockchain replicas The notion of distributed consensus The Economics behind blockchain consensus			
Unit – V	Conceptualization and Applications- The permission-less model Privacy and security Cryptocurrency applications using blockchains The permissioned Blockchain Hyperledger Fabric Blockchain for Enterprise Applications			
BOOKS	• Mastering Bitcoin: Unlocking Digital Cryptocurrencies, by Andreas Antonopoulos • Blockchain by Melanie Swa, O'Reilly • Hyperledger Fabric - https://www.hyperledger.org/projects/fabric • Zero to Blockchain - An IBM Redbooks course, by Bob Dill, David Smits https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html			



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Subject Title	Internet of Things (IoT)		
Subject Ref. No.	MANC425		
		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	Understand general concepts of Internet of Things		
CO-2	To understand the sensors & boards to implement IoT in real world		
CO-3	Recognize various devices, sensors and applications		
CO-4	Apply design concept to IoT solutions		
CO-5	To study IoT architectures & different models		
CO-6	Design issues in IoT applications		
Course Objective	In this course, student will explore various components of Internet of things such as Sensors, internetworking and cloud. In the end they will also be able to design and implement IoT circuits and solutions.		
Prerequisites	Before learning IoT Tutorial, you must have the basic knowledge of Internet, programming language, and electronics		
Unit I	Introduction to IoT : Concept , applications, advantages , disadvantage, Embedded Devices & System, IoT Ecosystem, IoT Framework, IoT Architecture & Domains .		
Unit II	IoT cloud Platforms : Definition, important , types of Platform with its applications, key features. Examples of platforms- AWS, Google Cloud, IBM Watson , SAP Cloud, Oracle Integrated , Bosch, MS Azur, ThingWorx, Cisco Jasper etc		
Unit III	IoT Technology & Communication protocols : concepts of protocols , properties , advantages & disadvantage of Data Link, Network Layer & Session Layer, types & applications of WiFi, Bluetooth, Zigbee, Z-wave, Cellular, NFC, LoRaWAN		
Unit IV	IoT Devices : Microcontroller, Microprocessor, sensors : Accelerometers, temperature sensors , magnetometers, gyroscopes ,acoustic sensors, pressure sensors, humidity sensors, proximity sensors, image sensors, light sensors, gas RFID sensors, micro flow sensors, fog detector sensors, Wearable devices - Helmets, glasses , Jewelry, Watches, WristBand, rings, clothing, backpacks		
Unit V	Developing IoT solutions: Introduction to different IoT tools, Introduction to Arduino and Raspberry Pi Implementation of IoT with Arduino and Raspberry, Cloud Computing, Fog Computing, Connected Vehicles, Data Aggregation for the IoT in Smart Cities, Privacy and Security Issues in IoT.		



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Text Book	1. Internet of Things (IoT) , Kamal Kant Hiran Dr. Kamlesh Lakhwani, Dr.Hemant Kumar Gianey, Joseph Kofi Wireko 2. Internet of Things: A Hands-On Approach, by Arsheep Bahga and VijayMadiseti. 3. IoT Fundamentals Networking Technologies, Protocols, and Use Cases forthe Internet of Things by Hanes David , Salgueiro Gonzalo. 4. IoT - Internet Of Things Basics: For Beginners: Fast And Easy Way To LearnIot Basics And Introduction To Data Science Kindle Edition
Reference Books	



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Subject Title	:	Cyber Security		
Subject Ref. No.	:	MANC426	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	Understand the broad set of technical, social & political aspects of			
CO-2	Computer Security			
CO-3	Describe the operational and organizational security Aspects			
CO-4	Have understood the fundamentals of cryptography			
CO-5	Explain Authentication Methods			
Pre Requisite	:	Basics of Networking		
Unit - I	:	Introduction To Security Trends: The Computer Security Problem - Targets and Attacks - Approaches to Computer Security - Ethics - Basic Security Terminology - Security Models Operational and Organizational Security: Policies, Procedures, Standards, and Guidelines - Security Awareness and Training - Interoperability Agreements - The Security Perimeter - Physical Security - Environmental Issues		
Unit - II	:	Cryptography: Cryptography in Practice - Historical Perspectives - Algorithms - Hashing Functions - Symmetric Encryption - Asymmetric Encryption - Quantum Cryptography- Cryptography Algorithm Use Authentication and Remote Access: User, Group, and Role Management - Password Policies - Single Sign-On - Security Controls and Permissions - Preventing Data Lossor Theft - The Remote Access Process - Remote Access Methods		
Unit - III	:	Intrusion Detection Systems: History of Intrusion Detection Systems - IDS Overview - Network-Based IDSs - Host-Based IDSs- Intrusion Prevention Systems - Honeypotsand Honeynets - Tools		
Text Books	:	W.A.Coklin, G.White, Principles of Computer Security: Fourth Edition, McGrawHill, 2016 William Stallings, Cryptography and Network Security Principles and Practices, Seventh Edition, Pearson Achyut S. Godbole, Web Technologies: TCP/IP, Web/Java Programming, and Cloud Computing, Tata McGraw-Hill Education, 2013		
EBOOKS MOOC		https://www.newhorizons.com/promotions/cybersecurity-ebooks https://www.coursera.org/learn/introduction-cybersecurity-cyber-attacks#syllabus		

MANC426

S.B.

Signature



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Subject Title	Advances in Data Structure & Algorithms Lab		
Subject Ref. No.	MANC454	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	To introduce the concepts of Abstract data Type, data structure, performance measur		
CO-2	To implement linear data structures such as stacks, queues and lists and their applica		
CO-3	To introduce various search data structures such as hashing, binary search trees, AVL		
CO-4	To implement graph theory concept (Minimum Spanning Tree) in Civil Network Plan		
CO-5	summarize searching and sorting techniques		
CO-6	translate the algorithms of Data Structure to application using C++		
Unit I	Introduction To Data Structure		
	1.	WAP a program to implement the addition of two Polynomial using an Array .	
	2.	WAP a program to implement the multiplication of two Polynomial using anArray .	
	3.	WAP a program to convert Array into Sparse Array using an Array .	
	4.	WAP a program to implement the stack operations such as push, pop, display &search element using an Array .	
	5.	WAP a program to implement the queue operation such as front , rear, display& search using an Array .	
	6.	WAP a program to implement the Circular Queue using an Array .	
	7.	WAP a program to implement the Priority Queue using an Array	
	8.	WAP a program to implement the DeQueue Queue using an Array	
	9.	WAP a program to implement the Reverse Stack using Queue implementation.	
Unit II	Linked List		
	10.	WAP a program to demonstrate the application of malloc, calloc and freefunction.	



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	11.	WAP a program to implement the addition of two Polynomial using Linked List.
	12.	WAP a program to implement the multiplication of two Polynomial using using Linked List.
	13.	WAP a program to Create the Linked List and Print it.
	14.	Write a menu driven program in to perform all operations such as create , delete (first,last & between), insert(first,last & between), display, search element in Linked List .
	15.	Write a menu driven program in to perform all operations of stack such as create , delete, insert, display, search element by using Linked List.
	16.	Write a menu driven program in to perform all operations of queue such as create , delete, insert, display, search element by using Linked List.
	17.	Write a menu driven program in to perform all operations such as create , delete (first,last & between), insert(first,last & between), display, search element in Circular Linked List .
	18.	Write a menu driven program in to perform all operations such as create , delete (first,last & between), insert(first,last & between), display, search element in Doubly Linked List .
	19.	Write a menu driven program in to perform all operations such as create , delete (first,last & between), insert(first,last & between), display, search element in Doubly Circular Linked List .
	20.	Write a program to convert normal linked List into Reverse Linked List .
Unit III	Tree	
	21.	Write a program to construct Tree by using three arrays.
	22.	Write a program to construct Tree by using one array.
	23.	Write a program to construct Tree by using Linked List
	24.	Write a program to construct BST by using array.
	25.	Write a program to construct BST by using Linked List.
	26.	Write a program to construct Tree by using three arrays and perform inorder,preorder and post order on it.
	Graph	
	27.	Write a program to construct Graph using Adjacency Matrix.
	28.	Write a program to construct Graph using Adjacency List.
	29.	Write a program to construct Graph using Incidence Matrix.
	Searching & Sorting	
	30.	Write a program to perform Bubble Sorting.
	31.	Write a program to perform Insertion Sorting.
	32.	Write a program to perform Selection Sorting.
	33.	Write a program to perform Merge Sorting.
	34.	Write a program to perform Shell Sorting.
	35.	Write a program to perform Quick Sorting.



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Unit-IV & V	36.	Write a program to implement Divide and Conquer algorithm
	37.	Write a program to implement merge sort algorithm
	38.	Write a program to implement Greedy algorithm
	39.	Write a program to find minimum spanning algorithm (PRIMS)
	40.	Write a program to find minimum spanning algorithm (Kruskals)
	41.	Write a program to implement (Knapsack Problem)
	42.	Program on Dynamic Programming

Subject Title	Advanced DBMS Lab		
Subject Ref. No.	MANC 455	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	Execute and create Triggers and write Advanced Triggers		
CO-2	Implement Cursors Management in PL/SQL		
CO-3	Write Subprograms and implement them.		
CO-4	Write Functions and use them in PL/SQL.		
CO-5	Write programs to perform Error Handling using PL/SQL.		
Practical based on SQL and Introduction to PL/SQL			

Subject Title	Software Testing Lab		
Subject Ref. No.	MANC456	No. of Credits	1
		Internal	20
		External	30
Content	Assignment containing Automated Testing will be covered.		

Subject Title	Mini Project		
Subject Ref. No.	MANC457	No. of Credits	2
		Internal	100%
Content	Mini Project based on Programming & Database concepts.		