DEPARTMENT OF COMPUTER SCIENCE

S.V.U. COLLEGE OF COMMERCE MANAGEMENT AND COMPUTER SCIENCE

SRI VENKATESWARA UNIVERSITY: TIRUPATI

RESTRUCTURED CURRICULUM FOR

MCA

TO BE IMPLEMENTED WITH EFFECT FROM THE ACADEMIC YEAR 2020-2021

NEP-2020

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SRI VENKATESWARA UNIVERSITY, TIRUPATI

SVU COLLEGE OF COMMERCE MANAGEMENT & COMPUTER SCIENCE

2 Year MCA Degree Programme (CBCS) Regulations 2020-2021

CHOICE-BASED CREDIT SYSTEM (CBCS)

DEPARTMENT VISION

To be a department of excellence in technical education, widely known for the development of competent and socially responsible IT professionals, entrepreneurs and researchers.

DEPARTMENT MISSION

- To impart established and contemporary technical knowledge.
- To synchronize concepts, logic and skills for effective decision making.
- To encourage entrepreneurial environment and nurture innovative ideas.
- To foster research and provide consultancy service to the corporate.
- To utilize technical knowledge of students towards social issues through various group activities and events.

PROGRAM OBJECTIVES

The objective of the MCA curriculum is to equip the students with the ability to analyze varieties of real-life problems and develop computer based solutions for effectiveness and efficiency. Keeping in view the requirements of the evolving software industry and also to provide a foundation for higher studies in Computer Science, effort has been made in the choice of subjects to balance between theory and practical aspects of Computer Science. On successful completion of this course a student can find a career in software industries, corporate sectors, or Government Organizations as a technical professional or pursue research in the core areas of Computer Science and Applications. MCA graduates will demonstrate analytical and design skills including the ability to generate creative solutions and foster team-oriented, professionalism through

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effective communication in their careers.

Programme Outcomes After Completion of the MCA programme, the student will be able to:

PO 1. Produce knowledgeable and skilled human resources who are employable in IT industry, government, academic institutions, research and development, entrepreneurial pursuit and software firms

PO 2. Produce professional who will impart knowledge required for planning, designing and developing software systems and interfaces.

PO 3. Develop human skills who will achieve long-term sustainability, having decision making and good analytical capability.

PO 4. Develop professional who can compete globally and impart ethical values and professional skills towards society.

PO 5. Apply the basic mathematical, scientific and engineering concepts appropriate to the discipline of Computer Science and Engineering and analyze a problem, identify and define the computing requirements appropriate to its solution.

PO 6. Use state-of-the-art techniques, tools and skills necessary for computing practice and Demonstrate the knowledge of sustainable development considering the impact of computing solutions in a global, economic, environmental, and societal context and apply ethical principles and commit to professional ethics and responsibilities and norms of the Computer Science and Engineering practice.

1. **Duration of the Program:**

   The professional postgraduate programme leading to the degree of Master of Computer Applications will extend 2 academic years/over a period of four semesters each semester will normally have duration of 90 working days.

2. **Minimum Qualifications for Admission :**

   Candidates for admission into the first semester of the M.C.A. degree programme must have a B.Tech / B.C.A / B.Sc / B.Com / B.A degree or any equivalent graduation program with Mathematics as one of the subject at 10+2 level or at graduation.

3. **Admission Procedure**

   Admission into MCA Program will be only through ICET Examination for Indian

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Students conducted by Andhra Pradesh State Council of Higher Education(APSCHE).

Admission of Foreign / NRI Students for MCA Program:

Students should have earned their qualifying degree from a University / Institute recognized by the Association of Indian Universities / similar Indian body.

Students nominated by Foreign Governments may be accepted to MCA programmes, without any further test / interview, if their request for admission is routed through MHRD / any agency of the Government of India.

4. **Structure of the Programme**:

The M.C.A. programme has a curriculum, with syllabus consisting of:

Core courses, which give a broad base in the main field of study in the academic programme concerned

Elective courses chosen by the student in consultation with the faculty adviser

Elective Course: Elective course is a course which can be chosen from a pool of papers. It may be:

Supportive to the discipline of study

Providing an expanded scope

Enabling an exposure to some other discipline/domain

Nurturing student's proficiency/skill.

An elective may be "Generic Elective" focusing on those courses which add generic proficiency to the students. These electives shall be "Discipline centric".

Second type elective may be open elective and shall be offered for other disciplines.

The Foundation Courses may be of two kinds: Compulsory Foundation and Elective foundation. "Compulsory Foundation" courses are the courses based upon the content that leads to Knowledge enhancement. They are mandatory for all disciplines. Elective Foundation courses are value-based and are aimed at man-making education.

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Laboratory, project work and software design courses where special emphasis is laid on the application of knowledge to real-life problems.

The program will also include seminars, Technical Seminars, Group discussions and practical Industry exposure training, as prescribed by the Board of Studies in the curriculum & syllabus and approved by the Academic Council.

In addition, the students may audit courses, in consultation with the faculty adviser.

5. **The Credit System:**

   Each course has a certain number of credits assigned to it, depending upon whether it is a lecture or tutorial or practical work and the number of periods assigned per week. The practical courses shall include laboratory work and project work.

6. **The credits are assigned according to the following pattern:**

   1 credit for each lecture period/week,

   1 credit for each tutorial period/week,

   1 credit for each practical session of 2 periods/week &

   2 credits for each project session of 3 periods / week.

7. **Minimum Instruction Days:**

   The normal duration of MCA Course is four semesters.

   Semesters, I, II, III, shall consist of a minimum of 90 instruction days (based on six instruction days per week) excluding the days allotted for tests, examinations and preparation holidays.

   Fourth semester shall consist of a minimum of 15 weeks for undertaking major project work either in the College or any of the recognized Public Service Sectors/ Government Sectors, National Laboratories and Industrial Houses or any other organizations approved by the Department among these 15 weeks first 4 weeks are allocated for teaching of two Generic Elective papers.

8. **Course Registration:**

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Every student has to register for the set of courses offered by the Department in that semester including those of Open Elective courses and MOOCS courses with the total number of their Credits being limited by considering the permissible weekly contact hours.

9. **Credits Required for Award of MCA Degree:**

   A student earns credits by passing courses every semester. A student, who has registered the M.C.A. degree programme, has to acquire 116 credits to be come eligible for the award of the degree.

10. **Evaluation of Academic Performance:**

    The performance of the students in each semester shall be evaluated paper wise. The Scheme of instruction and Examinations shown in Annexure -I shall be followed. The distribution of marks between sessional work (based on internal assessment) and University Examination is as follows:

Paper Category	**Sessional Marks**	**University Examination Marks**
Theory	**30**	**70**
Practical	**30** **Designing of the Program (10) + Program Execution (10) + Viva-Voce(10)**	**70** **Record (20) + Designing of the Program (20) + Program Execution(20) + Viva Voce(10)**
Seminar / Technical Seminars / Group discussion	**50** **Content Preparation (12) + Communication Skills (12) + Presentation Skills (12)**	-

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	+ **Attempting Queries (14)**	
Minor Project Work	**30** **Presentation(15) + Viva Voce (15)**	**70** **Documentation (10) + Presentation(20) + Execution(20) + Viva Voce (20)**
Major Project Work	**100** **Project Documentation (50)** **Presentation(30) + Viva Voce (20)**	**200** **paper based on project should be submitted to the National / International Conference and Published in the Proceedings** **Or** **paper based on project Should be published in National / International Journal (50 Marks)** **Project Documentation : 50 Marks** **Presentation : 50 Marks** **Viva Voce : 50 Marks**

For both Theory and Laboratory papers two Internal Assessments will be conducted and best of two Assessments considered for award of Sessional marks. The duration of the these tests will be 2 hours. These sessional marks are to be communicated to the Controller of Examinations Office on or before the commencement of the end Semester examination.

11. University Examinations:

For each theory subject, there shall be a comprehensive University Examination of three hours duration. Setting of Question papers shall be done by external

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examiners from the panels recommended by the Board of Studies.

(a) For each practical subject, the University Examination shall be conducted by one Internal examiner and one external examiner/two examiners.

(b) Viva -Voce examination in practical subject shall be conducted by Examiners (One Internal and One External Examiner/Two Examiners)

Viva-Voce Examination in Minor Project Work shall be conducted by One Internal Examiner and One External Examiner / Two Examiners

Viva-voce examination in Major Project Work shall be conducted by a committee consisting of Two External Examiners and One Internal Examiner / Three Examiners

(c) The Examiners for Practical examinations and Viva-voce examinations (Stated in 10.2) shall be appointed from among the panels submitted by the Chairperson/Chairman of the Board of Studies.

(d) The Examiners for Project report evaluation for Minor/Major Project Works and Viva Voce examination for Minor/Major Project Works (Stated in 10.3, 10.4) shall be appointed from among the panels submitted by the Chairperson/Chairman of the Board of Studies.

The internal examiners for theory/practical/minor project work shall have at least three years of teaching experience at PG level in ratified position.

The internal examiners for major project work shall have at least five years of teaching experience at PG level in ratified position.

12. Attendance Requirements:

Regular course of study, in a semester, means a minimum average attendance of 75% in all the papers computed by totaling the number of periods of lectures, tutorials, and practical's and project as the case may be, held in every paper as the denominator and the total number of periods attended by the student in all papers, as the numerator.

However, a student has to put in a minimum attendance of 50% in each subject, in

addition to the condition laid down in clause 11.1.

No consideration whatsoever in attendance will be shown to any student for late admission due to any reason.

Condonation of shortage of attendance may be recommended provided a student puts in at least 62.5% attendance, in all the papers put together as calculated in clause 11.1 above, along with a minimum of 50% attendance in each subject as stated in clause 11.2, and provided the Principal is satisfied with the reason for shortage of attendance.

A student, who could not satisfy these requirements of attendance as given in clauses above, in any semester, shall have to repeat that semester.

A student shall not be permitted to study any semester for more than three times during the course of study.

A certificate of satisfactory attendance must be submitted by the student from the organization where he/she undertakes Project Work. For the above purpose, the candidate is not expected to avail more than 12 working days of leave of absence.

Further, a student is required to complete the course of study satisfying the attendance requirements in all the four semesters, within a period of first twelve semesters from the time of admission, failing which he/she shall forfeit his /her seat.

A student, who has not satisfied the minimum attendance requirements in any semester, may repeat that semester after obtaining written permission from the Principal, canceling the previous record of attendance and sessional marks of that semester. However, this facility may be availed by any student not more than twice during the entire course of study and the entire course of study shall be within the first twelve semesters as stipulated in clause 11.8.

13. Academic Requirements:

A candidate shall be declared to have passed whole examination of a semester if he/she secures a minimum aggregate of 50% along with minimum marks of 40%

in the University Examination in each theory and practical paper, including project work. Aggregate for this purpose shall mean the total marks obtained in the University Examination and sessional put together in all the papers of that semester.

A candidate who secures a minimum aggregate of 50% in any semester as specified in clause 12.1, but fails to secure the paper minimum of 40% in the University Examination in any paper, shall be declared to have failed in that paper. The candidate may appear for the University Examination in such papers as and when conducted and pass by securing the subject minimum of 40% in each of such papers.

A candidate, who could not secure the minimum aggregate of 50% in any semester, as given in clause 12.1, shall be declared to have exempted in such theory papers in which he/she secured a minimum of 50% of the marks in the University Examination.

A candidate who could not secure the minimum aggregate of 50% in any semester, as given in clause 12.1, shall be declared to have exempted in such practical papers in which he/she secured a minimum of 40% in the University Examination and a minimum of 50% of the marks in the University Examination and sessionals put together in each of such papers.

A candidate has to appear for all the other papers in which he/she has not satisfied the stipulations of clauses 12.3 and 12.4, and pass compartmentally by satisfying the stipulations stated in clauses 12.3 and 12.4. Rechecking of the aggregate shall not arise when a candidate opts for compartmental passing.

Candidates who would not like to avail themselves of the facility of compartmental pass given in clauses 10.3, 10.4 and 10.5 may reappear for the whole examination of that semester, after canceling the previous result. In such a case, clauses 12.1 to 12.5 shall apply in that order.

Candidates shall register for improvement in one or more theory papers of a

semester indicating the same in the application form. However, improvement facility is not extended to practical and project work papers.

NOTE: The question of checking the aggregate shall arise only when the candidate registers for the whole examinations for the first time or when he/she registers for the whole examinations at a subsequent attempt after having canceled the previous result.

14.Condition of Promotion:

A candidate shall be promoted to the next semester, if he/she satisfies the minimum attendance requirements of that semester of MCA as stipulated in clause 12.

15.Award of Degree:

The degree of MCA shall be conferred on a candidate who has satisfied the following conditions:

The candidate, after admission to the MCA program of the University, must have studied each of the four semesters of MCA program at least once in any college to which affiliation is accorded by S.V.University to offer MCA Programme.

The candidate must have satisfied minimum attendance requirements as stipulated in clause 11, and minimum academic requirements as prescribed in clause 12, in each of the four semesters of the MCA program.

The Programme of Study for the M.C.A. Degree shall cover normally a period of two academic years, comprising of four semesters and No student shall be permitted to complete the course of study of M.C.A. Degree earlier than four semesters or to take not more than twelve consecutive semesters, failing which he / she shall forfeits his / her seat.

16.Award Grades and Grade Points:

After a candidate has satisfied all requirements for the award of the degree as specified in clause 14, he/she shall be placed in one of the following three classifications, irrespective of whether the candidate passed compartmentally or

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otherwise, even after the regular period of study of four semesters.

17. **Grade Point**: It is a numerical weight allotted to each letter grade on a 10-point scale.
18. **Letter Grade**: It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P and F.
19. **Semester Grade Point Average (SGPA):** It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places
20. **SGPA (Si)** = $\sum(C_i \times G_i) / \sum C_i$

    where C_i is the number of credits of the ith course and G_i is the grade point scored by the student in the ith course.

    The **CGPA** is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.
21. **Cumulative Grade Point Average (CGPA)**: It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places
22. **CGPA** = $\sum(Ci \times Si) / \sum Ci$

    Where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

23. Letter Grades and Grade Points

A 10 point grading system with the following letter grades is to be followed:

Letter Grade	Grade Point
O (Outstanding)	10

A+(Excellent)	9
A(Very Good)	8
B+(Good)	7
B(Above Average)	6
C(Average)	5
P (Pass)	4
F(Fail)	0
Ab (Absent)	0

A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

For non credit courses 'Satisfactory' or "Unsatisfactory' shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA

(a) For this purpose, aggregate shall mean the aggregate of the marks in the University Examinations and sessional put together at all four semester of MCA.

A Candidate, before and even after becoming eligible for the award of the Degree, may reappear for the University Examination, as and when conducted, in any of the theory subjects, which he/she has already passed, for the purpose of improving the aggregate. However, this facility cannot be availed by a candidate who has taken the Provisional pass Certificate. Candidates shall not be permitted to appear for University examination in Practical papers including project work for the purpose of improvement.

24.Award of Rank:

The rank shall be awarded based on the following:

Ranks shall be awarded for the top ten students appearing for the regular MCA

examination.

Only such candidates, who satisfy the minimum academic requirements as stipulated in clause 12, by the end of their four semester, and become eligible for the award of the degree, are eligible for the award of rank. Candidates, who lose one or more semesters for any reason whatever, are not eligible for the award of rank.

For the purpose of awarding rank, aggregate of marks in University Examination and Sessionals put together at all the semesters of MCA, secured at the first attempt only, shall be taken into account.

Award of Prizes, scholarships and other honors shall be according to the rank secured by a candidate, consistent with the desire of the Donor.

25. Transitory Regulations:

Candidates who studied the MCA Course under the Regulations (Semester Pattern) 2010-11 and revised syllabus from 2015-16 & 2016-2017 but who could not satisfy the minimum attendance requirements in any semester may join the appropriate semester in the Regulations (For the full time, regular course) – 2016-17 for the remaining part of the course and be governed by the Regulations of that batch from then on. Any candidate admitted under the Regulations who wished to join under the Regulations, 2016-2017 under any other circumstances may also join the appropriate semester and be governed by the Regulations-2016-17 from that semester onwards.

University Examinations shall be conducted three more times, after the last regular examination, in all those papers prescribed under the Regulations, 2010-11 and revised syllabus from 2015-2016 & 2016-2017.

Candidates, who satisfied the minimum attendance requirements in any semester under the Regulations, 2010-11 and revised syllabus from 2015-16 & 2016-2017 but who are yet to pass some papers of that semester even after Three chances shall appear for the equivalent papers under Regulations-2016-2017, specified by

the Chairman / Chairperson of the Board of Studies.

26.Amendments of Regulation:

The University may, from time to time, revise, amend, or change the Regulations, Scheme of Examinations and Syllabi, whenever necessary.

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SRI VENKATESWARA UNIVERSITY: TIRUPATI

DEPARTMENT OF COMPUTER SCIENCE

ADOPTION OF CBCS SYSTEM FOR TWO YEAR MCA PROGRAMME WITH EFFECT FROM 2020-21

Semester	Course Course Title Number	Core/Generic Elective /Open Elective/ Compul Foundation	No Of Credits	L	T	P	Total	Maximum marks		Total Marks
								Session	univ	
I SEM	MCA 101 Discrete Mathematical Structures		4	3	1		4	30	**70**	100
	MCA 102 Object Oriented Programming with Java	Core	4	3	1		4	30	70	100
	MCA 103 Computer Organization	Core	4	3	1		4	30	70	100
	MCA 104 Operating Systems	Core	4	3	1		4	30	70	100
	MCA 105 105A.Accounting and Financial management 105B.Accounting Essentials for Computer Applications	Generic Elective	4	3	1		4	30	70	100
	MCA 106 P Software Lab I (based on 101 & 103)	----	4	--	--	4	4	30	70	100
	MCA Object Oriented	----	4	--	--	4	4	30	70	100

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	107 P Programming Lab			-	-					
	MCA 108P Operating Systems Lab	----	4	-- -	-- -	4	4	30	70	100
II SEM	MCA 201 Computer Oriented Operations Research	Compul Foundation	4	3	1		4	30	70	100
	MCA 202 Data Structures using Java	Core	4	3	1		4	30	70	100
	MCA 203 Data Communication and Computer Networks	Core	4	3	1		4	30	70	100
	MCA 204 Advanced Database Management Systems	Core	4	3	1		4	30	70	100
	MCA 205 205A. E-Commerce 205B. Cyber Security 205C. Neural Networks	Generic Elective	4	3	1		4	30	70	100
	MCA 206 Group Discussion		2				2			50
	MCA 207P Software Lab II (Based on 201 & 203)	----	4	--	--		4	30	70	100
	MCA 208P Data Structures Lab	----	4	--	--		4	30	70	100
	MCA 209P Advanced Database Management Systems Lab	----	4	--	--		4	30	70	100

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III SEM	MCA 301	Software Engineering	Compul Foundation	4	3	1		4	30	70	100
	MCA 302	Computer Graphics	Core	4	3	1		4	30	70	100
	MCA 303	Web Technologies	Core	4	3	1		4	30	70	100
	MCA 304	304A.Data warehousing and Data mining	Generic Elective	4	3	1		4	30	70	100
		304B.Big Data Analytics									
		304C System Programming									
	MCA 305	305A. Cryptography and Network Security	Generic Elective	4	3	1		4	30	70	100
		305B.Artificial Intelligence									
		305C.Mobile Application Development									
	MCA 306	The courses offered by Other departments	Open Elective	4	3	1		4	30	70	100
	MCA 307	Technical Seminar		2				2			50
	MCA	Software Lab III	----	4	--	--		4	30	70	100

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	308P	(301&302)									
	MCA 309P	Web Technologies Lab	----	4	--	--		4	30	70	100
	MCA 310P	Minor Project work	----	4	--	--		4	30	70	100
IV SEM	MCA 401	401A.Cloud Computing 401B. Dot Net Technologies 401C. Software Testing	Generic Elective	4	3	1		4	30	70	100
	MCA 402	402A. Essentials of Data Science 402B.Deep Learning 402C.Internet of Things	Generic Elective	4	3	1		4	30	70	100
	403	Major Project work (One Month Course work & 3 Months **on site** project)		12				12	100	200	300

The following are the Open Elective Courses offered by the Department Of Computer Science for theStudents other Disciplines:

MCA III Semester:

Programming in C

Open Source Tools

Internet Fundamentals

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SRI VENKATESWARA UNIVERSITY: TIRUPATI

DEPARTMENT OF COMPUTER SCIENCE

ADOPTION OF CBCS SYSTEM FOR TWO YEAR MCA PROGRAMME WITH EFFECT FROM 2020-21

MCA 101: DISCRETE MATHEMATICAL STRUCTURE

Department	Master of Computer Applications	Course Type	Dscc
Course Title	Discrete Mathematical Structures	Course Code	MCA 101
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

Course objectives: They course will discuss fundamental. This course concepts and tools in discrete mathematics with emphasis on their applications to computer science. understanding the Topics include logic and Boolean. C&cuits, sets, Functions, relations, detereministic algorithms. and randomized algorithms, analysis techniques based on counting methods and recurrence relations, trees and graphs.

Co 1. Understand the concept of Mathematical logic and Solve problem, Rules of Inference and to use logical notations quantifiers

Co 2. understand the concept of Mathematical inductions Such as sets relations and functions and able to Formulate problems and solve recurrence relations.

Co 3. understands the basic concept of counting (or) enumerating different configurations and fundamentals and explains the permutation notion, calculates the number of subsets of given size via bionomial coffiencient, and finds number of subsets. List combinational tools and solve related problems to

use mathematical Induction methods in proofs, we Inclusion-exclusion principle and solves problems. via pigeon hole principle. how to prove and explain the binomial theorem and solves various distribution problems using Express multinomial theorem and its proofs. how to designs Fibonacci numbers and gives for the n^{th} Fibonacci number

Co 4. understand the basic concepts of Advanced Counting techniques as explains basic notations about cobber Combinational probability and express the law of large numbers and law of small numbers. And understands the integers, divisors and primes. to express the divisibility of integers and explains the primes and their history To demonstrate the factorization into primes calely Eulalian algorithm, and explaining how to test whether a number is a prime.

Co 5. understanding the basic concepts of Graphs and tree notations. Defines the graphs such as vertex, edge and degree of a vertex are. solving everyday. problems via graphs, express Cayley theorem Explains Eulalian and Hamilton graphs.

COURCE LEADING OUT COMES [CLO'S]

Learn the foundation of mathematics to be able to perform basic computations in higher mathematics

Learn able to read the understand middle –level proofs

Learn to write and understand basic proofs

Learn to develop and maintain problem solving skills

Learn to use mathematical ideas to model real-world problems

Learn and understands to able communicate mathematical ideas with others

Have experience using technology to address mathematical ideas

Learn and describing objects and problems in computer algorithms, programming languages cryptography , automated theorem proving and software development.

MCA I SEMESTER

MCA 101: Discrete Mathematical Structures

UNIT-I

Logic and Proof: Propositional Logic, Propositional, Predicators and Quantifiers, Nested Quantifiers, Rules of Inference, Induction to Proofs, Proof Methods and Strategies.

UNIT-II

Induction and Recursion: Mathematical Induction, Strong Induction and Well Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms.

UNIT-III

Counting: The basics of counting, The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients, Generalized permutations and Combination, Generating Permutations and Combinations.

UNIT-IV

Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence Relations, Divide and Conquer algorithms and Recurrence Relations, Inclusion – Exclusion, Applications of Inclusion – Exclusion.

UNIT – V

Graphs: Graphs And Graph Methods, Graph Terminology And Special Types of Graphs, Representing Graphs and Graphs Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring,

Text books

1. Discrete Mathematics and Its Applications, By Kenneth n, McGraw Hill, Sept.2002.

Reference Books

1. Discrete Mathematical Structures with Applications to Compute Science, By J.P.Tremblay,R.Manohar, McGraw Hill Pub, 1975.
2. Discrete Mathematics by N. Chandrasekaran and M. Umaparvathi, Prentice-Hall of India.

MCA 102: Object Oriented Programming with Java

COURSE OBJECTIVES:

The course should enable the students to:

Co 1. Understand the basic object oriented programming concepts and apply them in problem solving.

Co 2. Illustrate inheritance concepts for reusing the program.

Co 3. Demonstrate on the multi-tasking by using multiple threads.

Co 4. Develop data-centric applications using JDBC.

Co 5. Understand the basics of java console and GUI based programming.

COURSE LEARNING OUTCOMES (CLOs):

1. Use object oriented programming concepts to solve real world problems.
2. Explain the concept of class and objects with access control to represent real world entities.
3. Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.
4. Use overloading methodology on methods and constructors to develop application programs.
5. Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords.
6. Describe the concept of interface and abstract classes to define generic classes.
7. Use dynamic and static polymorphism to process objects depending on their class.
8. Illustrate different techniques on creating and accessing packages (fully qualified name and import statements).
9. Understand the impact of exception handling to avoid abnormal termination of

program using checked and unchecked exceptions.

10. Demonstrate the user defined exceptions by exception handling keywords (try, catch, throw, throws and finally).
11. Use multithreading concepts to develop inter process communication.
12. Understand and implement concepts on file streams and operations in java programming for a given application programs.
13. Describe the backend connectivity process in java program by using JDBC drivers.
14. Develop java application to interact with database by using relevant software component (JDBC Driver).
15. Understand the process of graphical user interface design and implementation using AWT or swings.
16. Use different layouts (Flow Layout, Boarder Layout, Grid Layout, Card Layout) to position the controls for developing graphical user interface.
17. Build the internet-based dynamic applications using the concept of applets.
18. Develop applets that interact abundantly with client environment and deploy on the server.
19. Knowledge on usage of graphical IDE for design and implementation of real time applications in java.

Posses the knowledge and skills for employability and to succeed in national and international level competitive exams.

UNIT-I

Introduction: Object Oriented Programming Concepts, Features of Java Language, Architecture, Data Types, Variables, Operators, Control Structures, Arrays. Class : Classes, Wrapper Classes, Constructors, Overloading of methods, Access control, Nested and Inner classes, Abstract classes. Inheritance: Inheritance basics, Using Super, Multilevel hierarchy, Method overriding, Dynamic method dispatch, Final with inheritance.

UNIT-II

Math Class and Methods, Packages and Interfaces, Exception Handling: fundamentals, exception types, uncaught exceptions, using try, nested try statements, throw, throws, Java built-in exceptions, user defined exceptions. Multithreading: Thread model, main thread, creating a thread, Multiple threads, Thread priorities, synchronization, Inter thread communication, String handling.

UNIT-III

Wrapper Classes: Number class, Character class, Boolean class. More utility classes: Vector, Stack, Dictionary, Hash table. String Tokenizer, Bit set, Data Calendar. Input/output: File, Stream classes, Byte Streams, Character Streams. GUI Programming,

UNIT-IV

Features Applets: Applet basics, Applet architecture, an applet skeleton, Applet display method, Repainting, Using Status window, HTML APPLET tag, passing parameters to applet, Audio Clip interface. Even Handling; two event handling mechanisms, Event model, Event classes, sources of events, Event Listener interfaces, Adapter classes. Introduction to SWING: Window Fundamentals, working with frame windows, creating window programs, working with color, fonts, SWING Controls, Layout Managers and Menus: Control fundamentals, Labels, Using buttons, check box s, checkbox group, choice controls, lists, scroll bars, Text field, layout managers, menu bars, and menus.

UNIT-V

Network Programming with Java: Networking classes and Interfaces, Internet Address, Factory method, Instance Methods, Sockets, Knowing IP address URL-URL Connection class. Creating a server that sends data, creating a client that receives data, two way communications between server and client, Stages in a JDBC program, registering the driver, connecting to a abase, Preparing SQL statements,

improving the performance of a JDBC program.

Text Book

1. Herbert Scheldt: "The Complete Reference Java "(Eighth Edition),TMH.

Reference Books

Dietel & Dietel : "Java2 How to Program", Prentice Hall.

Thamus Wu: " An Introduction to Object Oriented Programming With Java." TMH

Balagurusamy:"Programming With Java": TMH.

MCA 103: COMPUTER ORGANIZATION

Department	Master of Computer Applications	Course Type	DSCC
Course Title	Computer Organization	Course Code	MCA 103
L-T-P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Course Objectives:

CO1. Understand the basic concepts and structure of computers.

CO2. Understand concepts of register transfer logic and arithmetic operations.

CO3. Learn the concepts addressing modes and memory organization.

CO4. Learn the different types of serial communication techniques.

CO5. Summarize the Instruction execution stages.

Course Learning Outcomes:

1. Understand the theory and architecture of central processing unit.
2. Analyze some of the design issues in terms of speed, technology, cost,
    a. performance.
3. Design a simple CPU with applying the theory concepts.
4. Use appropriate tools to design verify and test the CPU architecture.
5. Learn the concepts of parallel processing, pipelining and interprocessor
    a. communication.

6. Understand the architecture and functionality of central processing unit.
7. Exemplify in a better way the I/O and memory organization.
8. Define different number systems, binary addition and subtraction, 2's
9. complement Representation and operations with this representations

CO-PO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√		√	√			√	√	√	√		
CO2	√	√			√		√	√	√	√	√	
CO3		√	√		√		√	√	√	√		
CO4		√			√						√	√
CO5		√					√	√	√	√	√	
CO6		√		√				√	√	√	√	

CO-PO MAPPING (JUSTIFICATION)

CO-PO	**Justification**
CO1-PO1	Students will identify basic concept in a system
CO2-PO1	Students will identify addressing mode details
CO2-PO2	Students will identify addressing mode generation
CO2-PO5	Students will identify application of different addressing modes
CO3-PO2	Students will identify arithmetic problems
CO3-PO3	Students will identify analyze logic problems in system
CO3-PO5	Students will identify tools for different computation
CO4-PO2	Students will identify sequencing of control logic problem

CO4-PO5	Students will identify tools for microinstructions
CO4-PO1	Students will identify engineering instructions in control sequence
CO5-PO2	Students will identify interfacing problems
CO6-PO2	Students will identify instruction execution problems
CO6-PO4	Students will identify instruction decoding problems

SYLLABUS:

MCA103: Computer Organization

UNIT I

Flip-flops – Registers and shift registers – counters – decoders – Multiplexers – PLDs – sequential circuits. Basic Structure of Computers. Functional UNITs – Basic operational concepts – Bus structures – performance

– Multiprocessors and Multi computers – Historical Perspective.

UNIT II

Addressing Methods and Machine Program Sequencing: 1. sic Concepts: –Memory locations and address, Main Memory operations, Instructions and Instruction Sequencing –Addressing Modes.

UNIT III

Input / Output organization: Accessing I/O Devices – Interrupts – Direct Memory Access-I/O Hardware- Standard I/O Interface.

UNIT IV

Memory System Concepts: – Semiconductor RAM Memories - Read only memories – Cache Memories – Performance Considerations –Virtual Memories: - Memory Management Requirements, Arithmetic: - Addition and subtraction of sign members – Design of fast adders – Multiplication of positive members – Signed operand multiplication – Fast multiplication – Integer division – Floating point numbers and operations.

UNIT V

Basic Processing UNIT: Concepts – execution of a complete instruction – Multiple – Bus organization – Hardware control – Micro Programmed Control. Pipelining: Concepts – Data hazards – Instruction hazards – Influence on Instruction sets - data path and control constructions.

Text Book:

1. Hamacher C, Vranesic Z, and Zaky S. Computer Organization, 5th edition, Mc Graw – Hill,2002.
2. 1. Stallings W, Computer Organization and Architectur 6th edition. Parson Education,2003.

Reference Books:

1. Yarbrough JM, Digital Logic – Applications and Design, Thomas Learning, 1997.

MCA 104: OPERATING SYSTEMS

DEPARTMENT	MASTER OF COMPUTER APPLICATIONS (MCA)	COURSE TYPE	DSC
COURSE TITLE	OPERATING SYSTEMS	COURSE CODE	MCA 104
L-T-P	3-1-0	CREDITS	4
CONTACT HOURS	60 Hrs	DURATION OF SEE	3 Hrs
SEE MARKS	70	CIE MARKS	30

COURSE DESCRIPTION:

This course examines the important problems in operating system design and implementation. The operating system provides an established, convenient, and efficient interface between user programs and the bare hardware of the computer on which they run. The operating system is responsible for sharing resources (e.g., disks, networks, and processors), providing common services needed by many different programs (e.g., file service, the ability to start or stop processes, and access to the printer), and protecting individual programs from interfering with one another. The course will start with a brief historical perspective of the evolution of operating systems over the last fifty years and then cover the major components of most operating systems. Particular emphasis will be given to three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), and file systems; and on operating system support for distributed systems.

Course Objectives:

At the end of the course, the students will be able to:

Co 1. Use the features of types of operating systems, functions, structure, and operations on the processes executing in the system to solve the problems.

Co 2. Employ the knowledge scheduling algorithms to solve the real life problems.

Co 3. Examine the deadlocks occurred in the real world applications and will be able to provide the remedial measures to avoid the deadlock situation.

Co 4. Employ the concepts of memory management including virtual memory and resource sharing among the user application processes.

Co 5. Solve the problems related to file system interface and implementation, disk management and protect the system and Use UNIX tools using features such as filters pipes, redirection, and regular expressions. Customize their UNIX working environment.

Course Learning Outcomes: Through the study of this course, students will gain a comprehensive understanding on the concepts and functions of a modern operating system. Students will be able to:

1. Explain the role of the operating system as a high level interface to the hardware.
2. Use OS as a resource manager that supports multiprogramming.
3. Explain the low level implementation of CPU dispatch.
4. Explain the low level implementation of memory management.
5. Explain the performance trade-offs inherent in OS implementation.

MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Objectives (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO I	√	√	√	√	√	√	√		√	√	√	√		√	√

CO II	√	√	√	√	√	√	√			√			√	√	√
CO III	√	√	√	√	√	√	√		√		√	√	√	√	√
CO IV	√	√	√	√	√	√	√			√	√			√	√
CO V	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

SYLLABUS:

MCA 104: Operating Systems

UNIT I

Computer System Structures: Computer System operation, I/O Structure, storage structures, Storage hierarchy, Hardware protection, Network structure. Operating system structures: System components, Operating System services, System calls, System programs, System structure, Virtual machines, System Design and Implementation, System Generation. Processes: Processes Concept, Processes Scheduling, Operations in processes, Inter-processes communication, Communication in Client server ems, Threads: overview, multithreading models, Threading issues, Threads,

UNIT II

CPU Scheduling: Scheduling criteria, Scheduling Algorithms, Multiple processor Scheduling, Real-time scheduling. Process Synchronization: - The critical-section problem, Synchronization hardware, Semaphores, Classic problems of Synchronization, Critical regions, Monitors. Dead Locks: Deadlock characterization, Deadlock handling, Deadlock prevention, Deadlock avoidance, Deadlock detection, and Recovery.

UNIT III

Memory Management: Swapping, Contiguous memory allocation Paging, Segmentation with paging Concept of Virtual memory Demand paging Page replacement, Allocation of frames, Thrashing. File System Interface & Implementation: File concept, Access methods, Directory structure, File System Mounting File Sharing Protection, File system structure, and implementation,

Directory implementation, Allocation methods. Free space management, Efficiency and performance, Recovery.

UNIT IV

I/O Systems: overview, I/O hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O to Hard ware operations, streams, Performance of I/O. Mass Storage Structure:- Disk Structure Disk Scheduling, Disk management, Swap-space Management,

RAID Structure,

UNIT V

Security: User authentication, program threats, system threats, security systems Facilities, Linux system: History, Design principles, Kernel modules, process management, Scheduling Memory Management, File Systems.

Text Books:

1. Silberschatz A, Galvin P.B, and Gaghe G. Operating System Concepts, 8th edition, John Wiley, 2002.
2. Tenenbaum A.S., Modern Operating Systems, 2nd edition, arson Education, 2001.

Reference Books:

1. Dhamdhere D.M., Operating Systems – A concept based Approach, Tata McGraw-Hill, 2002.
2. Bhatt P.C.P., An Introduction to Operating Systems – Concepts and Practice, PHI, 2003.

105A ACCOUNTING AND FINANCIAL MANAGEMENT

DEPARTMENT	MASTER OF COMPUTER APPLICATIONS (MCA)	COURSE TYPE	DSC
COURSE TITLE	ACCOUNTING AND FINANCIAL MANAGEMENT	COURSE CODE	MCA 105A
L-T-P	3-1-0	CREDITS	4
CONTACT HOURS	60 Hrs	DURATION OF SEE	3 Hrs
SEE MARKS	70	CIE MARKS	30

Course description:

The course provides a broad introduction to all aspects of the accounting function. The language of accounting and financial management is exacting. Our aim is to increase your familiarity with key components of this language and allow you to more effectively communicate with all organisational stakeholders. Users of accounting information may be typically classified as either external users (such as investors) or internal users (such as operational managers). Different users have different information needs. This course deals with the needs of these two main user groups and how the senior management of organisations can more effectively use accounting data to connect with them.

Course Objectives:

Co 1. Provide an in-depth view of the process in financial management of the firm.
Co 2. Develop knowledge on the allocation, management and funding of financial resources.
Co 3. Improving students' understanding of the time value of money concept and the role of a financial manager in the current competitive business scenario.

Co 4. Enhancing student's ability in dealing short-term dealing with day-to-day working capital decision; and also longer-term dealing, which involves major capital investment decisions and raising long-term finance.

Co 5. Providing action plan, estimation of income and expenditure, guiding the management in forecasting and decision making etc. are some notable objectives of budget.

Course Learning Outcomes: After completing this course the student must demonstrate the knowledge and ability to:

1. Ability to maintain full and systematic records of business transactions, ability to ascertain profit or loss of the business, to depict financial position of the business and provide accounting information to the interested parties.
2. Ascertainment of cost, Determination of selling price, Cost control & Cost reduction, Ascertaining the profit of each activity Assisting management in decision making, Matching cost with revenue and Preparation of financial statements P& L A/c and Balance Sheet.
3. Attempting to reduce the cost of finance., Ensuring sufficient availability of funds, Also, dealing with the planning, organizing, and controlling of financial activities like the procurement and utilization of funds.
4. The objectives of working capital include managing the liquidity position of a business, smoothening and shortening of its operating cycle, managing the working capital investment policies of the business and helping seasonal businesses with working capital.
5. Providing action plan, estimation of income and expenditure, guiding the management in forecasting and decision making etc. are some notable objectives of budget. A budget provides a realistic estimate of income and expenses for a period and of the financial position at the close of the period.

MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF

PROGRAM OUTCOMES:

Course Objectives (COs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO 2	PSO3
CO I	√	√	√	√	√	√	√		√	√	√	√		√	√
CO II	√	√	√	√	√	√	√			√			√	√	√
CO III	√	√	√	√	√	√	√		√		√	√	√	√	√
CO IV	√	√	√	√	√	√	√			√	√			√	√
CO V	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

SYLLABUS:

MCA 105A: Accounting and Financial Management

UNIT I

Introduction to Financial Accounting Concepts: Definition and concepts, Significance, Branches of Accounting, Accounting Cycle-Journal – Ledger – Trial Balance – Final accounts.

UNIT II

Cost Accounting: Elements of Cost, Nature and significance – Cost classification and Allocation, Cost Sheet

– Method of Inventory Valuation.

UNIT III

Financial Management: Meaning, scope and role. Financial Analysis through Ratios:

Types of Ratios, Liquidity, Activity, Capital Structure and profitability ratio, Limitations of Ratios.

UNIT IV

Working Capital Management: Nature, Elements and Importance of working capital, types of working capital,Determinants of working capital.

UNIT V

Budgeting: Budgets, Purpose, Budgetary control, preparation of budgets, Types of budgeting methods,difference between Master Budget, fixed and flexible budgeting.

Text Books:

Rajeswara Rao K and Prasad G, Accounting & Finance (MCA), Jai Bharat Publishers, Guntur

Jain and Narang, *Cost Accounting*, Kalyani Publishers.

Reference Books:

Sharma R K, and Gupta S K, *Management Accounting*, Kalyani Publishers.

Financial Management Text and Problems: M.Y.Khan, P.K.Jain.

Financial Management Theory and Practices, Prasanna Chandra tata McGraw Hills.

MCA II SEMESTER

COURSE OBJECTIVES:

The objective of the course is to present an introduction to Operations Research is a discipline that deals with the Application of Advanced Analytical Methods to help make better decisions. Further, the term operational analysis is used in the British Military as an intrinsic part of capability development, management and assurance. OR was introduced as a subject for academic study in American University. They were generally Schools of Engineering, Public Administration, Business Applied Mathematics, Economics, Statics, Commerce, Management and Computer Science etc. Research Society of America (ORSA) in 1950.

The course should enable the students to:

Co 1. An Operation may be defined a set of arts required for achievement of a desired outcome. Such complex, integrated arts can be performed by four types of systems.

Co 2. Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. Design solutions for complex engineering problems and design system componentsor processes that meet the specified needs environmental considerations and apply OR Techniques, resources, and modern engineering and OR tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

Co 3. A computer assisted mathematical representation of Real-Life problem under certain assumptions using Monte-Carlo Simulation, Use of Random Numbers, Forecasting models.

Co 4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the

information toprovide valid conclusions.

Co 5. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and needfor sustainable development.

Co 6. The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

MCA 201: Computer Oriented Operations Research

COURSE OBJECTIVES:

The objective of the course is to present an introduction to Operations Research is a discipline that deals with the Application of Advanced Analytical Methods to help make better decisions. Further, the term operational analysis is used in the British Military as an intrinsic part of capability development, management and assurance.

OR was introduced as a subject for academic study in American University. They were generally Schools of Engineering, Public Administration, Business Applied Mathematics, Economics, Stastics, Commerce, Management and Computer Science etc. Research Society of America (ORSA) in 1950.

The course should enable the students to:

Co 1. An Operation may be defined a set of arts required for achievement of a desired outcome. Such complex, integrated arts can be performed by four types of systems. (1) Man (11) Machine (iii) Man-Machine unit and (iv) Organization of men, machines, and man-machine units. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems (Engineering Knowledge).

Co 2. Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences (Problem Analysis).

Co 3. A computer assisted mathematical representation of Real-Life problem under certain assumptions using Monte-Carlo Simulation, Use of Random Numbers Forecasting models.

Co 4. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change (Life-long learning). Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development (Environment and Sustainability).

Problem-Solving Skills: The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

UNIT - I

Linear Programming: Concept of Linear Programming Model, Development of LP Model, Graphical Method,

Simplex Method, Duality, Formulation of Dual Problem, Application of Duality,(Text Book 1).

UNIT-II

Transportation Problem: mathematical Model for Transportation Problem, Types of transportation problem, Finding the Initial Basic Solution, Optimal Solution by U-V method, Assignment problem, Formulation of Assignment problem-Hungerian Method, Method of Solution, Branch and Bound Technique for Assignment Problem,(Text Book 1).

UNIT-III

Network Techniques: Shortest-Path Model, Systematic Method- Dijkstra's Algorithm, Floyid's Algorithm, Minimum Spanning Tree Problem, Prime Algorithm, Krusakal algorithm, Maximal Flow Problem, Linear

Programming Modeling for Maximal Flow Problem, Maximal Flow Problem Algorithm, (Text Book 1).

UNIT-IV

Games and Strategies : Two –Person Zero- Sum Games, Maxmin- Minimax Principle, Games Without Saddle Points- Mixed Strategies, Graphic Solution Of 2 x n, And m x 2 Games , Dominance Property, Arithmetic Model For n x n Games, General Solution For m x n Rectangular Games(Text Book 2).

UNIT – V

Queueing Theory: Queueing System, Elements of Queueing System, Operating Characteristics of Queueing System, Probability Distributions In Queueing System, Classification Of Queueing Models, Poisson Queueing Systems, Non Poisson

Queueing Systems. Network Scheduling by PERT / CPM: Rules o f Network Construction, Critical Path Analysis, Probability Considerations in PERT (Text Book 2).

Text Books:

R.Pannerselvam., "Operations Research" 2nd Edition, Prentice-Hall of India

Kanti Swarup., P.K.Gupta and Man Mohan, ., "Operations Research" 12th Edition Sultan chand & Sons

Reference Books:

Taha H.A., Operations Research: An Introduction, Prentice-Hall of India

S.D.Sharma., Operations Research, Kedar Nath Ram Nath, Delhi

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MCA 202: Data Structures Using Java

Couse Objectives:

Co 1. Apply the Laplace Transform technique to evaluate integrals , differential equations and their applications to engineering problems.

Co 2. Demonstrate the concept of Partial Differential Equation and their applications to engineering problems.

Co 3. Apply the Fourier Transform technique to evaluate improper integral and their applications to engineering problems

Co 4. Identify the analytic function and their applications to solve complex integrals

Co 5. Discuss the complex transformations and their applications to rotate, translate and magnify the images.

Couse Learning Outcomes:

Upon Completing the Course, Students will able to:

1. Learn the basic types for data structure, implementation and application.
2. Know the strength and weakness of different data structures.
3. Use the appropriate data structure in context of solution of given problem..
4. Develop programming skills which require to solve given problem

UNIT I

Linear Data Structures: Abstract Data Types - Asymptotic Notations: Big-Oh, Omega and Theta – Best, Worst and Average case Analysis: Definition and an exae – Arrays and its representations – Stacks and Queues – Linked lists – Linked list based implementation of Stacks and Queues – Evaluation of Expressions – Linked list based polynomial addition.

UNIT II

Non-Linear Data Structures; Trees – Binary Trees – Binary tree representation and traversals – Threaded binary trees – Binary tree representation of trees – Application

of trees: Set representation and Union-Find operations – Graph and its representations – Graph Traversals DFS and BFS – Connected components, Applications of Graphs- Minimum cost spanning tree using Kruskal's algorithm, Dijkstra's algorithm for Single Source Shortest Path Problem.

UNIT III

Search Structures and Priority Queues: AVL Trees – Red-Black Trees – Splay Trees – Binary Heap – Leftist Heap-Implementation of priority Queue ADT with Heap

UNIT IV

Sorting: Insertion sort – Merge sort – Quick sort – Heap sort – Radix Sort- Comparison of sorting algorithms in terms of Complexity - Sorting with disks – k-way merging – Sorting with tapes – Poly-phase merge.

UNIT V

Searching and Indexing: Linear Search – Binary Search - Hash tables – Overflow handling – CylinderSurface Indexing – Hash Index – B-Tree Indexing, B+ Trees.

Text Book:

Sartaj Sahni, Data Structures, Algorithms and Applications in Java, Second Edition, University Press.

Gregory L. Heilman, Data Structures, Algorithms and Object Oriented Programming, Tata Mcgraw-Hill,New Delhi, 2002.

References:

Jean-Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications, Second Edition, Tata McGraw-Hill, New Delhi, 1991.

Alfred V. Aho, John E. Hopcroft and Jeffry D. Ullman, Data Structures and Algorithms, Pearson Education, New Delhi, 2006.

203: DATA COMMUNICATION AND COMPUTER NETWORKS

DEPARTMENT	MASTER OF COMPUTER APPLICATIONS (MCA)	COURSE TYPE	DSC
COURSE TITLE	DATA COMMUNICATION AND COMPUTER NETWORKS	COURSE CODE	MCA 203
L-T-P	3-1-0	CREDITS	4
CONTACT HOURS	60 Hrs	DURATION OF SEE	3 Hrs
SEE MARKS	70	CIE MARKS	30

Course Description: This course is to provide students with an overview of the concepts and fundamentals of data communication and computer networks. Topics to be covered include: data communication concepts and techniques in layered network architecture, error detection and correction mechanisms in Data Link layer, multiple access protocols, IP addressing, routing in Network layer, different routing protocols, concepts of process to process delivery in Transport layer, congestion control techniques, different Application layer protocols and some modern techniques of communication.

Course Objectives: At the end of the course, the students will be able to:

- Build an understanding of the fundamental concepts of data communication and computer networking.
- Understand how errors detected and corrected that occur in transmission
- How collisions to be handled when many stations share a single channel
- Know about routing mechanisms and different routing protocols
- Understand transport layer functions and know about different application layer protocols.

Learning Outcomes: After completing this course the student must demonstrate the

knowledge and ability to:

1. Describe the basis and structure of an abstract layered protocol model

2. Independently understand basic computer network technology and Identify the different types of network topologies and protocols.

3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.

4. Identify the different types of network devices and their functions within a network and Understand and building the skills of subnet and routing mechanisms.

5. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation and Understand how the Internet works today.

6. Conversant with primitives of network application programming.

MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Objectives (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO I	√	√	√	√	√	√	√		√	√	√	√		√	√
CO II	√	√	√	√	√	√	√			√			√	√	√
CO III	√	√	√	√	√	√	√		√		√	√	√	√	√
CO IV	√	√	√	√	√	√	√			√	√			√	√
CO V	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

SYLLABUS:

UNIT I

Introduction, Network models – Internet model, OSI model Physical Layer: Signals – Analog, Digital, Digital Transmission – Coding, Sampling, Analog Transmission – Modulation of digital and analog signal, Multiplexing – FDM, WDM, TDM, Transmission Media – cable, wireless, Circuit switching and Telephone network, DSL Technology, Cable modern, SONET.

UNIT II

Data Link Layer: Error detection and correction, Data link control and Protocols – Stop and wait, Go-back-n, Selective repeat, HDLC, Point to point access, LANS – Traditional Ethernet, Fast Ethernet, Wireless LAN's – IEEE 802.11, Blue tooth, Connecting LANs – Connecting devices, Backbone networks, Virtual LANS, 2G,3G,4G,5G wireless technologies, Satellite networks, Virtual circuit switching, Frame relay, ATM.

UNIT III

Network Layer: Inter-networks, Addressing, Routing, Network layer Protocols, Types of Internet protocols – ARP, IPV4, ICMP, IPV6, Routing – Introduction, Unicast routing, Protocols – RIP, OSPF, BGP, Multicast Routing.

UNIT IV

Transport Layer: Process-to-Process Delivery, UDP, TCP, Data traffic, Congestion a d Control, Quality of service (QOS) and techniques to improve QOS, Integrated services, QOS in Switched Networks Security: Introduction. Symmetric-key and Asymmetric cryptography, Key Management and Kerberos, Message security, Digital signature, User authentication, E-mail Security, Web security, Social Issues.

UNIT V

Application Layer: Design issues, file transfer, accessed management. Client-Server model, Socket interface Introduction to DNS, Distribution of name space, DNS IP the

Internet. Electronic mail, SMTP, File Transfer, FTP, HTTP, World Wide web, Video-conferencing.

Text Books:

1. Forouzan B A, Data Communications and Networking, 4th edition, Tata McGraw-Hill, 2007.
2. Tanenbaum A S, Computer Networks, 4th edition, Pears n Education, 2003.
3. Ajay R. Mishra, Fundamentals of network planning and optimization, Willey,2nd edition,2018

Reference Books:

1. Stallings W, Data and Computer Communications, 7th edition, Pearson Education, 2004.
2. Gallo M A, and Hancock W M, Computer Communications and Networking Technologies, ThomsonBrooks/Cole, 2002.

MCA 204: Advanced Database Management Systems

Department	Master of Computer Application	Course Type	DSCC
Corse Title	ADBMS	Course Code	MCA 204
L-T-P	3-1-0	Credits	4
Contact Hours	60Hrs	Duration of SEE	3Hrs
SEE Marks	70	CIE Marks	30

Course Objective:

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a ADBMS, and Analyze and Implement the concept of Object- Relational database, XML Data. Practice SQL, PL/SQL concepts required for developing Data base programs.

Course Outcomes (Cos):

Co 1. To provide a strong foundation in advanced database concepts. To Understand the basic concepts and the applications of database systems, Database Languages, Data Dictionary, Database Administrators and Database Users, DBMS Architecture, Structure of Relational Databases.

Co 2. To Provide the basics of SQL and construct queries using SQL. To understand the relational database design principles. To Practice SQL, PL/SQL concepts required for maintaining database.

Co 3. To Impart the concepts of object-based data type to deal with large data and to Implement O-R Features. To Implement the concept of XML for developing the Application Programming Interfaces through XML.

Co 4. Basic concepts of query processing; converting SQL queries into Relational Algebra, based on cost-based query optimization. To Provide Basic Algorithms for executing query operations And Query Optimization.

Co 5. To learn Transaction management and Concurrency Control Concepts. To learn different protocols to handle the concurrency control and deadlock situation.

Course Learning Outcomes (CLOs):

1. Describe the fundamental elements of Relational database management systems.
2. Explain the basic concepts of relational data model, entity-relationship model, relational database design.
3. Design ER-models to represent simple database application scenarios.
4. Design Relational database and formulate SQL queries on data. And to implement PL/SQL Programs.
5. Implement the database design for Object based Data bases and Structure of XML with Applications.
6. Design Query Processing: Measures of Query Cost and Algorithms to implement Selection Operation- Sorting-Joint Operation- Evaluation of

Expressions-Query Optimization.

7. Learn Transaction concept, Transaction State-Implementation of Atomicity and Durability- Concurrent Executions- Serializability- Deadlock handling.

MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Objectives (COs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO7	PO 8	PO9	PO10	PO 11	PO12	PS O1	PS O 2	PS O3
I															
II															
III															
IV															
V															

SYLLABUS:

MCA 204: Advanced Database Management Systems

UNIT-I

Introduction: Database- System Application – Purpose of Database Systems – View of Data – Database Languages– Relational Databases – Database Design–Object– based and Analysis – Database Architecture. Entity Relationship Model-Constraints-Entity-Relationship Diagrams, Design Issue-Weak Entity Sets- Database Design for Banking Enterprise and Unified Mod ling language. Structure of Relational Databases - Relational Algebra Operation– Modification of the Database.

UNIT-II

SQL : Data Definition- Structure of SQL Queries- Set Operations- Aggregate

Functions- Nested Sub queries- Complex Queries – SQL Data Types and Schemas-Integrity Constraints-Authorization- Embedded SQL- Dynamic SQL- -Authorization in SQL.;PL/SQL Programming: Introduction, Control structures, functions, Exception handling, Cursors, Triggers, Package.

UNIT-III

Object- Databases and XML: Object-based databases – Complex data types, structured types and inheritance in SQL, table inheritance, array and Multiset types in SQL, object identity and reference types in SQL, implementing O-R features, Persistent programming languages, OO vs OR. XML – Structure of XML, Document Schema, Querying and Transformation, API in XML, XML applications.

UNIT-IV

Query Processing: Measures of Query Cost-Selection Operation-Sorting-Joint Operation-Evaluation of Expressions-Query Optimization: Transformation of Relational Expressions-Estimating Statistics of Expression Results-Choice of Evaluation Plans.

UNIT-V

Transactions: Transaction concept, Transaction State-Implementation of Atomicity and Durability-Concurrent Executions- Serializability- Recoverability-Implementation of Isolation-Testing for Serializability, Concurrency Control: Lock Based Protocols-Timestamp-Based Protocols-Validation-Based Protocols- Multiple Granularity-Multiversion Schemes. Deadlock handling-Insert and Delete Operations-Weak Levels of Consistency-Concurrency in Index Structures

Text Book:

Silberschatz A. Korth H F, and Sudarsan S, *Database System Concepts*, 5th edition, McGraw-Hill 2002.

Chapters 1to 4, 6 to 10 and 13 to 17)

SQL, PL/SQL: The Programming Language of Oracle by Ivan Bayross, BPB Publications, 2nd Revised Edition.

Reference Books:

Date C J,An Introduction to Database Systems, 7th edition, Pear on Education, 2000.

Elmasri R, and Navathe S B, Fundamentals of Database Systems, 4th edition, Pearson Education, 2004.

Mannino M V, Database Application Development and Design, McGraw-Hill, 2001.

MCA 205A: E-Commerce

Course Description and Objectives:

This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems

Course Outcomes: After Completion of the subject student should able to

Co 1. Understand the basic concepts and technologies used in the field of management information systems;

Co 2. Have the knowledge of the different types of management information systems;

Co 3. Understand the processes of developing and implementing information systems;

Co 4. Be aware of the ethical, social, and security issues of information systems;

UNIT I

Electronic Commerce: Electronic Commerce Framework; Electronic Commerce and Media Convergence; The Anatomy of E-Commerce Application; Electronic Commerce Organization Applications- The Network Infrastructure for Electronic Commerce: Market Forces Influencing the I- Way; Components of the I Way; Network Access Equipment; the Last Mlle: Local Roads a d Access Ramps; Global Information Distribution: Networks: Public Policy Issues Shaping the I-Way. Case study: B2B ecommerce

UNIT II

The Internet as a Network Infrastructure: The Internet Terminology; Chronological History of the Internet NSFNET: Architecture and Components: Globalization of the Academic Internet; Internet Governance: The Internet Society –An Overview of Internet: Applications –Electronic Commerce; World Wide Web(WWW) as the Architecture: Web Background: Hypertext Publish ng; Technology behind the Web:

Security and the Web-Consumer-Oriented Electronic Commerce: Oriented Applications; Mercantile Process, Models Mercantile Models from the Consumer's Perspective; Mercantile Models from the Merchant's Perspective. Case study: E-Commerce/High Security (Pci).

UNIT III

Electronic Payment Systems: Types of Electronic Payment Systems; Smart Cards and Electronic Payment Systems; Credit Card-Based Electronic Payment systems: Risk and Electronic payment Systems Designing Electronic Payment systems – Inter organizational Commerce and EDI: Legal, security, and Privacy Issues: EDI and Electronic Commerce – EDI Implementation, MIME, and Value- Added Networks : Standardization and EDI;EDI Software Implementation: EDI Envelope for Message Transport: Value- Added Networks (VANs); Internet – Based EDI. Case study: Social Media Marketing.

UNIT IV

Intra organization Electronic Commerce: Internal Information System: Macro forces and Internal Commerce; Work-Flow Automation and Coordination; Customization and Internal Commerce; Supply Chain Management (SCM) – The Corporate Digital Library: Dimensions of Internal Electronic Commerce Systems; Making a Business Case for a Document Library; Types o Digital Document Library; Types of Digital Documents; Issues behind Document Infrastructure; Corp e Data Warehouses. Case study: Email Marketing, Email Personalization

UNIT V

M-Commerce: Introduction to Mobile Commerce, Limitations, history, applications, architecture, transaction models, payment methods, advantages, disadvantages Case study: Mobile app marketing case study: O2 Priority Moments gets small businesses on side.

Text Book:

1. Ravi Kalakota and Andrew B.Whinston. Frontiers of Elec ronic commerce,

Pearson Education.

Reference Books:

1. Henry Chan, Raymond Lee. Tharan Dillan and E.Chany,E-Commerce, Wiley,2003.
2. Danjel Minoli and Emuna Mimoli, Web Commrece Technology, Tata MicGraw Hill, 1999.
3. Marilyn Greenstein and Todd M Feinman, aElectronic Commerce, TaraMcGraw Hill Edition.

MCA 205B: Cyber Security

Co 1. Understand the various tools and methods used in cybercrime.

Co 2. Identify risk management processes, risk treatment methods, organization of information security.

Co 3. Classify cyber security solutions and information assurance.

Co 4. Examine software vulnerabilities and security solutions to reduce the risk of exploitation.

Co 5. Analyze the cyber security needs of an organization.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1												
CO 2												
CO 3												
CO 4												
CO 5												

UNIT I

History of Cyber Security-Introduction to Cyber Security-Definition-Key terms-cyber Attacks and Security tools-Security Threats-Vulnerability assessments-roles in Security-Cyber Security-today- Critical Thinking in Cyber Security

UNIT II

Cyber Threat Actors and their Motives-Security Attacks, Actors and their Motive-A brief overview of types of actors and their motives-Hacking organizations-Major different types of cyber-attack-Security Attack Definition-Security services-Security Mechanisms-Network Security Model-Organizational Threats-Attacks- Security Architecture Attacks-Security Architecture -Attack models-Malware and Ransomware-Threat Examples-Threat Protection Defined-Internet Security Threats – Mapping-Internet Security Threats - Packet Sniffing-Security Threat - IP Spoofing-Security Threats - Denial of service-Security Attacks - Host insertions- What is Social Engineering, Phishing and Vishing- Cyber warfare

UNIT III

Overview of Cyber Security Concepts-CIA Triad – Confidentiality-CIA Triad – Integrity-CIA Triad – Availability-Non - Repudiation - How does it apply to CIA?-Access Management-Incidence Response-Key Concepts - Incident Response-Incident Response Process-Introduction to Frameworks and Best Practices-IT Governance Process-Cybersecurity Compliance and Audit Overview-Pentest Process and Mile 2 CPTE Training-OWASP framework

UNIT IV

Introduction to Key Security Tools -Introduction to Firewall-Firewalls - Packet Filtering-Firewalls - Application Gateway-Firewalls - XML Gateway-Firewalls - Stateless and Stateful- Firewall Administration – Firewall Selection-Firewall Administration – Firewall Configuration-IDPS Administration-VPN Administration-Antivirus/Antimalware-Penetration Testing Introduction-Penetration test Methodologies- Vulnerability Tests

UNIT V

Cyber Security –Organizational implications-cost of cybercrimes and IPR issues Web threats for organizations: the evils and Perils-Social media marketing Security and privacy Implications- Digital Forensic- Protecting people privacy in the organizations

Forensic best practices for organizations. Case Studies.

Text Books

1. Nina Godbole & Sunit Belapure "Cyber Security", Wiley ndia, 2012.
2. Cyber Security by Paul Augustine, Crescent Publication Information Security Policies, Procedures, and Standar Guidelines for Effective Information Security Management, Thomas Peltier, Auerbach Publication

References:

1. Harish Chander, "cyber laws & IT protection", PHI learning pvt.ltd, 2012.
2. MS.M.K.Geetha & Ms.Swapne Raman"Cyber Crimes and Fraud Management, "MACMILLAN,2012.
3. Pankaj Agarwal : Information Security& Cyber Laws (Acm Learning), Excel, 2013.

MCA 205C: Neural Networks

Course objectives:

Co 1. In this course, we will study the following topics:

Co 2. Basic neuron models: McCulloch-Pitts model and the generalized one, distance or similarity based neuron model, radial basis function model, etc.

Co 3. Basic neural network models: multilayer perceptron, distance or similarity based neural networks, associative memory and self-organizing feature map, radial basis function based multilayer perceptron, neural network decision trees, etc.

Co 4. Basic learning algorithms: the delta learning rule, the back propagation algorithm, self-organization learning, the r4-rule, etc.

Co 5. Applications: pattern recognition, function approximation, information visualization, etc.

SYLLABUS:

UNIT I

Introduction: What is Neural network, Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks, Learning Process: Error Correction learning, Memory based learning, Hebb an learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process.

UNIT II

Single Layer PERCEPTRONS: Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perception – convergence theorem, Relation between perception and Bayes classifier for a Gaussian Environment.

UNIT III

Multilayer Perceptron: Back propagation algorithm XOR problem, Heuristics, Output representation an d decision rule, Computer experiment, feature detection, BACK PROPAGATION - back propagation and differentiation, Hessian matrix, Generalization, Cross validation, Network pruning Techniques, Virtues and limitations of back propagation learning, Accelerated vergence, supervised learning.

UNIT IV

Self-Organization Maps: Two basic feature mapping models, Self-organization map, SOM algorithm, properties of feature map, computer simulations, learning vector quantization, Adaptive patter classification, Hierarchal Vector quantifier, context Maps.

UNIT V

Neuro Dynamics: Dynamical systems, stability of equilibrium states, Attractors, Neuro dynamical models, manipulation of attractors' as a recurrent network paradigm HOPFIELD MODELS – Hopfield models.

Text Book:

1. Neural networks A comprehensive foundation, Simon Hhaykin, Pearson Education 2nd Edition 2004

Reference Books:

1. Artificial neural networks - B.Vegnanarayana Prentice Halll of India P Ltd 2005
2. Neural networks in Computer intelligence, Li Min Fu TMH 2003
3. Neural networks James A Freeman David M S kapura Pearson Education 2004

MCA III SEMESTER

301: SOFTWARE ENGINEERING

DEPARTMENT	MASTER OF COMPUTER APPLICATIONS (MCA)	COURSE TYPE
COURSE TITLE	SOFTWARE ENGINEERING	COURSE CODE
L-T-P	3-1-0	CREDITS
CONTACT HOURS	60 Hrs	DURATION OF SEE
SEE MARKS	70	CIE MARKS

COURSE DESCRIPTION:

Software Engineering (SE) comprises the core principles consistent in software construction and maintenance: fundamental software processes and life-cycles, mathematical foundations of software engineering, requirements analysis, software engineering methodologies and standard notations, principles of software architecture

and re-use, software quality frameworks and validation, software development, and maintenance environments and tools. An introduction to object-oriented software development process and design. Topics include: iterative development, interpretation of requirements and use case documents into code; application of design notation in UML and use of commonly-used design patterns.

Course Objectives:

Co 1. 1. Knowledge of basic SW engineering methods and practices, and their appropriate application and Describe software engineering layered technology and Process frame work and A general understanding of software process models such as the waterfall and evolutionary models.

Co 2. Understanding of software requirements and the SRS documents, Understanding of the role of project management including planning, scheduling, risk management, etc. and Describe data models, object models, context models and behavioural models.

Co 3. 3.Understanding of different software architectural styles, Understanding of implementation issues such as modularity and coding standards and Understanding of approaches to verification and validation including static analysis, and reviews.

Co 4. Understanding of software testing approaches such as unit testing and integration testing and Describe software measurement and software risks, Understanding of software evolution and related issues such as version management.

Co 5. Understanding on quality control and how to ensure good quality software and Demonstrate the software project management skills through case studies.

Course Learning Outcomes:

1. Basic knowledge and understanding of the analysis and design of complex systems and Ability to apply software engineering principles and techniques.

2. Ability to develop, maintain and evaluate large-scale software systems to produce efficient, reliable, robust and cost-effective software solutions.
3. Ability to perform independent research and analysis.
4. Ability to work as an effective member or leader of software engineering teams and to manage time, processes and resources effectively by prioritizing competing demands to achieve personal and team goals Identify and analyzes the common threats in each domain.
5. Ability to understand and meet ethical standards and legal responsibilities.

MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Objectives (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**	**PSO3**
CO I	√	√	√	√	√	√	√		√	√	√	√		√	√
CO II	√	√	√	√	√	√	√			√			√	√	√
CO III	√	√	√	√	√	√	√		√		√	√	√	√	√
CO IV	√	√	√	√	√	√	√			√	√			√	√
CO V	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

SYLLABUS:

MCA 301: Software Engineering

UNIT I

Software and Software Engineering: Introduction, Software, Software Myths, Software Engineering- Process:- Software Engineering, Software Processes models; Evolutionary process Models, Component based development; Formal Methods Model, Fourth generation Techniques. An Agile view of processes and Development: Software Engineering practice – Software Engineering, communication, planning, modeling construction practices and deployment.

UNIT II

System Engineering: Computer-based systems, the system engineering Hierarchy, business process engineering, product engineering and system modeling. Building the analysis model, Requirement analysis, modeling approaches, data modeling. Behavioral model.

UNIT –III

Design Engineering: Design process and quality, design concepts the design model, and pattern-used software design. Architectural design: Software architecture, data design, architectural styles and patterns, architectural design mapping data flow into software architecture. Component-based software engineering, Critical systems development, Software reuse, User interface design, web apps design issues and architecture design.

UNIT –IV

Testing strategies: Strategies and issues, testing strategies for and object-oriented software. Validation testing and system testing. Software testing tactics: Fundamentals, black-box and white-box testing white-box testing basis path testing. Control structure testing, Black-box testing, Object-oriented testing methods. Testing methods applicable at the class level inter class testing case design.

UNIT V

Product Metrics: Software quality, framework, metrics for analysis model design model, source case and testing. Managing Software Projects: The management spectrum, the

W^5 HH principle, metrics in process, software measurement, Estimation: Observations, Decomposition Techniques, Empirical Models, Estimation For Object-Oriented Projects Other Estimation Techniques, Project Scheduling, Risk Management, Reengineering.

Text Books:

1. Roger, S, Pressman, Software Engineering, A Practitioner's Approach, Six Edition, McGraw-Hill, International Edition, 2005.
2. Ian Sommerville, Software Engineering, Pearson Educati , 8th Edition.

Reference Books:

1. James F Peters, Software Engineering, John Wiley
2. Waruan S Jawadekar, Software Engineering, Tata McGraw ll, 2004.
3. Carlo Ghezzi, Mehdi Jazayeri, Dino Manrioli, Fundamentals of Software Engineering, PHI, 2001 Pankaj Jalote, An Integrated approach to Software Engineering Narosa

MCA 302: COMPUTER GRAPHICS

Department	Master of Computer Applications	**Course Type**	DSCC
Course Title	Computer Graphics	**Course Code**	MCA 302
L-T-P	3-1-0	**Credits**	4
Contact Hours	60 Hours	**Duration of SEE**	3 Hours
SEE Marks	80	**CIE Marks**	20

COURSE OBJECTIVES:

The objective of the course is to present an introduction to the basic concepts of Computer Graphics. It provides the necessary theoretical background and demonstrates the application of computer science to graphics. The course further allows students to

develop programming skills in Computer Graphics through programming assignments. It presents the most important drawing algorithms, 2-Dimensional and 3-Dimensional transformations, clipping, filling and interactive Computer Graphics.

The course should enable the students to:

Co 1. Introduction to Computer Graphics and its Applications. To understand various Video Display Devices and its working. To know various Input devices. To learn various line-drawing algorithms like Digital Differential Analyzer (DDA), Bresenhams line-drawing algorithm, Mid-point Circle and Mid-point Ellipse Algorithm.

Co 2. To understand the concept of Scan-line polygon filling algorithm, Boundary fill. flood- fill algorithms. To learn the concepts of basic Two-Dimensional Transformations like Translation, Rotation, Scaling, Reflection and Shearing.

Co 3. To learn the concepts of 2-Dimensional Viewing like The Viewing Pipeline, Window-to- Viewport Co-ordinate Transformation and Viewing functions. To understand the Cohen-Sutherland and Cyrus-beck line clipping algorithms and Sutherland-Hodgeman Polygon clipping algorithm.

Co 4. To provide a good understand of 3-Dimensional Object representations like polygon surfaces, Hermite curves, Quadric surfaces, Spline representation of Curves, Bezier and B-spline curves. To learn basic illumination models and various polygon rendering methods.

Co 5. To understand the basic 3-Dimensional transformations like Translation, Rotation, Scaling, Reflection and Shearing. To learn the concept of Animation, Computer Animation languages, Animation functions, Raster animations and key frame systems.

COURSE LEARNING OUTCOMES (CLOs):

1. Have a knowledge and understand of the structure of an interactive computer graphics system, and the separation of system components.
2. able to create interactive graphics applications.

3. Perform simple 2D graphics with lines, curves and can implement algorithms to rasterizing simple shapes, fill and clip polygons and have a basic grasp of anti-aliasing techniques.
4. Understand the concepts of 3D object representations and also Spline representation of objects.
5. Learn the basic 3D transformations of an object.
6. Creating the computer animations.

MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENTOF PROGRAMOUTCOMES

Course Objectives (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	√	√	√										√		
CO2	√	√		√	√								√		
CO3			√		√							√	√	√	
CO4	√	√	√									√		√	

SYLLABUS:

MCA 302: Computer Graphics

UNIT I

Overview of Graphics systems, Application areas of Computer Graphics, video-display devices, Raster-scan systems, random scan systems, graphics monitors and workstations and input devices. Output primitives: Points and lines, line drawing algorithms, mid-

point circle and ellipse algorithms.

UNIT II

Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms. 2-D Geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates.

UNIT III

2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland – Hodgeman polygon clipping algorithm.

UNIT IV

3-D Object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curves, Bezier and B-spline surfaces. Basic illumination models, polygon rendering methods.

UNIT V

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations, 3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping. Computer Animation: Design of animation sequence, gene al computer animation functions, Raster animations, Computer animation languages, Key frame systems

Text Books:

1. Donald Hearn and M.Pauline Baker, Computer Graphics C Version, Second Edition, Pearson Educations.2005.

Reference Books:

1. Steven Harrington (1987), Computer Graphics – A Programming Approach, Second Edition, Mc Graw –Hill International Editions.
2. William M. Newman and Robert F. Sprowli (1979), Princi les of Interactive Computer Graphics, second Edition, Mc Graw – Hill International Editions.

MCA 303: WEB TECHNOLOGIES

Course outcomes (cos):

Co 1. Understands the basis of internet, a web browser. Learns how to browse the web browsers, Search Engines Seeking the Net, HTTP, URL other inferred tools. and learns to create a webpage and web site HTML and advanced HTML & HTML Form with HTML-5 controls and used to describe a web page's appearance / presentation (css) or functionality behaviour (java Script)

Co 2. Understanding the de Java script based frame like J query and libraries already developed which can be used directly in software development to reduce the time to marketing also. "Javascript Is a light wait, interpreted programing language that allows user to build interactivity into otherwise Static HTML pages, Javascript supports both C-Style and C++ style comments. JQuery as a javascript toolkit designed to simplify various tasks by writing less code.

Co 3. An understanding the Rich Intanet Application Technology - AJAX is a web browser technology indepent of web server software. how to creating AJAX (Asynchis Javascript and XML) is a new technique for better, fast and more interactive web applications with the help of XML, HTML, CSS and Javascript. Web server can refer to hardware or software, of both of them working together." where as static and dynamic web server.

Co 4. Understanding the features of PHP, is a recursive acronym for ("PHP. Hypertext pre processor", to developing web based software application. PHP is MUST for students and working professionals to become a great Software Engineer specially when working in web development Domain and learns major protocols such as pop3, IMAP, and LDAP. they are PHP4 added support for Java and distribute objet architectures (COM) and CORBA), making development a possibility for the first time

Co 5. Understanding the Servlet technology is used to Create Dynamic web application and as robust and Scalable. Servlet is java class which extends the functionality of web server by dynamically generating webpages. By default session management are not enabled the in servlet, the user has to enable at & explicitly. Java servlet page (JSP) & is compatible with HTTP request only and in Jsp Session management is automatically enabled. Java Data Base Connectivity (JDBC) which is Standard Java API for database-independent Connectivity between the java programing language and a wide range of databases

Course Learning (CLOS):

1. Learns all basics of Internet and browse data in webpage. Learns different internet tools.
2. Learns all the three main languages as HTML, advanced HTML, and CSS, and Java script.
3. Learns AJax is Rich Infernal Application Technology.
4. Learns the bare concepts of web server working with both static and dynamic web server
5. Learns iQuary and libraries as javascript base frame works,
6. Learns major protocols such as poP3, IMAP, and LDAP.
7. Learns Servlet Technology to create a dynamic web. application
8. Learns and gain the skills and project based expensive, essentials to develop a good webpage design and websites.

SYLLABUS

UNIT I

Introduction to Internet-Browser Architecture-IE: Chrome-Search Engines-Introduction to HTML-5-HTML-5 Tags-Audio, Video Tags – HTML-5 Forms-Controls-CSS Styling-CSS Tags-Attributes.

UNIT II

Java Script-JQuery: JavaScript Programming Scripts- Control structures- Functions-Document, Browser, Date, Math, String objects-Events- JQuery Libraries-JQuery Objects, Functions – JQuery Events-Animations.

UNIT III

AJAX Concepts: Simple AJAX objects-Ajax Libraries-Examples, Webservers IIS, Tomcat-Hosting Website
in a Web servers.

UNIT IV

Introduction to PHP: Control Structures-Arrays-Functions-Database connectivity-Introduction to ZEND Framework and applications

UNIT-V

Introduction to Java Servlets: Servlet classes and interfaces - Java Database Connectivity- Introduction to JSP-Java Server Page scriptlets -JSP Objects-JSP Web applications.

Text Books:

1. Deitel, Deitel and Goldberg Internet & World Wide Wide how to program"by End. Pearson Education
2. Ivan Bayross, Webenavled commercial Application Development in Java 2.0 BPB.
3. HTML 5 Black book, Kogent Learning Solutions Inc.

Reference Books:

1. Raj Kamal Internet and web Technologies, Tata Mc Graw Hill, 2002.
2. Chirs Bates, Web Programming, John Wiley, 2nd Edition

MCA 304A: DATA WAREHOUSING AND DATA MINING

Department	Master of Computer Applications	**Course Type**	DSCC
Course Title	Data Warehousing and Data Mining	**Course Code**	MCA 304A
L-T-P	3-1-0	**Credits**	4
Contact Hours	60 Hours	**Duration of SEE**	3 Hours
SEE Marks	80	**CIE Marks**	20

COURSE OBJECTIVES:

This course will introduce the concepts of data ware house and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data ware housing concepts

The knowledge of following subject is essential to understand the subject:

Understand the concepts of Data Ware housing and Data Mining Concepts.

Explain the methodologies used for analysis of data

Describe various techniques which enhance the data modeling.

Discuss and Compare various approaches with other techniques in data mining and data ware housing

KEY OBJECTIVES:

Co 1. To Be familiar with mathematical foundations of data mining tools.

Co 2. Understand and implement classical models and algorithms in data warehouses and data mining

Co 3. Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.

Co 4. Different data mining techniques in various applications like social, scientific

and environmental context.

Co 5. Build up skill in selecting the appropriate data mining algorithm for solving practical problems.

COURSE LEARNING OUTCOMES (CLOs):

1. Understand the functionality of the various data mining and data warehousing component
2. Appreciate the strengths and limitations of various data mining and data warehousing models
3. Simplifying the Data analyzing techniques to implement various Historical data Repositories
4. Describe different methodologies used in data mining and data ware housing.
5. Compare different approaches of data ware housing and data mining with various technologies

MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENTOF PROGRAMOUTCOMES

Course Objectives (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	√	√	√										√		
CO2	√	√		√	√								√		
CO3			√		√							√	√	√	
CO4	√	√	√									√		√	

CO5															

SYLLABUS:

MCA 304A: Data Warehousing and Datamining

UNIT I

Data warehousing and OLAP**:** Data Warehouse basic concepts, Data Warehouse Modelling, Data Cube and OLAP: Characteristics of OLAP systems, Multidimensional view and Data cube, Data Cube Implementations, Data Cube operations, Implementation of OLAP and overview on OLAP Software.

UNIT II

Data Mining and its Applications **:** Introduction, What is Data Mining, Motivating Challenges, Data Mining Tasks, Which technologies are used for data mining, Kinds of pattern that can be mined, Data Mining Applications, Data Pre-processing, Data cleaning, data integration, data redu on and data transformation.

UNIT III

Association Analysis: Basic Concepts and Algorithms **:** Frequent Item set Generation, Rule Generation,

Compact Representation of Frequent Item sets, Alternative methods for generating Frequent Item sets, FPGrowth Algorithm, Evaluation of Association Patterns.

UNIT IV

Classification: Methods, Improving accuracy of classification: Basics, General approach to solve classification problem, Decision Trees, Rule Based Classifiers, Nearest Neighbor Classifiers. Bayesian Classifiers, Estimating Predictive accuracy of classification methods, Improving accuracy of classification methods, Evaluation criteria for classification method Multiclass Problem.

UNIT V

Clustering Techniques: Overview: Features of cluster analysis, Types of Data and Computer Distance, Types of Cluster Analysis Methods, Partitioned Methods,

Hierarchical Methods, Density Based Methods, Quality and Validity of Cluster Analysis

Text Books:

1. Jiawei Han and MichelineKamber: Data Mining - Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publisher, 2006.
2. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, Addison- Wesley,2005.

Reference Books:

1. Arun K Pujari: Data Mining Techniques University Press 2nd Edition, 2009.
2. G. K. Gupta: Introduction to Data Mining with Case Studies, 3rd Edition, PHI, New Delhi, 2009.
3. Alex Berson and Stephen J.Smith: Data Warehousing, Dat ning, and OLAP ComputingMcGrawHill Publisher, 1997

MCA 304B: Big Data Analytics

Course Description and Objectives:

This course gives an overview of Big Data, i.e. storage, retrieval and processing of big data. In addition, it also focuses on the "technologies", i.e., the tools/algorithms that are available for storage, processing of Big Data. It also helps a student to perform a variety of "analytics" on different data sets and to arrive at positive conclusions.

Course outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand Big Data and its analytics in the real world	1

2	Analyze the Big Data framework like Hadoop and NOSQL to efficientlystore and process Big Data to generate analytics	**2**
3	Design of Algorithms to solve Data Intensive Problems using Map Reduce Paradigm	**3**
4	Design and Implementation of Big Data Analytics using pig and spark tosolve data intensive problems and to generate analytics	**4**
5	Implement Big Data Activities using Hive	**5**

Course Objectives

Co 1. Design classification models for various standard datasets and user datasets.

Co 2. Develop clustering techniques and association rules for large standard datasets anduser datasets.

Co 3. Analyse large scale data using MAPREDUCE programming which includes JAVA and HADOOP frameworks.

Co 4. Analyse large scale data using PIG and HIVE.

Course Learning Outcomes:

1. Logistic Regression using MENARCHE dataset.
2. Logistic Linear Regression using TITANIC dataset.
3. Decision Tree & Cross Validation using IRIS dataset.
4. Random Forest & Cross Validation using IRIS dataset.

Syllabus:

UNIT I

What is Big Data : Varieties of Data – Unstructured data – Trends in Data Storage - Basically Available Soft State Eventual Consistency (BASE) - Industry Examples of Big Data.

UNIT - II

Big Data Technology: New and older approaches – Data Discovery –Terminologies used in Big Data Environments- Open Source technologies for Big Data Analytics – Cloud and Big Data – Big Data Foundation – Computation – Limitations – Big Data

Emerging Technologies.

UNIT III

Business Analytics –Consumption of Analytics – Creation to Consumption of Analytics – Data visualization by Organizations – 90/10 rule of critical thinking – Decision sciences and analytics – Learning over knowledge – Agility – Scale and convergence – Privacy and security in Big Data.

UNIT IV

Predictive Analytics – Target Definition - Linear Regression – Logistic Regression - Decision trees – Neural Networks – Support Vector machines - Classification trees – Ensemble methods – Association Rules – Segmentation, Sequence Rules, Social Network analytics.

UNIT V

Hadoop – Why Hadoop? – Why not RDBMS? – RDBMS Versus Hadoop - Components of Hadoop – Hadoop File System – Hadoop Technologies Stack – Managing Resources and Applications with Hadoop YARN – Data warehousing Hadoop Concepts – Applications of Hadoop using PIG, YARN,HIVE.

Text Books

1. Big Data and Analytics, seema Acharya ,Subhashini chel an, Wiley publications
2. Baesens, 2014, Analytics in a Big Data World: The Essential Guide to Data Science and Itsapplications, Wiley India Private Limited

Reference Books

1. "Big Data Analytics: Systems, Algorithms, Applications" **Prabhu**, C.S.R., **Sreevallabh Chivukula**,A., **Mogadala**, A., **Ghosh**, R., **Livingston**, L.M.J.

MCA 304C: System Programming

Course Objectives:

The aim of this course is to provide students with knowledge and abilities to design system programs such as assemblers, linkers, loaders, macro-processors, editors, interpreters, compilers and operating systems using modern methodologies and to implement their design using modern development tools.

Course Learning Outcomes

Co 1. Adequate knowledge in system programs (assemblers, loaders, linkers, macro-processors, text editors, debuggers, interpreters, compilers, operating systems).

Co 2. Ability to use theoretical and applied information in these areas to design system software with realistic constraints.

Co 3. Ability to conduct experiments, gather data, analyze and interpret results for investigating solutions to real life applications with assembly language programming and Unix shell programming.

Co 4. Ability to devise, select, and use modern techniques and tools needed for the design and implementation of system programs

SYLLABUS

UNIT I

Background introduction, system software and machine Accenture, SIC, RISC, and CISC architecture. Assembler: basic assembler functions, machine dependent and independent assembler features, assembler design options, and implementation examples.

UNIT II

Loading and linkers basic loader junction, machine dependent and independent loader features, loader design options and implementation examples. Macro processors, basic macro processor functions machines – independent macro processor features, macro processor design options, implementation examples.

UNIT III

Compilers: basic compiler functions, machine dependent and independent compiler features, compiler design options and implementation examples. Other system

software: text editors and interactive debugging systems.

UNIT-IV

Introduction to Device Drivers, Design issues-Types of Drivers, Character driver-1 and Design issues, Character Driver-2- A/D converter and its design issues, Block driver-1 and its design issues.

UNIT-V

Introduction to Linux- Linux Architecture- X-windows- Linux administration tools - Commands to use Linux OS- Executing Linux Shell scripts – Shell Programming concepts-Shell scripts.

Text Books:

1. Leland .Beck, System Software: An Introduction to systems programming :3/e, Pearson Educations Asia,2003. George pajari, Writing Unix Drivers, Addison – Wesley, 1991.

Reference Books:

1. Richard Petersen, Linux complete Reference, McGraw Hill Education (India) Private Limited; 6 edition(21 November 2007)
2. Dhamdhere, System programming and operation Systems Book 2/E, Tata Mc Graw, Hill, 1999

MCA 305A: Cryptography and Network Security

Department	Master of Computer Application	Course Type	DSCC
Corse Title	CNS	Course Code	MCA 305 A
L-T-P	3-1-0	Credits	4
Contact Hours	60Hrs	Duration of SEE	3Hrs
SEE Marks	80	CIE Marks	20

Course Objective:

To make the student learn different encryption techniques along with hash functions, MAC, digital signatures and their use in various protocols for network security and system security.

Course Outcomes (Cos):

Co 1. Analyze and design classical encryption techniques and block ciphers. Understand and analyze data encryption standard

Co 2. Understands the concepts of Conventional Encryption Algorithms, Characteristics of advanced symmetric Block Ciphers. Understands and analyze Confidentiality using Conventional Encryption.

Co 3. Understand and analyze public-key cryptography, RSA and other public-key cryptosystems. such as Diffie-Hellman Key Exchange, El Gamal Cryptosystem, hash functions etc.,

Co 4. Understand key management and distribution schemes and design User Authentication. Protocols, Analyze and design hash and MAC algorithms, and digital signatures. Design network application security schemes, such as PGP, S/ MIME, IPsec. Know about Intruders and Intruder Detection mechanisms, Types of Malicious software, Firewall Characteristics, Types of Firewalls, Firewall Location and Configurations.

Co 5. Understands and learns to provide security for Mobile and manage the Risks. Provides security for cloud-based applications. Learns to provide security for E- money like Crypto currency, Bit Coin Security and working

Course Learning Outcomes (CLOs):

1. Understand the fundamentals of networks security, security architecture, threats and vulnerabilities
2. Apply the different cryptographic operations of symmetric cryptographic algorithms
3. Apply the different cryptographic operations of public key cryptography
4. Apply the various Authentication schemes to simulate different applications.
5. Understand various Security practices and security standards.

MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Objectives (COs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO7	PO 8	PO9	PO10	PO 11	PO12	PS O1	PS O 2	PS O3
I															
II															
III															
IV															
V															

SYLLBUS:

MCA 305A: Cryptography and Network Security

UNIT – 1

Cryptography – Terminology, Conventional Encryption Model, Steganography, Classical Encryption Techniques, DES Data Encryption Standard, Block Cipher Design principles and Modes of Operation.

UNIT II

Conventional Encryption Algorithms: Triples DES, International Data Encryption Algorithm, Blowfish, RC5, Characteristics of advanced symmetric Block Ciphers, Confidentiality using Conventional Encryption.

UNIT III:

Public-Key Cryptography, Introduction to Number Theory: Prime Numbers, Modular Arithmetic, Euler's Theorem, Primary and Factorization, discrete logarithm, D-H Key sharing technique, RSA and its variants-Homomorphic Encryption Techniques Message Authentication and Hash Functions – Hash and MAC algorithms..

UNIT IV

Digital, Signatures and authentication Protocols, Digital Signature Standard, Network Security Practice, Authentication Applications. Basic overview of Electronic Mail Security: pretty Good Privacy's/MIME: IP Security, Web Security – Intruders, Viruses and Worms – Firewalls.

UNIT V

Mobile Security, Risk Model, Eco-System, Service Risks, App Risks, Countermeasures-Cloud Computing Security- Threats-Security in Cloud. Security at service layers. Introduction to Block chain, Crypto currency, BitCoin Security and working, *Ethereum*.

Text Books

1. Cryptography and Network Security – by William Stallings, Principles and Practice, 7th Edition, Pearson
2. Cryptography and Network Security, by John Wiley, Edn, 001

Reference Books

1. Bruce Schneier, Applied Cryptography, John Wiley, Second Edn,2001.
2. Charke Kaufman, Rodia Perlman and Mike Speciner, Network Security

MCA 305B: ARTIFICIAL INTELLIGENCE

Department	Master of Computer Applications	**Course Type**	DSCC
Course Title	Artificial Intelligence	**Course Code**	MCA **305B**
L-T-P	3-1-0	**Credits**	4
Contact Hours	60 Hrs	**Duration of SEE**	3 Hrs
SEE Marks	70	**CIE Marks**	30

COURSE OBJECTIVES:

Co 1. To introduce the prominent methods for machine learning

Co 2. To study the basics of supervised and unsupervised learning

Co 3. To study the basics of connectionist and other architectures

COURSE LEARNING OUTCOMES

1. Differentiate various learning approaches, and to interpret the concepts of supervised learning.
2. Compare the different dimensionality reduction techniques.
3. Apply theoretical foundations of decision trees to identify best split and Bayesian classifier to label data points.
4. Illustrate the working of classifier models like SVM, Neural Networks and identify classifier model for typical machine learning applications.
5. Identify the state sequence and evaluate a sequence emission probability from a given HMM.
6. Illustrate and apply clustering algorithms and identify its applicability in real life

problems.

CO-PO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PPO11	PO12
CO1	✓	✓	✓	✓					✓			✓
CO2	✓	✓	✓	✓					✓			✓
CO3	✓	✓	✓	✓		✓			✓			✓
CO4	✓	✓	✓	✓					✓			✓
CO5	✓	✓	✓	✓								
CO6	✓	✓	✓	✓								

SYLLABUS:

UNIT I

Introduction Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree

UNIT II

Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search.

UNIT III

Probability, conditional probability, Constraint Satisfaction, Propositional Logic & Satisfiability, Uncertainty in AI, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.

UNIT IV

MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially Observable MDPs.

UNIT V

Passive reinforcement learning, direct utility estimate adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning.

Introduction to Machine learning, Deep Learning.

Text Books

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach" , 3rd Edition, Prentice Hall
2. Elaine Rich and Kevin Knight, " Artificial Intelligence", Tata McGraw Hill

Reference Books

1. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011
2. David Poole and Alan Mackworth, "Artificial Intelligence: Foundations for Computational Agents",Cambridge University Press 2010.

MCA 305C: Mobile Application Development

Course Outcomes:

Co 1. Upon completion of the course students should be able to:

Co 2. Install and configure Android application development tools.

Co 3. Design and develop user Interfaces for the Android platform.

Co 4. Save state information across important operating system events.

Co 5. Apply Java programming concepts to Android application development.

Course Learning Outcome:

1. Design and develop User Interfaces for the Android platform.
2. Content that supports this outcome:
3. Android Applications, Activities and Widgets
4. ActionBar Activities
5. Customizing Styles and Themes
6. Displaying images
7. Playing video and audio
8. UI Fragments and the Fragment Manager
9. Creating custom SurfaceViews and simple animation
10. Responding to touch events

11. Supporting different devices, localizations, orientations, API levels, and resolutions.
12. XML resources
13. Launching Activities and passing information between Activitie.

SYLLABUS

UNIT I

Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications

UNIT II

Basic Design: Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

UNIT III

Advanced Design: Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing.

UNIT IV

Technology I - Android: Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

UNIT V

Technology II – IOS: Introduction to Objective C – iOS features – UI implementation – Touch frameworks –Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating

calendar and address book with social media application

Text Books

1. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012
2. Charlie Collins, Michael Galpin and Matthias Kappler, Android in Practice", DreamTech, 2012

Reference Books

1. http://developer.android.com/develop/index.html
2. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, "Beginning iOS
3. Development: Exploring the iOS SDK", Apress, 2013.

MCA 401 CLOUD COMPUTING

Department	Master of Computer Application	Course Type	DSCC
Corse Title	Cloud Computing	Course Code	MCA 401
L-T-P	3-1-0	Credits	4
Contact Hours	60Hrs	Duration of SEE	3Hrs
SEE Marks	80	CIE Marks	20

Course Objective:

Cloud computing could be a key distributed systems paradigm that has big in style within the previous few years. Cloud technologies square measure pervasive, touching our daily lives any time we have a tendency to access the globe wide net, use a mobile app, or build a retail purchase. Clouds also are the de facto infrastructure for "Big Data" applications. whereas innovative Cloud services square measure offered by data technology corporations, Cloud computing is additionally grounded in foundational distributed systems and ascendible software system systems principles, and is a vigorous space of analysis by the educational community.

Course Outcomes (Cos):

Co 1. To deliver a strong fundamental concept in cloud computing. Making to understand the cloud architectures like SaaS, PaaS, LaaS and public and private cloud. To understand the distributed system models and enabling technologies for network- based systems, performances and security measures.

Co 2. To implement the basics of virtualization types and levels of virtualization implementation.

Co 3. To understand the virtualization structures, tools and mechanisms. To learn the concepts of hardware and software support for virtualization. To become familiar about virtual clusters, resource management and data center automation in virtualization.

Co 4. To Impart the concepts of cloud infrastructure, the service models and the design for storage in cloud. To understand design for data center and interconnection network. To know how to provide the security for trust management in the cloud.

Co 5. To get the knowledge on cloud programming and software environment. To Provide basic programming support on google app engine, amazon AWS and Microsoft Azure. To know the emerging cloud software environment.

Co 6. To enable the knowledge on providing security, risk and challenges for cloud environment. To provide basic knowledge on security architecture design for data security, user identification security, and access control in cloud.

Course Learning Outcomes (CLOs):

1. Explore the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for cloud computing.
2. Identification for different cloud architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud,

etc.

3. Identifying the appropriate technologies, tools, mechanisms, algorithms, and approaches for the related issues.
4. Figuring out the problems for providing the data security in the cloud, and their solutions.
5. Attempting to learn the new technologies like google app engine, amazon AWS.
6. New software environments like Eucalyptus, Open nebula, Aneka will be learnt.
7. Explain the core issues of Cloud Computing such as security challenges, risk, privacy, and interoperability.

MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Objectives (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**
I															
II															
III															
IV															
V															

SYLLABUS:

MCA 401A : CLOUD COMPUTING

UNIT I

Cloud Architecture and Model: Technologies for Network-Based System – System

Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture, Cloud Models: Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public Vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand.

UNIT II

Virtualization: Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation. VMWare, Virtual Box Virtualization software.

UNIT III

Cloud Infrastructure: Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources. Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

UNIT IV

Programming Model: Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support – Software environments for service development; Amazon, Azure, Google App Engine, AWS - Cloud Environments - Eucalyptus, Open Nebula, OpenStack, Aneka, Cloud Sim. Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

UNIT V

Security In The Cloud: Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security

Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control.

Text Books:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed a d Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. Ritting house, John W., and James F. Ransome Cloud Co puting: Implementation, Management and Security?, CRC Press, 2017.

Reference Books:

1. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, andSecurity", CRC Press, 2010.
2. Kumar Saurabh, "Cloud Computing – insights into New-Era Infrastructure", Wiley India,2011.

MCA 401C: SOFTWARE TESTING

Course Objectives:

Co 1. To study fundamental concepts in software testing

Co 2. To discuss various software testing issues and solutions in software unit test, integration and system testing.

Co 3. To expose the advanced software testing topics, such as object-oriented software testing methods.

Course Learning Outcomes:

At the end of this course student will:

1. List a range of different software testing techniques and strategies and be able to apply specific(automated) unit testing method to the projects.
2. Distinguish characterstics of structural testing methods.
3. Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible.
4. Discuss about the functional and system testing methods.

5. Demonstrate various issues for object oriented testing.

SYLLABUS:

UNIT I

The role of process in software quality: Testing as a process - Overview of the Testing Maturity Model (TMM) - Basic definitions - Software testing principles - Origins of defects - Defect classes, Defect repository - Test design - Defect example: the coin problem

UNIT II

Test case design strategies: Black box approach - Random testing - Equivalence class partitioning - Boundary value analysis - Cause and Effect graphing - State transition testing - Error guessing - White box approach - Test adequacy criteria - Coverage and control flow graphs - Covering code logic - Data flow and white box test design - Loop testing - Mutation testing - Evaluating test adequacy criteria.

UNIT III

Levels of testing: Unit test: functions, procedures, classes and methods units - Unit test planning - Designing test units - The class as a testable unit - The test harness - Integration test: goal - Integration strategies for procedures and functions - Integration strategies for classes - Designing integration test - System test - The different types - Regression testing - Alpha, beta and acceptance test - Test planning - Test plan components - Test plan attachments - Reporting test results.

UNIT IV

Software quality: Defining Quality: importance of quality - Quality control v/s quality assurance - Quality assurance at each phase of SDLC - Quality assurance in software support projects - SQA function - Quality management system in an organization - Software quality assurance plans - Product quality.

UNIT V

Software metrics and models: Walkthroughs and Inspections - Software Configuration Management - ISO:9001 Model - CMM Model - CMM and ISO

comparative analysis - CMM-I.

Text Books

1. IIene Burnstein, "Practical Software Testing", Springer International Edition, First Indian reprint, 2004.
2. Nina S Godbole, "Software Quality Assurance, Principles and Practice", Narosa Publishing House, 2004.

Reference Books

1. P.C. Jorgensen, "Software Testing - A Craftman's Approach", CRC press, 1995.
2. Boris Beizer, van Nostrand Reinhold, "Software Testing Techniques", 2nd Edition, 1990.

MCA 401C: Software Testing

UNIT I

The role of process in software quality: Testing as a process - Overview of the Testing Maturity Model (TMM) - Basic definitions - Software testing principles - Origins of defects - Defect classes, Defect repository - Test design - Defect example: the coin problem

UNIT II

Test case design strategies : Black box approach - Random testing - Equivalence class partitioning - Boundary value analysis - Cause and Effect graphing - State transition testing - Error guessing - White box approach - Test adequacy criteria - Coverage and control flow graphs - Covering code logic - Data flow and white box test design - Loop testing - Mutation testing - Evaluating test adequacy criteria.

UNIT III

Levels of testing : Unit test: functions, procedures, classes and methods as units - Unit test planning - Designing test units - The class as a testable unit - The test harness - Integration test: goal - Integration strategies for procedures and functions - Integration strategies for classes - Designing integration test - System test - The different types - Regression testing - Alpha, beta and acceptance test - Test planning - Test plan components - Test plan attachments - Reporting test results.

UNIT IV

Software quality: Defining Quality: importance of quality - Quality control v/s quality assurance - Quality assurance at each phase of SDLC - Quality assurance in software support projects - SQA function - Quality management system in an organization - Software quality assurance plans - Product quality.

UNIT V

Software metrics and models: Walkthroughs and Inspections - Software Configuration Management - ISO:9001 Model - CMM Model - CMM and ISO comparative analysis - CMM-I .

Text Books

1. IIene Burnstein, "Practical Software Testing", Springer International Edition, First Indian reprint, 2004.
2. Nina S Godbole, "Software Quality Assurance, Principles and Practice", Narosa Publishing House, 2004.

Reference Books

1. P.C. Jorgensen, "Software Testing - A Craftman's Approach", CRC press, 1995.
2. Boris Beizer, van Nostrand Reinhold, "Software Testing Techniques", 2nd Edition, 1990.

MCA 402A: Essentials of Data Science

Course Objectives:

The main objective of this program is to provide the best graduate education to students so that they can meet the growing national and international need for highly qualified personnel in the fields of data science and artificial intelligence. The overarching objectives of the Master of Data Science and Artificial Intelligence.

1. Develop a broad academic and practical literacy in computer science, statistics, and optimization, with relevance in data science and artificial intelligence, so that students are able to critically select and apply appropriate methods and techniques to extract relevant and important information from data.
2. Provide strong core training so that graduates can adapt easily to changes and new demands from industry.
3. Enable students to understand not only how to apply certain methods, but when and why they are appropriate.
4. Integrate fields within computer science, optimization, and statistics to create adept and well-rounded data scientists.
5. Expose students to real-world problems in the classroom and through experiential learning.

Course Outcomes:

Co 1. Students will develop relevant programming abilities.

Co 2. Students will demonstrate proficiency with statistical analysis of data.

Co 3. Students will develop the ability to build and assess data-based models.

Co 4. Students will execute statistical analyses with professional statistical software.

Co 5. Students will demonstrate skill in data management.

Co 6. Students will apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively.

UNIT I

Introduction: What is Data Science? - Big Data and Data Science, Statistical Inference - Populations and samples - Statistical modeling, probability distributions, fitting a model - Intro to R Language.

UNIT II

Exploratory Data Analysis and the Data Science Process - Basic tools (plots, graphs and summary statistics) of EDA - Philosophy of EDA - The Data Science Process - Case Study: Real Direct (online real estate firm)

UNIT III

Feature Generation and Feature Selection (Extracting Meaning From Data) - Motivating application: user (customer) retention - Feature Generation (brainstorming, role of domain expertise, and place for imagination) - Feature Selection algorithms – Filters; Wrappers; Decision Trees; Random Forests.

UNIT IV

Data Visualization: Basic principles, ideas and tools for data visualization 3 - Examples of inspiring (industry) projects - Exercise: create your own visualization of a complex dataset

UNIT V

Data Science and Ethical Issues - Discussions on privacy, security, ethics - A look back at Data Science - Next-generation data scientists

Text Books

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly. 2014.

References Books

1. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 2014. (free online)
2. Kevin P. Murphy. Machine Learning: A Probabilistic Perspective. ISBN 0262018020. 2013.

MCA 402B: Deep Learning

Course Objectives

The main objective of this course is to make students comfortable with tools and techniques required in handling large amounts of datasets. They will also uncover various deep learning methods in NLP, Neural Networks etc. Several libraries and datasets publicly available will be used to illustrate the application of these algorithms. This will help students in developing skills required to gain experience of doing independent research and study.

Course Outcomes

Co 1. Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.

Co 2. Implement deep learning algorithms and solve real-world problems.

UNIT I

Basics Of Neural Networks: Basic concept of Neurons – Perceptron Algorithm – Feed Forward and Back Propagation Networks.

UNIT II

Introduction To Deep Learning: :Feed Forward Neural Networks – Gradient Descent – Back Propagation Algorithm – Vanishing Gradient problem – Mitigation – RelU Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training – Nestors Accelerated Gradient Descent – Regularization – Dropout.

UNIT III

Convolutional Neural Networks: : CNN Architectures – Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning

UNIT IV

More Deep Learning Architectures\:LSTM, GRU, Encoder/Decoder Architectures – Autoencoders – Standard- Sparse – Denoising – Contractive- Variational Autoencoders – Adversarial Generative Networks – Autoencoder and DBM

UNIT V

Applications Of Deep Learning: Image Segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative Adversarial Networks – Video to Text with LSTM Models – Attention Models for Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent

Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs.

Text Books:

1. Ian Good Fellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2017.
2. Navin Kumar Manaswi, "Deep Learning with Applications Using Python", Apress, 2018.

Reference Books

1. Francois Chollet, "Deep Learning with Python", Manning Publications, 2018.
2. Phil Kim, "Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence", Apress , 2017.
3. Ragav Venkatesan, Baoxin Li, "Convolutional Neural Networks in Visual Computing", CRC Press, 2018.

MCA 402C: Internet of Things

Course description and objectives:

Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices.

Course Outcomes:

Co 1. Able to understand the application areas of IOT

Co 2. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks

Co 3. Able to understand building blocks of Internet of Things and characteristics

UNIT I

Fundamentals of IoT: Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.

UNIT II

Sensors Networks : Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.

UNIT III

Wireless Technologies For Iot**:** WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, Bacnet, Modbus. IP Based Protocols For IoT: IPv6, 6LowPAN, RPL, REST, AMPQ, CoAP, MQTT.

Edge connectivity and protocols

UNI IV

Data Handling& Analytics**:** Introduction, Bigdata, Types of data, Characteristics of Big data, Data handling Technologies, Flow of data, Data acquisition, Data Storage, Introduction to Hadoop.

Introduction to data Analytics, Types of Data analytics, Local Analytics, Cloud analytics and applications, Edge/Fog Computing

UNIT V

Applications of IoT**:** Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.

Text Books:

1. Olivier Hersent, David Boswarthick, and Omar Elloumi, ― "The Internet of Things: Key Applications and Protocols", WileyPublications
2. Vijay Madisetti and ArshdeepBahga, ― "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.

Reference Books

1. Daniel Minoli, ― "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications
2. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press