SRI Y.N.COLLEGE
(Autonomous)

Affiliated to Adikavi Nannaya University, Rajamahendravaram
Accredited by NAAC with 'A+' Grade (IV Cycle)

Dr. C.S RAO PG CENTRE
DEPARTMENT OF COMPUTER SCIENCE
(Estd. 1993)

MCA: MASTER OF COMPUTER APPLICATIONS

A Two Year Full - Time Programme Approved by

All India Council for Technical Education (AICTE)

SYLLABUS

(with effect from 2025-26 Admitted Batch)

SRI Y.N.COLLEGE (AUTONOMOUS), NARSAPUR

(Affiliated to Adikavi Nannaya University)
Accredited by NAAC with 'A+' Grade (IV Cycle)

MASTER OF COMPUTER APPLICATIONS (MCA)

MCA – SYLLABUS

(With effect from the admitted batch of 2020-2021 academic year)

Name of the Program: **Masters in Computer Applications (MCA)**

Year of Establishment: **1992**

Curriculum developed and implemented have relevance to the local, national, regional and global developmental needs which is reflected in Programme outcomes (POs), Programme Specific Outcomes(PSOs) and Course Outcomes(COs) of the Programmes offered by the University.

Sri Y.N.College has started **Master of Computer Applications (MCA) Programme** in the year 1992 with an intake of 30 seats and is being successfully running, which was subsequently increased to 42 seats in the year 2002-03 and now for the academic year 2020-21 the total available seats are 46. This program gives exposure to its students, not only the regular curriculum but also to the aspirations of today's corporate world by inculcating a professional attitude.

This program has well-defined learning objectives including program outcomes, program specific outcomes and course outcomes. Curriculum development and delivery guidelines and norms relating to Choice Based Credit System (CBCS) are as per AICTE and UGC guidelines and norms. The course has been enriched by offering additional value-added courses and flexibility in choosing elective courses. The final semester students pursue dissertation/project work/internships in National Institutes and Industries.

As a result, the program is well diversified and regularly upgraded to fulfill the needs of the local/ national/regional and global developments. This program is focused towards enhancing employability of the students.

PROGRAM OUT COMES:

PO1: Computational Knowledge: Apply the knowledge of computing fundamentals to various real life applications to anygiven requirement.

PO2 Problem Analysis: Identify, formulate and solve complex computing problems reaching substantiated conclusions.

PO3 Development of Solutions: Design and evaluate solutions for complex computing problems with appropriate consideration.

PO4 Investigations of complex Computing problems: Use research-based knowledge and research methods for analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 Modern Tool Usage: Create, identify and apply appropriate techniques, resources, and modern computing tools to complex computing activities.

PO6 Professional Ethics: Understand and commit to professional ethics and cyber regulations for professional computing practices.

PO7 Life-long Learning: Identify the need and have the ability, to engage in independent learning as a computing professional.

PO8 Project management and finance: Understand and apply computing, management principles to manage multidisciplinary projects.

PO9 Communication Efficiency: Communicate effectively with the computing community and with society.

PO10 Societal and Environmental Concern: Understand and assess societal, environmental, health, safety, legal, and cultural issues.

PO11 Individual and Team Work: Function effectively in diverse teams and in multidisciplinary environments.

PO12 Innovation and Entrepreneurship: Identify a timely opportunity and using innovation to pursue that opportunity.

PROGRAM SPECIFIC OUTCOMES

PSO1: Apply the knowledge of computer application to find solutions for real-life application

PSO2: Ability to analyze, design, develop and maintain the software application with latest technologies

PSO3: Utilize skills and knowledge for computing practice with commitment on social, ethical, cyber and legal values.

PSO4: Inculcate employability and entrepreneur skills among students who can develop customized solutions for small to large Enterprises.

APPROVED

SRI Y.N. COLLEGE (AUTONOMOUS) Accredited by NAAC at A+ Grade (4th Cycle) DEPARTMENT OF COMPUTER SCIENCE NARASAPUR - 534 275, W.G.Dt.

24/10/25

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Accredited by NAAC at A+ Grade (4th Cycle)
NARSAPUR - 534 275

REGULATIONS

1. The MCA (Masters in Computer Applications) is a Full-time **Two** Year Programme with **Four** Semesters.

2. Candidates for the degree of Masters in Computer Applications (MCA) shall be required to pass any Graduation with Mathematics at Intermediate.

3. Intake for M.C.A course is 132 (96 Convener Quota and 36 Category-B seats) approved by AICTE.

4. Mode of admission is through (APICET) Entrance examination and Counseling conducted by APSCHE. For the candidates seeking admission under category B, I-CET qualification is not mandatory.

5. The Courses/ Papers in four semesters are divided into Core and Electives. The first, second and third semesters with six papers and two labs. In first semester only Core papers are offered. In the second and third semesters Elective courses are offered along with the CoreCourses/Papers.

6. Candidates have to undergo project work for four months during the fourth semester at theirown expense and have to submit project report.

7. Each paper carries 100 marks out of which 25 marks are internal and 75 marks areexternal. The pass mark in each paper is 40.

8. Two internal theory examinations are conducted in every paper for 20 Marks. The average marks are awarded finally. In addition, two marks are awarded for two assignments in eachpaper and three marks are awarded for seminar presentation. **There is no minimum pass marks for internal assessment both in theory and practicals.**

9. The practical examinations will be conducted and valued by both internal and external examiners at the end of each semester. The viva- voce examination will be conducted on projectwork by both internal and external examiners at the end of the IV semester.

10. **Each practical paper carries 50 marks for external evaluation process** in which both the internal and external examiners conduct the examination. Out of these 50 marks 20 marks are allocated for program writing, 10 marks for program execution,10 marks are for Record and10 marks for Viva-voce examination of the student.

11. **Each practical paper carries 50 marks for internal evaluation process** in which the internal examiner conduct the examination. Out of these 50 marks 20 marks are allocated for program writing, 10 marks for program execution,10 marks are for Record and 10 marks for Viva-voce examination of the student.

12. Students shall put in attendance to the College for not less than 75% of the total number of working days. Condonation of shortage of attendance may be granted on medical grounds between 60 and 75% .

13. **Bridge Course** is Mandatory for Non-IT students and the students must pass thecourse with minimum 50% of marks.

14. **Summer Internship:** Every student has to do summer internship for 2 months duringfirst yearsummer i.e. after the completion of second semester to be evaluated during third semester.

15. **Skill Development Course:** As part of the curriculum, Skill Development Course with MOOCS isto be offered to the students during the second semester.

16. **Project Work**: Every student has to do a project work during the fourth semester. Every Student, under the direction of a faculty guide and Industry guide has to develop a project report on the work done and submit to the department at the end of 4^{th} semester. The **project report** will be evaluated for **400 Marks**. The **internal 200 Marks** will be awarded by the **Department Committee** based on the PowerPoint presentation of the student on his work. The Department Committee shall consist of all the faculty members.

The External marks 200 will be awarded by the Examiners Committee comprising the Department Head, One Senior Faculty Member and One External Examiner having 10 years of experience preferably Ph.D degree from an Autonomous College MCA Dept. or a Senior Faculty Member from the Parent University or any other University.

Viva Voce: At the end of Fourth Semester, a Comprehensive Viva Voce Examination will be conducted on the project work executed by the student and also on the overall subject knowledge of the student for 200 Marks.

The Viva will be conducted by the Examiners Committee as mentioned above.

17. Blue Print for Theory Internal Assessment:

Max Marks – 25 Time – 1:30 Hrs

Theory Exam • Short notes 2 out of 4 – 2x3 = 6 Marks • Essay Questions 2 either or choice – 2x7 = 14Marks ** Average of two Internal Exams is to be considered	20 Marks
• Assignments – 2x1 Mark	2 Marks
• Seminar - 1x3 Marks	3 Marks
Total	**25 Marks**

18. Blue Print for Laboratory/Practical Course Internal Assessment:

Max. Marks: 50 **Time: 3 hrs.**

Program writing	20 Marks
Program execution	10 Marks
Record	10 Marks
Viva-voce	10 Marks
Total	**50 Marks**

❖ Practical Internal examination will be conducted after completion of practical course.

19. **Blue print for Theory Semester - End Examinations:**

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							**75**

1. Section – A Essay Questions four either or chioce 4 x 15 = 60 Marks
2. Section – B Short Answer Questions five 5 x 3 = 15 Marks
   Total Marks = 75 Marks
3. One question compulsory from each unit.

20. **Blue Print for Laboratory/ Practical Course External Assessment:Max.**

Marks: 50 **Time: 3 hrs.**

Program writing	20 Marks
Program execution	10 Marks
Record	10 Marks
Viva-voce	10 Marks
Total	**50 Marks**

21. The Question paper will be set by the External Paper Setters of other Autonomous Colleges and the valuation of the answer scripts will be done by the External Faculty at the end of each Semester.

22. **Results:** Grading system is followed in awarding marks. The performance of the students is evaluated on a ten point grading scale with seven letter grades i.e., O, A^+, A, B^+, B, C, P, and F. A candidate shall be declared to have passed in any paper if he /she secures not less than 'P' grade in theoryand not less than 'C' grade in the Project and Viva Voce.

Letter Grades and Grade Points:

S. No	Range of Marks (%)	Grade	Grade Points	Description
01	90 – 100	O	10	**O** (Outstanding)
02	80 – 89.99	A+	9	**A+** (Excellent)
03	70 – 79.99	A	8	**A**(Very Good)
04	60 – 69.99	B+	7	**B+** (Good)
05	55 – 59.99	B	6	**B** (Above Average)
06	50 – 54.99	C	5	**C** (Average)
07	40- 49.99	P	4	**P**(Pass)
08	0 – 39.99	F	0	**F** (Fail)
	.	Ab	0	Absent

Definitions of Key words:

- **Credit Point:** It is the product of grade point and number of credits for a course.
- **Credit:** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching.
- **Grade Point:** It is a numerical weight allotted to each letter grade on a 10 point scale.
- **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.

❖ **Semester:** Each semester consists of 15-18 weeks of academic work equivalent to 90 actual teaching days.

❖ **Semester Grade Point Average(SGPA) :** It is a measure of performance of work done in a semester. It is the ratio of total credit points secured by a student in a semester and the total course credits taken during that semester.

❖ **Cumulative Grade Point Average(CGPA):** It is a measure of overall cumulative performance of a student in all semesters. The CGPA is the ratio of total credit points secured by a students 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.

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester I (First Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
MCA-20101	Discrete Mathematical Structures	75	25	100	4	-	4
MCA-20102	Management Accountancy	75	25	100	4	-	4
MCA-20103	C Programming & Data Structures	75	25	100	4	-	4
MCA-20104	Computer Organization	75	25	100	4	-	4
MCA-20105	Operating Systems	75	25	100	4	-	4
MCA-20106	Design & Analysis of Algorithms	75	25	100	4	-	4
MCA-20107	C Programming & Data Structures Lab	50	50	100	-	3	2
MCA-20108	Operating Systems and Computer Organization Lab	50	50	100	-	3	2
MCA-20109	**Bridge Course*** Fundamentals of Computers (For General B.Sc/B.A./B.ComStudents)	75	25	100	4	-	4
MCA-20110	**Bridge Course Lab*** Fundamentals of ComputersLab (For General B.Sc/B.A./B.Com Students)	50	50	100	-	3	2
	Total Credits						28

Note: All the General B.Sc/B.A./B.Com Students must pass the **Bridge Course (MCA-20109) and Bridge Course Lab (MCA-20110)** with minimum 50% marks, but the credits allotted for that courses will not be considered for SGPA calculation.

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Semester II (First Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
MCA-20201	Computer Networks	75	25	100	4	-	4
MCA-20202	Object Oriented Programming through JAVA	75	25	100	4	-	4
MCA-20203	Database Management Systems	75	25	100	4	-	4
MCA-20204	Formal Languages and Automata Theory	75	25	100	4	-	4
MCA-20205	Data Mining Concepts and Techniques	75	25	100	4	-	4
MCA-20206	Elective-I 1. Artificial Intelligence and Expert Systems 2. Internet of Things 3.Image Processing	75	25	100	4	-	4
MCA-20207	Object Oriented Programming through JAVA Lab	50	50	100	-	3	2
MCA-20208	Database Management Systems Lab	50	50	100	-	3	2
MCA-20209	Skill Development Course with Python	50	50	100	1	2	2
	Total Credits						30

Note:2 lab Hrs and 1 Theory Hrs/Week or 2 Theory Hrs/ Week for Skill Development Course and only Lab Exam will be conducted.

Summer Internship (Mandatory) after First Year (to be evaluated during IIIsemester).

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M. Kanishka

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Semester III (Second Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
MCA-20301	Information Security and Cryptography	75	25	100	4	-	4
MCA-20302	Big Data Analytics	75	25	100	4	-	4
MCA-20303	Object Oriented Software Engineering	75	25	100	4	-	4
MCA-20304	Web Technologies	75	25	100	4	-	4
MCA-20305	Elective II 1.Blockchain Technology 2.Cloud Computing 3.Machine Learning and Deep Learning	75	25	100	4	-	4
MCA-20306	Elective-III 1. Business Intelligence and Visualization 2. Robotics 3.Foundations of Data Science	75	25	100	4	-	4
MCA-20307	Web Technologies and Object Oriented Software Engineering Lab	50	50	100	-	3	2
MCA-20308	Big Data Analytics lab	50	50	100	-	3	2
MCA-20309	Innovation, Entrepreneurship and Intellectual Property Rights	-	50	50	2	-	0
MCA-20310	Summer Internship	50	50	100	-	-	2
	Total Credits						30

Note: Summer Internship 2 Months (Mandatory) after First Year (to be evaluated during III semester)

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K. Padma Bhooruya

M. Kanshle

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester IV (Second Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
MCA-20401	Project	150	200	350	-	-	10
	Total Credits						10

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M. Kanshlee

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester I (First Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
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MCA-20102	Management Accountancy	75	25	100	4	-	4
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MCA-20104	Computer Organization	75	25	100	4	-	4
MCA-20105	Operating Systems	75	25	100	4	-	4
MCA-20106	Design & Analysis of Algorithms	75	25	100	4	-	4
MCA-20107	C Programming & Data Structures Lab	50	50	100	-	3	2
MCA-20108	Operating Systems and Computer Organization Lab	50	50	100	-	3	2
MCA-20109	**Bridge Course*** Fundamentals of Computers (For General B.Sc/B.A./B.ComStudents)	75	25	100	4	-	4
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	Total Credits						28

Note: All the General B.Sc/B.A./B.Com Students must pass the **Bridge Course (MCA-20109) and Bridge Course Lab (MCA-20110)** with minimum 50% marks, but the credits allotted for that courses will not be considered for SGPA calculation.

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(w.e.f. 2020 Admitted Batch)

Semester I (First Year) Curriculum

Course Code &Title: MCA-20101 DISCRETE MATHEMATICAL STRUCTURES Semester: I Course Index: C101	
Course Objectives: The learning objectives of this course are:	
Course Objectives	
Learn about introduction of discrete mathematical structures.	
Learn the Counting Techniques and Recurrence relations.	
Learn about in detail about Graphs and Trees.	
Learn about Boolean Algebra and Models of Computation.	
Course Outcomes: Bythe end of the course, the student will be	
Course Index	**Course Outcomes**
C101.1	Understand about introduction of discrete mathematical structures.
C101.2	Understand the Counting Techniques and Recurrence relations.
C101.3	Understand about in detail about Graphs and Trees.
C101.4	Understand about Boolean Algebra and Models of Computation.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20101 DISCRETE MATHEMATICAL STRUCTURES

Instruction: 4 Periods/week | Time: 3 Hours | Credits: 4

Internal: 25 Marks | External: 75 Marks | Total: 100 Marks

UNIT I

Introduction: Logic-Prepositional Equivalences-Truth tables-Totalogies-Predicates and Quantifiers-Sets-Operations on sets- - relations and their properties- n-ary relations and their applications - Representation of relations-Closures of relations- Equivalence relations-Partial Orderings.

UNIT II

Counting Techniques: Basics of Counting- Pigeonhole Principle- Combinations and Permutations-Generalized Permutations and Combinations

Recurrence relations: Solving Recurrence Relations-Divide and Conquer relations - Inclusion and Exclusion-Applications of Inclusion-Exclusion.

UNIT III

Graphs: Introduction to Graphs-Terminology-Relations and Directed Graphs - Representations of Graphs- Isomorphism-Connectivity- Euler and Hamiltonian Paths- Shortest Path problems- Planar Graphs- Graph Coloring.

Trees: Introduction to trees- Applications of trees- Traversals-Trees and sorting Spanning Trees-Minimum Spanning Trees.

UNIT IV

Boolean Algebra and Models of Computation: Boolean Functions - Representing Boolean Functions-Logic Gates-Minimizations of Circuits-Languages and Grammars- Finite State Machines with and with no output.

Text Book:

Discrete mathematics and its applications, Keneth. H. Rosen, Tata McGraw-Hill Publishing Company, New Delhi

Reference Books:

1) Discrete Mathematics for computer scientists & Mathematicians, Joe L. Mott, Abraham Kandel &T. P. Baker,Prentice Hall of India Ltd, New Delhi
2) Discrete mathematics, Richard Johnsonbaug, Pearson Education, New Delhi

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MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA 20101: DISCRETE MATHEMATICAL STRUCTURES

Time:3Hrs Max Marks: 75

SECTION- A (4 X 15 = 60 M)

Answer ALL Questions

1. a) Show that $p \rightarrow q$ and $\neg q \rightarrow \neg p$ are logically equivalent. [7M]
   b) Show that the relation $\leq$(less than or equalto) defined on the set of positive integers Z^+ is a partial order relation. [8M]

(OR)

   c) S.T $R \wedge (P \vee Q)$ is a valid conclusion from the premises $P \vee Q$, $Q \Rightarrow R$, $P \Rightarrow M$ and $\neg M$. [7M]
   d) If R be a relation in the set of integers z defined by R = {(x,y)/:x$\in$z,y$\in$z, (x-y) is divisible by 6}. [8M]

2. a) Solve the recurrence relation $an = an-1+2$, $n \geq 2$ subject to initial condition $a1=3$. [7M]
   b) How many ways are there to assign five different jobs to four different employees if everyemployee is assigned at least one job? [8M]

(OR)

   c) Applying pegion hole principle show that of any 14 integers are selected from the set S= {1,2,3,…..,25} there are at least two whose seem is 26.Also write a statement that generalizes this result. [7M]

   d) In a class of 25 students, 12 have taken mathematics. 8 have taken mathematics but not biology. Find the number of students who have taken mathematics and biology and those who have taken biology but not mathematics. [8M]

3. a) If G= (V,E) be a directed graph with e edges , then $\Sigma v \epsilon V \deg_G^+(V) = \Sigma v \epsilon V \deg_G^-(V) = e$ [7M]
   b) Explain Isomorphism of Graphs with example. [8M]

(OR)

   c) Prove that a tree with n vertices has n-1 edges [7M]
   d) Explain Spanning Tree Algorithms. [8M]

4. a) Find the sumof products expansion for the function $F(x,y,z)=(x+y)\bar{z}$ [7M]
   b) Construct circuits that produce the following outputs (i)$(x+y)\bar{x}$ (ii)$\bar{x}(y+\bar{z})$ [8M]

(OR)

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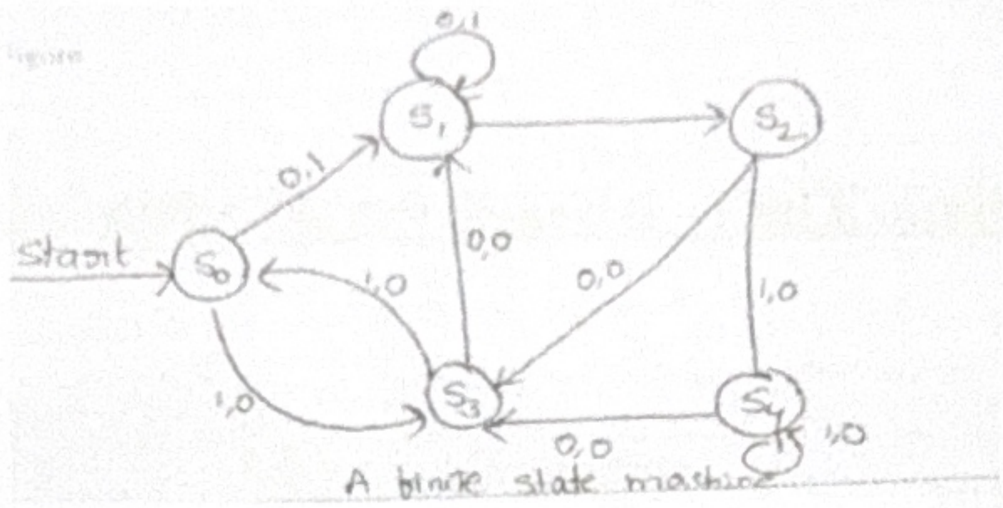
c) Show that distributive law $(y+z)=xy+xz$ is valid [7M]

d) Construct the state table for the finite state machine with the state diagram shown in the following Figure [8M]



A finite state machine

SECTION-B (5 X 3 = 15 M)

Answer any FIVE of the following

5. a) Construct the truth table for $p\wedge(p\rightarrow q)$

b) Prove $A(B\cap C)=(AUB)\cap(AUC)$

c) State and prove Hand shaking theorem.

d) Define Hamilton circuit, Hamiltonian graph, give examples to each.

e) Inclusion and Exclusion Principle.

f) Minimal Spanning Tree.

g) DeMorgan's Law in Boolean Algebra.

h) Find the duals of $(y+0)$ and $x.\bar{1}+(\bar{y}+z)$.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

Blue print for Theory Semester - End Examinations:

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							**75**

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester I (First Year) Curriculum

Course Code &Title: MCA-20102 MANAGEMENT ACCOUNTANCY **Semester: I** **Course Index: C102**
Course Objectives: The learning objectives of this course are:

Course Objectives
Learn the basic concept of Principles Of Accounting and Final Accounts.
Learn about in detail about Ratio Analysis.
Learn about the concepts of Costing, Budget and Budgetary Control, Marginal Costing.
Learning the Introduction To Computerized Accounting System.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C102.1	Understand the basic concept of Principles Of Accounting and Final Accounts.
C102.2	Understand about in detail about Ratio Analysis.
C102.3	Understand about the concepts of Costing, Budget and Budgetary Control, Marginal Costing.
C102.4	Understanding the Introduction To Computerized Accounting System.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20102 MANAGEMENT ACCOUNTANCY

Instruction: 4 Periods/week	Time: 3 Hours	Credits: 4
Internal: 25 Marks	External: 75 Marks	Total: 100 Marks

UNIT I

Introduction to Management Accountancy – Definition – Objectives, need & scope of Management Accountancy.

Principles of Accounting: Nature And Scope of Accounting, Double Entry System of accounting (introduction To Basic Books of Accounts of Sole Proprietary Concern), closing of books of accounts and Preparation of Trial Balance.

Final Accounts: Trading, Profit And Loss Accounts And Balance Sheet of Sole Proprietary Concern with Normal Closing Entries.(With numerical problems)

UNIT II

Costing: Nature, Importance And Basic Principles. Budget and Budgetary Control: Nature And Scope, Importance, Method Of Finalization And Master Budget, Functional Budgets.

Marginal Costing: Nature, Scope, Importance, Construction Of Break Even Chart, Limitations And Uses Of Break Even Chart, Practical Applications Of Marginal Costing.(with numerical problems)

UNIT III

Ratio Analysis: Meaning, Advantages, Limitations, Types of Ratio and Their Usefulness. (Theory only)Fund Flow Statement: Meaning Of The Term Fund, Flow Of Fund, Working Capital Cycle, Preparation and Inter-preparation Of Statement.

UNIT IV

Introduction To Computerized Accounting System: Coding Logic And Codes Required, Master Files, Transaction Files, Introduction To Documents Used For Data Collection, Processing Of Different Files And Outputs Obtained.

Text Books:

1. Introduction to Accountancy. T.S. Grewal.
2. Management Accountancy, S.P.Jain.

Reference Book:

Introduction To Accounting, G.Agarwal.

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MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA 20102: MANAGEMENT ACCOUNTANCY

Time:3Hrs Max Marks: 75

SECTION- A (4 X 15 = 60 M)

Answer ALL Questions

1. a) Define Accounting? Explain various Concepts of Accounting. [15M]

(OR)

b) Give detailed proforma for Trading A/C, P&L A/C and Balance Sheet. [15M]

2. a) What do you mean by financial statement analysis? Explain the importance of Ratio analysis in analyzing the financial strength of an organization? [15M]

(OR)

b) Distinguish between Funds flow and cash flow analysis [15M]

3. a) Define Budget? Explain different types of Budgets. [15M]

(OR)

b) Calculate P/V ratio, BEP and Margin of Safety from the following data of a manufacturing Enterprise.

Selling price 10 Rs
Variable Cost 6 Rs
Fixed Cost 40,000 Rs
Actual Sales 16,500 Units [15M]

4. a) What are the various types of documents used for data collection in computerized accounting system? [15M]

(OR)

b) Explain the importance of coding logics in computerized accounting system? [15M]

SECTION – B (5 X 3 = 15 M)

Answer any FIVE of the following

5. a) Double Entry System
   b) Relevant Cost
   c) Liquidity ratios
   d) Make or buy decision
   e) Margin of Safety
   f) Working Capital Cycle
   g) Master Budget
   h) Transaction file.

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MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

Blue print for Theory Semester - End Examinations:

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							**75**

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MASTER OF COMPUTER APPLICATION

(w.e.f. 2020 Admitted Batch)

Semester I (First Year) Curriculum

Course Code &Title: MCA-20103 C PROGRAMMING AND DATA STRUCTURES
Semester: I
Course Index: C103

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn the Fundamentals and Basic concepts of C Programming.
Learn about in detail about Arrays, Functions and Pointers.
Learn the concepts of Derived Data Types and Data Structures.
Learn the concepts of Linked Lists, Trees, Graphs, Searching and Sorting.

Course Outcomes:
Bythe end of the course, the student will be

Course Index	Course Outcomes
C103.1	Understand the Fundamentals and Basic concepts of C Programming.
C103.2	Understand about in detail about Arrays, Functions and Pointers.
C103.3	Understand the concepts of Derived Data Types and Data Structures.
C103.4	Understand the concepts of Linked Lists, Trees, Graphs, Searching and Sorting.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20103: C PROGRAMMING AND DATA STRUCTURES

Instruction: 4 Periods/week | Time: 3 Hours | Credits: 4

Internal: 25 Marks | External: 75 Marks | Total: 100 Marks

UNIT-I

Introduction to Computers, Algorithm, flowchart, program development steps, Structure of C program, A Simple C program, identifiers, basic data types and sizes, Constants, Variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence and order of evaluation. Control structures such as if, go to, labels, and switch statements. Loops- while, do-while and for statements, break, continue.

UNIT-II

Arrays - declaration, definition, accessing elements, storing elements, Strings and string manipulations, 1- D arrays, 2-D arrays – 2-D and character arrays – Multidimensional arrays.

Functions: basics, parameter passing, storage classes- scope rules, user defined functions, standard library functions, recursive functions, header files, C pre processor.

Pointers: Concepts, initialization of pointer variables, pointers and Function arguments, passing by address –dangling memory, Character pointer s and functions, pointer s to pointer s, pointer s and multidimensional arrays, dynamic memory managements functions, command line arguments.

UNIT-III

Derived types: structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typed of, bit-fields, Input and output – concept of a file, text files and binary files, Formatted I/o, file I/o operations.

Data Structures: Introduction to Data Structures – **Stacks:** Definition, Stack implementation. **Queues:** Definition, Queue implementation and Types of Queues.

UNIT-IV

Linked Lists: Single Linked List-Definition, implementation: Double Linked List- Definition, Implementation. **Trees:** Binary Trees- representation, traversals. **Graphs:** Introduction, representation, Traversals. **Searching:** Linear Searching and Binary Searching. **Sorting**: Bubble Sort, Quick Sort and Merge Sort

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TEXT BOOKS:

1. C and Data Structures: A snapshot oriented treatise using live engineering examples, N B Venkateswarlu, E. V Prasad, S Chand & Co.
2. Let Us C ,YashwantKanetkar, BPB Publications, 5th Edition.
3. Computer science, A structured programming approach using C, B.A. Forouzan and R.F.Gilberg, Third edition, Thomson.

REFERENCE BOOKS:

1. Fundamentals of Data Structures in C , Horowitz, Sahni, Anderson-Freed, 2nd ed, 2008.
2. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/ Pearson.

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MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20103: C PROGRAMMING & DATA STRUCTURES

Time:3Hrs Max Marks: 75

SECTION- A (4 X 15 = 60 M)

Answer ALL Questions

1. a) Define the term Operator. Explain various Operators in C with examples? [15M]

(OR)

b) What is Control Structure? Explain about different types of Control Structures in C with examples. [15M]

2. a) What is an Array? Explain 1 D and 2 D Arrays with examples. [15M]

(OR)

b) Define Function. Explain in detail about the Storage Classes in C with examples. [15M]

3. a) What is Structure? Explain in detail about the declaration, initialization and accessing of Structures with examples? [15M]

(OR)

b) Define Data Structure? Explain the implementation of Stack with an example. [15M]

4. a) Define Graph. Explain in detail about DFS and BFS with examples. [15M]

(OR)

b) Define Searching. Explain Binary Search method with an example. [15M]

SECTION – B (5 X 3 = 15 M)

Answer any FIVE of the following

5. a) Explain briefly about structure of C program.
   b) Write a short note on constants and variables.
   c) Write about Strings in C.
   d) Write about defining and initialization of pointer variables.
   e) Differentiate Structure and Union in C.
   f) Write a short note on File I/O operations.
   g) Explain briefly about Single Linked List?
   h) Write a brief note on Binary Tree traversals.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

Blue print for Theory Semester - End Examinations:

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							75

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester I (First Year) Curriculum

Course Code &Title: MCA-20104 COMPUTER ORGANIZATION **Semester: I** **Course Index: C104**
Course Objectives: The learning objectives of this course are:

Course Objectives
Learn the basics of Digital Logic Circuits and Digital Components.
Learn about the Concepts of Data Representation, Register Transfer and Micro Operations.
Learn the concept of Basic Computer Organization and Design and Central Processing Unit.
Learn about the concept of Input /Output Organization and Memory Organization.

Course Outcomes:
Bythe end ofthe course, the student will be

Course Index	Course Outcomes
C104.1	Understand the basics of Digital Logic Circuits and Digital Components.
C104.2	Understand about the Concepts of Data Representation, Register Transfer and Micro Operations.
C104.3	Understand the concept of Basic Computer Organization and Design and Central Processing Unit.
C104.4	Understand about the concept of Input /Output Organization and Memory Organization.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20104 COMPUTER ORGANIZATION

Instruction: 4 Periods/week | Time: 3 Hours | Credits: 4

Internal: 25 Marks | External: 75 Marks | Total: 100 Marks

UNIT-1

Digital Logic Circuits : Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuit, Flip-flops Sequential Circuits.

Digital Components: Integrated Circuits, Decoders, Multiplexes, Registers ,Shift Registers, counters, Memory Unit.

UNIT-II

Data Representation: Data Types, Complements, Fixed-point Representation, Floating point Representation

Register Transfer and Micro Operations: Register Transfer Language, Register Transfer, Bus and Memory Transfer, Arithmetic Micro Operations, Assembly language Instructions, 8085 Microprocessor Instruction Set Architecture.

UNIT-III

Basic Computer Organization and Design: Instruction Codes, Computer Register, Computer Instructions, Timing and Control, Instruction Cycle memory reference Instructions, Input-Output , Interrupt.

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction formats, addressing modes.

UNIT-IV

Input /Output Organization: Peripherals Devices, I/O Interface, Asynchronous Data Transfer, Mode of Transfer, Priority Interrupt, Direct memory access, Input – Output Processor(IOP).

Memory Organization: Memory Hierarchy, Main memory, Auxiliary Memory, Associate Memory, Cache Memory and Virtual Memory.

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Text Books:

1. Computer System Architecture, M.Morris Mano, Prentice Hall of India Pvt.ltd. Third Edition,Sept. 2008.

Reference Books:

1. Computer Architecture and Organization, William Stallings, PHI Pvt. Ltd. Eastern Economy Edition, Sixth Edition, 2003.
2. Computer System Architecture John P. Hayes.
3. Computer Architecture A Quantitative approach 3rd Edition John L. Hennessy & David A. Patterson Morgan Kufmann (An Imprint of Elseveir)

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MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA 20104: COMPUTER ORGANIZATION

Time:3Hrs Max Marks: 75

SECTION- A (4 X 15 = 60 M)

Answer ALL Questions

1. a) What is Flip-Flop? Explain Various Types of Flip-Flop. [15M]

(OR)

b) Write About De- Multiplexer and Construct a 5x32 decoder. [15M]

2. a) What is Complement. Discuss their types. What is floating point representation. [15M]

(OR)

b) Explain Memory reference instructions in details. [15M]

3. a) Differentiate Instruction Cycle and Interrupt Cycle. Discuss [15M]

(OR)

b) Explain Variants of addressing modes [15M]

4. a) Explain in detail about DMA [15M]

(OR)

b) What is Cache memory. Explain associate memory in detail [15M]

SECTION – B (5 X 3 = 15 M)

Answer any FIVE of the following

5. a) Over flow
   b) Data Selector
   c) Hand Shaking
   d) Interrupt Routine
   e) I/O Interface
   f) ISR
   g) Error Detection code
   h) DMA

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MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

Blue print for Theory Semester - End Examinations:

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							**75**

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M. Kanishlee

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester I (First Year) Curriculum

Course Code &Title: MCA-20105 OPERATING SYSTEMS
Semester: I
Course Index: C105

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn the concept of Introduction to Operating Systems and Process Management.
Learn about Process Synchronization and Deadlocks in detail.
Learn about the concept of Memory Management, File System Implementation, Mass-storage structure.
Learn the concept of Protection and Case Study.

Course Outcomes:
Bythe end ofthe course, the student will be

Course Index	Course Outcomes
C105.1	Understand the concept of Introduction to Operating Systems and Process Management.
C105.2	Understand about Process Synchronization and Deadlocks in detail.
C105.3	Understand about the concept of Memory Management, File System Implementation, Mass-storage structure.
C105.4	Understand the concept of Protection and Case Study.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20105 OPERATING SYSTEMS

Instruction: 4 Periods/week	Time: 3 Hours	Credits: 4
Internal: 25 Marks	External: 75 Marks	Total: 100 Marks

UNIT I

Introduction: Definition of Operating System, Types Of Operating Systems, Operating System Structures, Operating-System Services, System Calls, Virtual Machines, Operating System Design and Implementation.

Process Management: Process Concepts, Operations on Processes, Cooperating Processes, Threads, Inter Process Communication, Process Scheduling, Scheduling Algorithms, Multiple - Processor Scheduling. Thread Scheduling.

UNIT II

Process Synchronization: The Critical Section Problem, Semaphores, And Classical Problems of Synchronization, Critical Regions.

Deadlocks: Principles of Deadlocks, System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Avoidance, Detection & Recovery from Deadlocks.

UNIT III

Memory Management: Logical Versus Physical Address, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Thrashing

File System Implementation: Concept of a file, Access Methods, Directory Structure, File System Structure, Allocation Methods, Free Space Management, Directory Management, Device Drivers.

Mass-storage structure: overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, swap-space management.

UNIT IV

Protection: Goals and Principles of Protection, Access matrix implementation, Access control, Revocation of access rights.

Text Book:

1. Operating System Principles by Abraham Silberschatz, Peter Galvin, Greg Gagne. Seventh Edition, Wiley Publication.

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Reference Books:

1. Operating Systems, William Stallings 5th Edition – PHI
2. Modern Operating Systems, Andrew S.Tanenbaum, , 2nd edition, 1995, PHI.
3. Operating Systems - A concept based approach, Dhamdhere, 2nd Edition, TMH, 2006.
4. Understanding the Linux Kernel, Daniel P Bovet and Marco Cesati, 3rd Edition,' Reilly, 2005.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA 20105: OPERATING SYSTEM

Time:3Hrs Max Marks: 75

SECTION- A (4 X 15 = 60 M)

Answer ALL Questions

1. Write short note on
   a) i)Mainframe Systems ii) Multiprocessor Systems iii)Distributed Systems iv) Real Time Systems v) Functions of OS [5*3=15M]

   (OR)

   b) Compare and Construct preemptive and non-preemtive scheduling algorithms. [15M]

2. a) i) Write short notes on System calls. ii) Explain System Structure. [8+7M]

   (OR)

   b) Write a short noteon Demand Paging and Segmentation. [15M]

3. a) Describe protections concepts and mechanisms provided by an operating system. [15M]

   (OR)

   b) Differentiate Paged Segmentation and Demand Paging. [15M]

4. a) i) Explain Inter process Communications.
   ii) Write short notes on communication in Client-Server Systems [9+6M]

   (OR)

   b) i) Explain various Page Replacement Algorithms.
   ii) Write a short note on Disk Management and Disk Scheduling. [8+7M]

SECTION – B (5 X 3 = 15 M)

Answer any FIVE of the following

5.
a) Paging
b) Methods for Handling Deadlocks
c) Directory Structure
d) User Authentication
e) Threads
f) Spooling
g) Aging
h) Response Time.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

Blue print for Theory Semester - End Examinations:

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							75

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester I (First Year) Curriculum

Course Code &Title: MCA-20106 DESIGN AND ANALYSIS OF ALGORITHMS **Semester: I** **Course Index: C106**	
Course Objectives: The learning objectives of this course are:	
Course Objectives	
To learn about the Asymptotic Notations, Mathematical Analysis of Non-recursive and recursive Algorithms and sorting techniques.	
To learn about the Divide-and-Conquer technique, Decrease-and-Conquer and Transform-and-Conquer techniques.	
To learn about the Dynamic Programming and Greedy Technique	
To learn about the Decision Trees, P, NP and NP- complete problems, Backtracking, Branch-and-Bound, Approximation Algorithms for NP-hard Problems.	
Course Outcomes: By the end of the course, the student will be	
C106.1	Understand about the Asymptotic Notations, Mathematical Analysis of Non-recursive and recursive Algorithms and Selection Sort and Bubble sort, Sequential Search and Exhaustive Search.
C106.2	Understand about the Divide-and-Conquer technique, Decrease-and-Conquer and Transform-and-Conquer techniques.
C106.3	Understand the Optimal Binary Search Trees, The Knapsack Problem Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm.
C106.4	Understand about the Decision Trees, P, NP and NP- complete problems, Backtracking, Branch-and-Bound, Approximation Algorithms for NP-hard Problems.

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Chairman
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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20106 DESIGN AND ANALYSIS OF ALGORITHMS

Instruction: 4 Periods/week | Time: 3 Hours | Credits: 4

Internal: 25 Marks | External: 75 Marks | Total: 100 Marks

UNIT I

Introduction: Fundamentals of algorithmic problem solving, important problem types, Fundamental data structures.

Fundamentals of analysis of algorithms and efficiency: Analysis framework, Asymptotic Notations and Basic Efficiency classes, Mathematical Analysis of Non-recursive Algorithms, Mathematical Analysis of recursive Algorithms, Empirical Analysis of Algorithms, Algorithm Visualization

Brute Force: Selection Sort and Bubble sort, Sequential Search and Exhaustive Search.

UNIT II

Divide-and-Conquer: Merge Sort, Quick sort, Binary Search, Binary Tree Traversals and Related Properties.

Decrease-and-Conquer: Insertion Sort, Depth-First Search and Breadth-First Search Topological Sorting, Decrease-by-a-Constant-Factor Algorithms, Variable-Size-Decrease Algorithms.

Transform-and-Conquer: Presorting, Balanced Search Trees, Heaps and Heap sort, Problem Reduction.

UNIT III

Space and Time Tradeoffs: Sorting by Counting, Hashing, B-Trees.

Dynamic Programming: Warshall's and Floyd's Algorithm, Optimal Binary Search Trees, The Knapsack Problem and Memory Functions.

Greedy Technique: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees

UNIT IV

Limitations of Algorithm Power: Lower-Bound Arguments, Decision Trees, P, NP and NPcomplete problems.

Coping with the Limitations of Algorithms Power: Backtracking, Branch-and-Bound, Approximation Algorithms for NP-hard Problems.

Text Book: 1. Introduction to Design & Analysis of Algorithms by Anany Levitin, Pearson Education, New Delhi, 2003

Reference Books:

1. Introduction to Algorithms by Thomas H. Corman, Charles E. Leiserson, Ron ald R. Rivest& Clifford Stein, Prentice Hall of India, NewDelhi.
2. The Design and Analysis of computer Algorithms, Aho, Hopcroft & Ullman, Pearson Education, New Delhi, 2003
3. Fundamentals of algorithmics, Gilles Brassard & Paul Bratley, Prentice Hall of India.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA 20106: DESIGN AND ANALYSIS OF ALGORITHMS

Time:3Hrs Max Marks: 75

SECTION – A (4X15=60 Marks)

Answer ALL Questions

1. a) Define Algorithm. Explain fundamentals of Algorithmic problem solving. [15M]

(OR)

b) Define space and time complexity. Explain different types of Asymptotic notations. [15M]

2. a) Explain divide and conquer solution for quick sort. Illustrate with examples. [15M]

(OR)

b) Explain DFS and BFS search using decrease and conquer technique with examples [15M]

3. a) Explain Floyd's algorithm for all-pairs shortest path problem with an example. [15M]

(OR)

b) Explain Greedy method .Discuss Krushkal's algorithm for minimum spanning tree. [15M]

4. a) Explain NP-Complete and NP-Hard problems. [15M]

(OR)

b) Explain n-queen problem using backtracking technique. [15M]

SECTION – B (5X3=15 Marks)

Answer any FIVE of the following

5. a) Analysis of recursive algorithm.
   b) Selection Sort
   c) Binary search algorithm
   d) Dijkstra's algorithm.
   e) Decision tree.
   f) Hamiltonian circuit problem.
   g) Big O notation
   h) Define Branch and bound

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

Blue print for Theory Semester - End Examinations:

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							75

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester I (First Year) Curriculum

Course Code &Title: MCA-20107 C PROGRAMMING AND DATA STRUCTURES LAB
Semester: I
Course Index: C107

Course Objectives: The learning objectives of this course are:

Course Objectives
Learn how to write code for different types of programs using C Programming.
Learn how to write code programs of Data Structures.
Learn how to write/code and own programs using C Programming.

Course Outcomes:
Bythe end of the course, the student will be

Course Index	Course Outcomes
C107.1	Able to write code for different types of programs using C Programming.
C107.2	Able to write code programs of Data Structures.
C107.3	The students are able to write/code and own programs using C Programming.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20107: C PROGRAMMING AND DATA STRUCTURES LAB

Practical: 3 Periods /week	Time: 3 Hours	Credits: 2
Internal: 50 Marks	External: 50 Marks	Total: 100 Marks

1. Write a C program to read x, y coordinates of 3 points and then calculate the area of a triangle formed by them and print the coordinates of the three points and the area of the triangle. What will be the output from your program if the three given points are in a straight line.
2. Write a C program which generates 100 random numbers in the range of 1 to 100. Store them in an array and then print the array. Write 3 versions of the program using different loop constructs (eg. for, while and do-while).
3. Write a program which determines the largest and the smallest number that can be stored in different data types like short, int, long, float and double. What happens when you add 1 to the largest possible integer number that can be stored?
4. Write a C program which generates 100 random real numbers in the range of 10.0 to 20.0 and sort them in descending order.
5. Write a C function for transporting a square matrix in place (in place means that you are not allowed to have full temporary matrix).
6. Write a C function which will invert a matrix.
7. Write a set of string manipulation functions eg. for getting a sub-string from a given position, copying one string to another, reversing a string and adding one string to another.
8. Write a C program for sorting a list using Bubble sort and then apply binary search.
9. Write a C program to implement the operations on stacks.
10. Write a C program to implement the operations on circular queues.
11. Write a C program for the representation of polynomials using circular linked list and for the addition of two such polynomials.
12. Write a C program for quick sort.
13. Write a C program for Merge sort.
14. Write a C program to create a binary search tree and for implementing the in order, preorder, Post order traversal using recursion.
15. Write a C program for finding the Depth First Search of a graph.
16. Write a C program for finding the Breadth First Search of a graph.

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REFERENCE BOOKS:

1. Let Us C ,YashwantKanetkar, BPB Publications, 5th Edition.
2. Computer Science, A structured programming approach using C", B.A.Forouzan and R.F.Gilberg, " 3rd Edition, Thomson, 2007.
3. The C –Programming Language' B.W. Kernighan, Dennis M. Ritchie, PHI
4. Data Structures and Algorithms, 2008,G.A.V.Pai, TMH
5. Classic Data Structures, 2/e, Debasis ,Samanta,PHI,2009
6. Fundamentals of Data Structure in C, 2/e, Horowitz,Sahni, Anderson Freed,University

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M. Kanishka

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester I (First Year) Curriculum

Course Code &Title: MCA-20108 OPERATING SYSTEMS AND COMPUTER ORGANIZATION LAB

Semester: I
Course Index: C108

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn how to write code in UNIX operating system using some basic commands.
Learn how to write code some basic programs using Shell Programming.
Learn how to write/code different types of algorithms using C/C++/JAVA.
Learn how to do Digital Logic Design Experiments
Learn how to do 8085/86AssemblyLanguage Programs

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C108.1	The students able to write code in UNIX operating system using some basic commands.
C108.2	The students able to write code some basic programs using Shell Programming.
C108.3	The students are able to write/code different types of algorithms using C/C++/JAVA.
C108.4	The students able to do Digital Logic Design Experiments
C108.5	The students able to write 8085/86AssemblyLanguage Programs

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B Bhavya.

K. Padma

M. Kamesh Rao

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20108 OPERATING SYSTEMS AND COMPUTER ORGANIZATION LAB

Practical: 3 Periods /week | Time: 3 Hours | Credits: 2

Internal: 50 Marks | External: 50 Marks | Total: 100 Marks

OPERATING SYSTEMS LAB

1. Basic UNIX commands

Implement the following using Shell Programming

2. Input number even or odd.
3. Count the number of lines in the input text.

Implement the following using C/C++/JAVA

4. FCFS CPU scheduling algorithm.
5. SJF CPU scheduling algorithm.
6. Round Robin CPU scheduling algorithm.
7. Priority CPU scheduling algorithm.
8. Implement Semaphores.

REFERENCE BOOKS:

1. Operating System Principles by Abraham Silberschatz, Peter Galvin, Greg Gagne. SeventhEdition, Wiley Publication
2. Understanding the Linux Kernel, Daniel P Bovet and Marco Cesati, 3rd Edition, Reilly, 2005.
3. Unix programming, Stevens, Pearson Education.
4. Shell programming, Yashwanth Kanetkar.

COMPUTER ORGANIZATION LAB

Digital Logic Design Experiments

1. TTL Characteristics and TTL IC Gates
2. Multiplexers & Decoders
3. Flip-Flops
4. Counters
5. Binary Adders & Subtractors

8085/86AssemblyLanguageProgramming:

1. Addition of two 8 bit numbers.
2. Addition of two 16 bit numbers.
3. Sum of series of 8 bit numbers.
4. Subtraction of two 8 bit numbers.
5. Largest number in an array.

REFERENCE BOOKS:

1. Computer System Architecture: Morris Mano.
2. Advanced Micro Processor and Peripherals - Hall/ A K Ray.
3. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
4. Structured Computer Organization and Design - Andrew S. Tanenbaum, 4th EditionPHI/Pearson.

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester I (First Year) Curriculum

Course &Title: MCA-20109 BRIDGE COURSE (FUNDAMENTALS OF COMPUTERS) (For General B.Sc/B.A./B.Com Students) Course Index: C109
Course Objectives: The learning objectives of this course are:

Course Objectives
Explain the concepts of computers and classify based on type and generation
Demonstrate the techniques of writing algorithms pseudo codes & schematic flow of logic in software development process.
Teach about Operating Systems and its concepts.
Teach about the purpose of networks and types of networks and media to connect the computers and learn about introduction to internet and email

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C109.1	Explain the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming
C109.2	Able to develop techniques of writing algorithms pseudo codes and logic
C109.3	Summarize the concepts of Operating Systems
C109.4	Recognize the Computer networks, types of networks and topologies, network devices and get introduction to internet and email.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20109: BRIDGE COURSE (FUNDAMENTALS OF COMPUTERS)

(For General B.Sc/B.A./B.Com Students)

Instruction: 4 Periods/week | Time: 3 Hours | Credits: 4

Internal: 25 Marks | External: 75 Marks | Total: 100 Marks

UNIT - I

Introduction to Computers: History of Computers, Central processing unit, Characteristics and limitations of computer, Types of Computers, Types of memories. Block diagram of Computer, Peripheral Devices: Input, Output and storage, Input devices, Output devices, Secondary devices, Communication between the CPU and Input/ Output devices. Software: Types of software. Number Systems (Binary, Octal, Hexadecimal).

UNIT- II

Operating System: Introduction to OS, Types of OS, Functions of OS, Evolution of Operating Systems - Simple Batch, Multi programmed, time-shared, Parallel, Distributed Systems, Real- Time Systems. MSDOS Internal Commands: chdir, cls, path, prompt, label, ver, vol, echo, set. External Commands: scandisk, discopy, diskcomp, format, backup, restore, Operating System installation steps.

MS-Office Tools (Word, Excel & PowerPoint): Introduction of Word Processing, MSWord: Creating, Editing, printing, page formatting, inserting tables, pictures, Mail Merge. MS Excel: Introduction to spreadsheet, creating, formatting, printing, usage of formulae, Graphs of worksheets. MS PowerPoint: Creating a presentation with designs and animations.

UNIT - III

Computer Networks: Introduction to computer Networks, Network topologies -Bus topology, startopology, Ring topology, Mesh topology, Hybrid topology. Types of Networks: Local area Network, Wide Area Networks, Metropolitan Networks, Campus/ Corporate Area Network, Personal Area Network. Network Devices: Hub, Repeater, Switch, Bridge, Router, Gateway, Network interface Card.

Introduction to Internet: Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails. Web Browsers, Searching and Surfing, Creating an E-Mail account,sending and receiving E-Mails.

UNIT- IV

Problem Solving and Programming: Algorithm development, Flowcharts, Looping, some-programming features, Pseudo code, Structured Programming concepts.

Programming Languages: Machine Language and assembly language, high-level and low level languages, Assemblers, Compilers and Interpreters.

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TEXT BOOKS:

1. An Introduction to Computer studies –Noel Kalicharan-Cambridge.
2. Fundamentals of Computers –ReemaThareja-Oxford higher education.
3. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley.
4. Computer Networks: Tannenbaum.

REFERENCE BOOKS:

1. Peter Norton_s, Introduction to Computers, Tata McGraw Hill.
2. Computer Fundamentals, Anita Goel, Pearson Education, 2017.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20109: BRIDGE COURSE (FUNDAMENTALS OF COMPUTERS)
(For General B.Sc/B.A./B.Com Students)

Time:3 Hrs. Max Marks: 75

SECTION- A (4 X 15 = 60 M)

Answer ALL Questions

1. a) Draw the Block Diagram of Computer and explain the functioning of Computer units. [15M]

(OR)

b) Convert the decimal number $(985647)_{10}$ in to Binary, Octal and Hexadecimal Systems. [15M]

2. a) Explain about different types of Operating Systems. [15M]

(OR)

b) Explain about the process of Mail Merge in MS Word with example [15M]

3. a) Explain about types of Network Topologies. [15M]

(OR)

b) Explain about Email management. [15M]

4. a) Explain about algorithm and flowchart with examples. [15M]

(OR)

b) Explain about Assemblers, Compilers and Interpreters. [15M]

SECTION – B (5 X 3 = 15 M)

Answer any FIVE of the following

5. a) Types of Memories.
   b) Functions of Operating System
   c) Define any three network devices
   d) Types of Programming Languages
   e) Types of Software
   f) What are the effects in Custom Animation
   g) Types of networks
   h) Programming Features

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

Blue print for Theory Semester - End Examinations:

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							75

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester I (First Year) Curriculum

Course & Title: MCA-20110 BRIDGE COURSE LAB (FUNDAMENTALS OF COMPUTERS LAB) (For General B.Sc/B.A./B.Com Students) Course Index: C110
Course Objectives: The learning objectives of this course are:
Course Objectives
Learn about the internal parts of a computer, peripherals, I/O ports, connecting cables
Learn how to install Operating System, Demonstrate basic command line interface commands on MSDOS
Learn about Internet, Browsing, Email
Demonstrate Office Tools such as Word processors, Spreadsheets and Presentation tools
Writing Algorithms, Flow Charts for simple programs in C
Course Outcomes: By the end of the course, the student will be

Course Index	Course Outcomes
C110.1	Understand about the internal parts of a computer, peripherals, I/O ports, connectingcables
C110.2	Able to install Operating System, able to write basic command line interfacecommands on MSDOS
C110.3	Know about Internet, Browsing, Email
C110.4	Able to work on Office Tools such as Word processors, Spreadsheets andPresentation tools
C110.5	Able to Write Algorithms, Flow Charts for simple programs in C

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER I

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20110: BRIDGE COURSE LAB (FUNDAMENTALS OF COMPUTERS LAB)

(For General B.Sc/B.A./B.Com Students)

Practical: 3 Periods /week	Time: 3 Hours	Credits: 2
Internal: 50 Marks	External: 50 Marks	Total: 100 Marks

Computer Hardware:

Experiment 1: Identification of peripherals of a PC, Laptop, Server and Smart Phones

Experiment 2: Prepare a report containing the block diagram along with the configuration of each component and its functionality, Input/ Output devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, networking components and speeds.

Operating Systems:

Experiment 3: Operating System installation: Installing an Operating System such as Windows on Computer hardware.

Experiment 4: MSDOS Operating System Internal Commands: chdir, cls, path, prompt, label,ver,vol, echo, set.

Experiment 5: MSDOS Operating System External Commands: scandisk, discopy, diskcomp,format, backup, restore

Introduction of Internet:

Experiment 6: Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails.

Office Tools:

Experiment 7: Office Tools: Demonstration and practice on Microsoft

Word.Experiment 8: Demonstration and practice on Microsoft Excel.

Experiment 9: Demonstration and practice on Power Point.

Introduction to Programming:

Experiment 10: Write simple C Programs with Algorithms and Flow Charts.

TEXT BOOKS:

1. Computer Fundamentals, Anita Goel, Pearson Education, 2017
2. PC Hardware Trouble Shooting Made Easy, TMH
3. C & Data Structures (A practical approach) - by G.S. Baluja and G.K.baluja,Dhanapatrai& Co publishers.

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester II (First Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
MCA-20201	Computer Networks	75	25	100	4	-	4
MCA-20202	Object Oriented Programming through JAVA	75	25	100	4	-	4
MCA-20203	Database Management Systems	75	25	100	4	-	4
MCA-20204	Formal Languages and Automata Theory	75	25	100	4	-	4
MCA-20205	Data Mining Concepts and Techniques	75	25	100	4	-	4
MCA-20206	Elective-I 1. Artificial Intelligence and Expert Systems 2.Internet of Things 3.Image Processing	75	25	100	4	-	4
MCA-20207	Object Oriented Programming through JAVA Lab	50	50	100	-	3	2
MCA-20208	Database Management Systems Lab	50	50	100	-	3	2
MCA-20209	Skill Development Course with Python	50	50	50	1	2	2
	Total Credits						30

Note:2 lab Hrs and 1 Theory Hrs/Week or 2 Theory Hrs/ Week for Skill Development Course and only Lab Exam will be conducted.

Summer Internship (Mandatory) after First Year (to be evaluated during IIIsemester).

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester II (First Year) Curriculum

Course Code &Title: MCA-20201 COMPUTER NETWORKS **Semester: II** **Course Index: C201**	
Course Objectives: The learning objectives of this course are:	
Course Objectives	
To learn about the basics of computer networks and Data Communication.	
To learn about Data Link Layer, IEEE Standards, design issues in networks.	
To learn about Internet Transport Protocols and different types of protocols.	
To learn about various types of Network Devices and different types of Networks	
Course Outcomes: Bythe end of the course, the student will be	
C201.1	Understand the basics of computer networks and Data Communication.
C201.2	Understand about Data Link Layer, IEEE Standards, design issues in networks.
C201.3	Understand Internet Transport Protocols and different types of protocols.
C201.4	Overview of various types of Network Devices and different types of Networks

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER II

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20201 COMPUTER NETWORKS

Instruction: 4 Periods/week | Time: 3 Hours | Credits: 4

Internal: 25 Marks | External: 75 Marks | Total: 100 Marks

UNIT I

Introduction to Computer Networks: Introduction, Network Hardware, Network Software, Reference Models, Data Communication Services & Network Examples, Internet Based Applications.

Data Communications: Transmission Media, Multiplexing, Switching, Transmission in ISDN, Broad Band ISDN, ATM Networks

UNIT II

Data Link Control, Error Detection & Correction, Sliding Window Protocols

Design Issues in Networks: Routing Algorithms, Congestion Control Algorithms, Network Layer in the Internet, IP Protocol, IP Address, Subnets, and Internetworking.

UNIT III

Internet Transport Protocols: Transport Service, Elements of Transport Protocols, TCP and UDP Protocols, Quality of Service Model, Best Effort Model, Network Performance Issues.

Over View of DNS, SNMP, Electronic Mail, FTP, HTTP Protocols, World Wide Web.

UNIT IV

Network Devices: Over View of Repeaters, Bridges, Routers, Gateways, Multiprotocol Routers, Brouters, Hubs, Switches, Modems, Channel Service Unit CSU, Data Service Units DSU, NIC, Wireless Access Points, Transceivers, Firewalls, Proxies.

Overview of Cellular Networks, Ad-hoc Networks, Mobile Ad-hoc Networks, Sensor Networks

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Text Books:

1. Computer Networks, Andrews S Tanenbaum, Edition 5, PHI, ISBN: -81-203-1165-5
2. Data Communications and Networking, Behrouz A Forouzan, Tata McGraw-Hill Co Ltd, Second Edition

Reference Books:

1. . Computer networks, Mayank Dave,Cengage.
2. Computer Networks, A System Approach, 5th ed, Larry L Peterson and Bruce S Davie,Elsevier.
3. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
4. Understanding Communications and Networks, 3rd Edition, W.A. Shay, Thomson.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER II

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20201 COMPUTER NETWORKS

Time:3Hrs Max Marks: 75

SECTION – A (4X15=60 Marks)

Answer ALL Questions

1. a) With a neat block diagram explain the TCP/IP reference model. List out the limitations of the model. [15M]

(OR)

b) What are the functions of the physical layer?

c) Give the physical description, characteristics, and uses of all the guide transmission media. [5+10M]

2. a) Explain Sliding Window Protocol

b) Differentiate Error detection and Correction Codes [8+7M]

(OR)

c) Explain Link State Routing Protocol

d) What are the methods of congestion control in datagram subnets [10+5M]

3. a) what is TCP protocol? How is connection management done by TCP?

b) Explain how TCP controls congestion [8+7M]

(OR)

c) Explain SMTP and MIME [15M]

4. a) Compare the different network devices [15M]

(OR)

b) Write brief notes on Mobile Ad-hoc Networks and Sensor networks [15M]

SECTION – B (5 X 3=15 Marks)

Answer any FIVE Questions

5. a) Explain Frequency Division Multiplexing

b) Give the format of IPv4 header

c) Difference between TCP and UDP

d) Short Notes on Firewalls

e) SNMP

f) Wireless Access Points

g) BRouter

h) Email

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER II

(W.e.f. 2020 – 2021 Admitted Batch)

Blue print for Theory Semester - End Examinations:

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							75

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester II (First Year) Curriculum

Course Code & Title: MCA-20202 Object Oriented Programming through JAVA Semester: II Course Index: C202	
Course Objectives: The learning objectives of this course are:	
Course Objectives	
Learn Introduction to OOP and concept of Inheritance.	
Learn about Interfaces, Packages and Enumeration, Exceptions & Assertions.	
Learn about MultiThreading and Applets.	
Learn the concept of Event Handling and Abstract Window Toolkit.	
Course Outcomes: Bythe end of the course, the student will be	
Course Index	**Course Outcomes**
C202.1	Understand Introduction to OOP and concept of Inheritance.
C202.2	Understand about Interfaces, Packages and Enumeration, Exceptions & Assertions.
C202.3	Understand about MultiThreading and Applets.
C202.4	Understand the concept of Event Handling and Abstract Window Toolkit.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER II

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20202 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Instruction: 4 Periods/week	Time: 3 Hours	Credits: 4
Internal: 25 Marks	External: 75 Marks	Total: 100 Marks

UNIT I

Introduction to OOP : Introduction, Principles of Object Oriented Languages, Applications of OOP, Programming Constructs: Variables, Primitive Datatypes, Identifiers- Naming Coventions, Keywords, Literals, Operators-Binary, Unary and ternary, Expressions, Precedence rules and Associativity, Primitive TypeConversion and Casting, Flow of control-Branching, Conditional, loops. Classes and Objects- classes, Objects, Creating Objects, Methods, Constructors,Constructor Overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments.

Inheritance: Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class.

UNIT II

Interfaces, Packages and Enumeration: Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages, using Packages, Access protection, java.lang package. **Exceptions & Assertions** – Introduction, Exception handling techniques- try… catch, throw, throws, finally block, user defined exception, Exception Encapsulation and Enrichment, Assertions.

UNIT III

MultiThreading: java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading- Using isAlive () and join (), Syncronization, suspending and Resuming threads, Communication between Threads Input/Output: reading and writing data, java.io package, **Applets**– Applet class, Applet structure, An Example Applet Program, Applet : Life Cycle, paint(), update() and repaint(),

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UNIT IV

Event Handling -Introduction, Event Delegation Model, java.awt.event Description, Sources ofEvents, Event Listeners, Adapter classes, Inner classes.

Abstract Window Toolkit :Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar, Swing: Introduction, JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScroll Pane, Split Pane, JTabbedPane, Dialog Box Pluggable Look and Feel.

Text Books:

1. The Complete Refernce Java, 8ed, Herbert Schildt, TMH
2. Programming in JAVA, Sachin Malhotra, Saurabh choudhary, Oxford.

References:

1. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.\
2. Introduction to Java rogramming, 7th ed, Y Daniel Liang, Pearson.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER II

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20202 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Time:3Hrs Max Marks: 75

SECTION- A (4 X 15 = 60 M)

Answer ALL Questions

1. a) Explain about Principles of Object Oriented Languages? [15M]

(OR)

b) What is inheritance? Explain about types of inheritance in java with examples [15M]

2. a) Define an interface. How to create interfaces? When they are implemented and extended?Explain with examples. [15M]

(OR)

b) What is an Exception? Explain in detail about Exception handling techniques? [15M]

3. a) Explain the concept ofthread in detail? [15M]

(OR)

b) What is an Applet? Discuss about Applet Life Cycle? [15M]

4. a) Explain about the delegation event model with Event Listeners. [15M]

(OR)

b) What are the limitations of AWT? Discuss about the classes of check boxes, Radio buttons, Combo boxes with examples. [15M]

SECTION – B (5 X 3 = 15 M)

Answer any FIVE of the following

5. a) Write a short note on Classes and Objects.
   b) Explain briefly about Constructors in Java programming.
   c) Write a short note on packages.
   d) What is the difference between error and an exception?
   e) What is synchronization and why is it important?
   f) Write about Applet Structure.
   g) What is an adapter class? Explain with an example.
   h) Differentiate JApplet, JFrame and JComponent.

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MCA I YEAR SEMESTER II

(W.e.f. 2020 – 2021 Admitted Batch)

Blue print for Theory Semester - End Examinations:

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							**75**

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester II (First Year) Curriculum

Course Code &Title: MCA-20203 DATABASE MANAGEMENT SYSTEMS **Semester: II** **Course Index: C203**	
Course Objectives: The learning objectives of this course are:	
Course Objectives	
To learn about the Introduction of Database System, Data Modeling Using the Entity-Relationship Model	
To learn about Relational Data Model and Relational Database Constraints, Relational Algebra and Relational Calculus, Schema Definition, Basic Constraints and Queries	
To learn about Relational Database Design, Indexing Structures for files	
To learn about Transaction Processing, Concurrency Control Techniques	
Course Outcomes: Bythe end of the course, the student will be	
C203.1	Able to understand the Introduction of Database System, Data Modeling Using the Entity-Relationship Model
C203.2	Able to understand Relational Data Model and Relational Database Constraints, Relational Algebra and Relational Calculus, Schema Definition, Basic Constraints and Queries
C203.3	Able to understand Relational Database Design, Indexing Structures for files
C203.4	Able to understand Transaction Processing, Concurrency Control Techniques

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER II

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20203 DATABASE MANAGEMENT SYSTEMS

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

Introduction to Database and Database Users: Introduction, An Example, Characteristics of the Database Approach, Applications of DBMS, Actors on Scene, Workers behind the scene, Advantages of Using the DBMS Approach, Data models, schemas, and instances, three-schemas architecture and data independence, database languages and interfaces, the database system environment, Centralized and client/server architectures for DBMSs, Classification of database management system.

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model, Weak entity types ,Conceptual Design for Large Enterprises,.

Relational data model and relational database constraints: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity Constraints, Querying Relational Data, Logical Database Design: ER to Relational.

UNIT II

Relational Algebra and Relational Calculus: Unary Relational operations, Relational Algebra operations, Binary Relational operation, Additional Relational operation, Examples of Queries in Relational Algebra, Tuple and Domain Relational Calculus.

Schema Definition, Basic Constraints and Queries: SQL Data definition, Specifying basic constraints in SQL, Schema change Statements in SQL, Basic queries in SQL, More complex SQL queries, INSERT DELETE UPDATE queries in SQL, Views in SQL, Data base stored Procedures

UNIT III

Relational Database Design: Informal design Guide lines for Relation Schema, Functional Dependences, Normal forms based on Primary keys, General definitions of Second and Third Normal form, BOYCE-CODE Normal form, Algorithm for Relational database schema design, Multi-valued dependencies and fourth Normal forms,

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UNIT IV

Algorithm for query processing and Optimization: Translating SQL Queries into Relational Algebra, Algorithms for SELECT and JOIN Operations, Algorithms for PROJECT and SET Operations.

Introduction to Transaction Processing Concepts and Theory: Transaction Concept, A Simple Transaction Model, Storage Structure, ACID Properties, Serializability, Transaction Isolation Levels, Concurrency Control, Lock-Based Protocols, Validation-Based Protocols.

Text Book:

1. Fundamentals of Database System, Elmasri, Navathe, Pearson Education.

References Books:

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw- Hill.

2. Database Concepts, Abraham Silberschatz, Henry F Korth, S Sudarshan, McGraw-Hill

Additional Inputs:

Introduction, An Example, Characteristics of the Database Approach, Applications of DBMS, Actors on Scene, Workers behind the scene, Advantages of Using the DBMS Approach,

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER II

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20203: DATABASE MANAGEMENT SYSTEMS

Time:3Hrs Max Marks: 75

SECTION- A (4 X 15 = 60 M)

Answer ALL Questions

1. a) Write a brief note on advantages and applications of DBMS [8M]
   b) Briefly explain about Three-Schema Architecture with neat diagram [7M]

   (OR)

   c) Briefly discuss about Database System Environment with neat diagram [15M]

2. a) Explain in detail about various keyconstraints used in database system with examples [10M]
   b) Explain about Relational Algebra Set Operations with examples [5M]

   (OR)

   c) Explain in detail about Tuple and Domain Relational Calculus with examples [15M]

3. a) Explain about informal design guide line 1 for relation schema and functional dependences with example [15M]

   (OR)

   b) What is Normalization? Briefly explain the types of normal forms with an example [15M]

4. a) What is Serializability? Briefly explain the different types of Serializability [15M]

   (OR)

   b) Briefly explain the following Concurrency Control Techniques
      i) Two Phase Locking Protocol [8M]
      ii) Validation Concurrency Control [7M]

SECTION – B (5 X 3 = 15 M)

Answer any FIVE of the following

5. a) Define DBMS, Schema, Instance. What is weak entity? Explain with example
   b) What is Data Independence? Specify the classificationb) Liquidity ratios
   c) Give a brief note on Insert, Delete, and Update Queries in SQL with examples
   d) What is View in SQL? Create a view and perform DML operations on it
   e) What is Transaction? Discuss Characteristics of Transaction
   f) Indexes in SQL
   g) Lock Compatibility
   h) Define Distributed Transactions.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER II

(W.e.f. 2020 – 2021 Admitted Batch)

Blue print for Theory Semester - End Examinations:

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							**75**

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester II (First Year) Curriculum

Course Code & Title: MCA-20204 FORMAL LANGUAGES & AUTOMATA THEORY **Semester: II** **Course Index: C204**
Course Objectives: The learning objectives of this course are:
Course Objectives
Learn the concept of Finite Automata and Regular Expressions, Regular sets &Regular Grammars.
Learn the concept of Context Free Grammars and Languages, Push down Automata
Learn about Turing Machines, Universal Turing Machines and Undecidability in detail.
Learn the concept of The Propositional calculus and The Predicate calculus.
Course Outcomes: By the end of the course, the student will be

Course Index	Course Outcomes
C204.1	Understand the concept of Finite Automata and Regular Expressions, Regular sets &Regular Grammars.
C204.2	Understand the concept of Context Free Grammars and Languages, Push down Automata
C204.3	Understand about Turing Machines, Universal Turing Machines and Undecidability in detail.
C204.4	Understand the concept of The Propositional calculus and The Predicate calculus.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA I YEAR SEMESTER II

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20204 FORMAL LANGUAGES & AUTOMATA THEORY

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT-I

Finite Automata and Regular Expressions: Basic Concepts of Finite State Systems, Chomsky Hierarchy of Languages, Deterministic and Non-Deterministic Finite Automata, Finite Automata with ϵ-moves, Regular Expressions.

Regular sets &Regular Grammars: Basic Definitions of Formal Languages and Grammars, Regular Sets and Regular Grammars, Closure Properties of Regular Sets, Pumping Lemma for Regular Sets, Decision Algorithm for Regular Sets.

UNIT-II

Context Free Grammars and Languages: Context Free Grammars and Languages, Derivation Trees, simplification of Context Free Grammars, Pumping Lemma for CFL, Closure properties of CFL's.

Push down Automata: Informal Description, Definitions, Push-Down Automata and Context free Languages, Parsing and Push-Down Automata.

UNIT-III

Turing Machines: The Definition of Turing Machine, Design and Techniques for Construction of Turing Machines, Combining Turing Machines.

Universal Turing Machines and Undecidability: Universal Turing Machines. The Halting Problem, Decidable & Undecidable Problems - Post Correspondence Problem.

UNIT-IV

The Propositional calculus: The Prepositional Calculus : Introduction – Syntax of the Prepositional Calculus – Truth-Assignments – Validity and Satisfiability – Equivalence and Normal Forms – resolution in Prepositional Calculus.

The Predicate calculus: Syntax of the Predicate Calculate Calculus – Structures and Satisfiability – Equivalence – Un-solvability.

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester III (Second Year) Curriculum

Course Code &Title: MCA-20301 INFORMATION SECURITY AND CRYPTOGRAPHY
Semester: III
Course Index: C301

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the security approaches and techniques, Introduction to number theory
To learn about Symmetric key and Asymmetric key cryptographic algorithms
To learn about User Authentication Mechanisms ,System security
To learn about Internet Security Protocols and Network Security

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C301.1	Able to understand the security approaches and techniques, Introduction to number theory
C301.2	Able to Symmetric key and Asymmetric key cryptographic algorithms
C301.3	Able to understand the User Authentication Mechanisms ,System security
C301.4	Able to understand the Internet Security Protocols and Network Security

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20301 INFORMATION SECURITY AND CRYPTOGRAPHY

Instruction:4Periods/week **Time: 3Hours** **Credits:4**

Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

Introduction: The need for security-security approaches-principles of security-Plain Text and Cipher Text-substitution and Transposition Techniques-Encryption and Decryption-Symmetric and Asymmetric Cryptography-Stenography-key range and key size-types of attacks.

Conventional Encryption and Message Confidentiality: Conventional Encryption Principles, Conventional Encryption Algorithms, Cipher Block Modes of Operation and Key Distribution.

UNIT II

Symmetric Key Cryptographic Algorithms: Algorithm types and modes-overview ofsymmetric key cryptography – DES – IDEA – Blowfish – AES-Differential and Linear Cryptanalysis.

Asymmetric Key Cryptographic Algorithms: Overview of asymmetric key cryptography- RSA algorithm-symmetric and asymmetric key cryptography together-digital signatures.

UNIT III

User Authentication Mechanisms: Introduction-Authentication basics – passwords- authentication tokens-certificate based authentication-biometrics Authentication-Hash functions-SHA1.

System Security: Intruders, Viruses, Related Threats, Trusted Systems.

UNIT IV

Internet Security Protocols: Basic concepts-SSL-SHTTP-TSP-SET-SSL versus SET- Electronic Money-Email security-WAP security-security in GSM.

Network Security: Brief Introduction to TCP/IP -Firewalls -IP Security-Virtual PrivateNetworks.

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Text Books:-

1. Cryptography and Network security, AtulKahate, Tata McGraw-Hill Pub companyLtd., NewDelhi
2. Network Security Essentials Applications and Standards, William Stallings, PearsonEducation, New Delhi

Reference Books:

1. Network Security Private Communication in a public world, Charlie Kaufman,Radia Perlman & Mike Speciner, Prentice Hall of India Private Ltd., NewDelhi
2. Network Security: The Complete Reference by Roberta Bragg, Mark Phodes -Ousley, Keith Strass berg TataMcGraw-Hill.

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MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20301 INFORMATION SECURITY AND CRYPTOGRAPHY

Time:3Hrs Max Marks: 75

SECTION- A (4 X 15 = 60 M)
Answer ALL Questions

1. a) Explain Principles of Security. 7M
   b) Discuss Substitution and Transportation techniques? 8M

   Or

   c) What is Modulo Arithmetic and discuss its properties? 8M
   d) What is Totient Function and explain how to calculate Totient Function with an example. 7M

2. a) Show that DES decryption is the inverse of DES encryption? 8M
   b) Discuss different block cipher modes of operation? 7M

   Or

   c) Explain RSA algorithm with an example? 8M
   d) Explain how to generate digital signatures? 7M

3. a) What is authentication and discuss different authentication mechanisms? 7M
   b) Explain SHA1? 8M

   Or

   c) What is Virus? And discuss different types of Viruses? 5M
   d) Write short notes on Intruders and Trusted Systems? 10M

4. a) Briefly explain SSL protocol? 7M
   b) Explain SET in detail? 8M

   Or

   c) Explain about IP Security architecture? 8M
   d) What is Firewall and discuss different types of Firewalls? 7M

SECTION B (5 X 3 = 15M)
Answer any FIVE Questions

5. a) Explain any five Security attacks?
   b) What is Key and what are different types of keys?
   c) Briefly discuss Differential cryptanalysis?
   d) Define Prime number and explain relatively prime numbers with an example?
   e) Differentiate between Symmetric and Asymmetric key cryptography?
   f) What are the requirements of Hash Functions?
   g) Explain SHTTP?
   h) Briefly discuss Virtual Private Network?

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

Blue print for Theory Semester - End Examinations:

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							**75**

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester III (Second Year) Curriculum

Course Code &Title: MCA-20302 BIG DATA ANALYTICS **Semester: III** **Course Index: C302**
Course Objectives: The learning objectives of this course are:
Course Objectives
To learn about introduction to Big Data and Hadoop
To learn about Real Time Analytics, Map Reduce Programming
To learn about Streaming in Spark, Machine Learning, Map Reduce Advanced Programming
To learn about Graph Representation in Map Reduce, Graph Analytics in Spark, Programming with RDDs-Basics, Spark SQL overview
Course Outcomes: By the end of the course, the student will be

Course Index	Course Outcomes
C302.1	Understand about introduction to Big Data and Hadoop
C302.2	Understand about Real Time Analytics, Map Reduce Programming
C302.3	Understand about Streaming in Spark, Machine Learning, Map Reduce Advanced Programming
C302.4	Understand about Graph Representation in Map Reduce, Graph Analytics in Spark,Programming with RDDs-Basics, Spark SQL overview

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA IIYEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20302 BIG DATA ANALYTICS

Instruction:4Periods/week	**Time: 3Hours**	**Credits:4**
Internal:25Marks	**External:75Marks**	**Total: 100Marks**

UNIT I

Introduction to Big Data: Big Data-definition, Characteristics of Big Data (Volume, Variety, Velocity, Veracity, Validity), Importance of Big Data, Patterns for Big Data Development, Data in the Warehouse and Data in Hadoop.

Introduction to Hadoop: Hadoop-definition, understanding distributed systems and Hadoop, Comparing SQL databases and Hadoop, Starting Hadoop , The building blocks of Hadoop, Name Node, Data Node, Secondary Name Node, Job Tracker and Task Tracker

UNIT II

Real Time Analytics - Examples, What is Apache Spark, Why Spark when Hadoop is there, Spark Features, Getting started with Spark, Spark Eco System, Architecture and its working, Data Structures of Spark, Spark components, Using Spark with Hadoop, Use case.

Map Reduce Programming: Writing basic Map Reduce programs, Getting the patent data set, constructing the basic template of a Map Reduce program, Counting things, Programming with RDDs – Basics.

UNIT III

Streaming in Spark, Streaming features, Streaming Fundamentals. Use case on streaming. Machine Learning, Spark MLlib Overview, Tools, Algorithms-Classification, Regression, clustering, Dimensionality Reduction, Feature Extraction..Map Reduce Advanced Programming Chaining Map Reduce jobs, joining data from different sources. Use case.

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UNIT IV

Graph Representation in Map Reduce: Modeling data and solving problems with graphs, Shortest Path Algorithm, Friends-of-Friends Algorithm, Page Rank Algorithm, Bloom Filters.

Graph Analytics in Spark, Spark GraphX, GraphX features, GraphX Examples, Use case.

Creating RDDs, Operations, Passing Functions to Spark, Common Transformations and Actions, Persistence, Adding Schemas to RDDs, RDDs as Relations, Creating Pairs in RDDs, transformations and actions on RDDs.

Spark SQL, Overview, Libraries, Features, Querying using Spark SQL.

TEXT BOOKS:

1. Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data by Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch, 1st Edition,TMH,2012.
2. Learning Spark: Learning Big Data Analysis: Karauetc., O'reilly Publications. Hadoop in Action by Chuck Lam, MANNING Publishers.
3. Hadoop in Practice by Alex Holmes, MANNING Publishers

REFERENCE BOOKS:

1. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
2. Big Java Fourth Edition Cay Horstmann Wiley, John Wiley &Sons
3. Mining of massive datasets, Anand Rajaraman, Jeffrey D Ullman, Wiley Publications.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20302 BIG DATA ANALYTICS

Time:3Hrs Max Marks: 75

SECTION- A (4 X 15 = 60 M)

Answer ALL Questions

1. a) Explain the Characteristics of Big Data. How the data is different in Warehouse and in Hadoop

OR

b) Explain in detail about Job Tracker and Task Tracker with neat diagrams.

2. a) What is Apache Spark and explain the Eco System of it. What are the main data structures used in Spark

OR

b) What is key-value pair. Write a Map reduce program to count the number of words in a given text

3. a) Discuss in detail about Streaming in Spark and Spark features.

OR

b) How do you join data from different sources in Map reduce programming? Show with Matrix Multiplication example.

4. a) What are Resilient Distributed Dataset. Explain how to create pairs in RDDs and transformations that are carried in them.

OR

b) Explain Page Rank and Bloom Filter Algorithms.

SECTION B (5 X 3 = 15M)

5. ANSWER ANY FIVE

a. What is Big Data and explain is importance and applications

b. Explain Spark components

c. Explain the working of Spark Architecture

d. Explain streaming in Spark

e. Explain the concept of Dimensionality Reduction

f. Explain Friends-Of Friends Algorithm

g. Explain the features of Spark SQL

h. How to add schemas on RDD

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

Blue print for Theory Semester - End Examinations:

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							**75**

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(w.e.f. 2020 Admitted Batch)

Semester III (Second Year) Curriculum

Course Code &Title: MCA-20303 OBJECT ORIENTED SOFTWARE ENGINEERING **Semester: III** **Course Index: C303**
Course Objectives: The learning objectives of this course are:

Course Objectives
To learn about IntroductionRequirements Engineering to Object Oriented Software Engineering, Object Orientation,
To learn about the Unified Modeling Language & Use Case Modeling, Class Design and ClassDiagrams
To learn about the Software Design , Architecture and Design Patterns
To learn about the Software Testing, Software Project Management, Software Process Models

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C303.1	Able to understand about the Introduction to Object Oriented SoftwareEngineering, Object Orientation, Requirements Engineering
C303.2	Able to understand about the Unified Modeling Language & Use Case Modeling,Class Design and Class Diagrams
C303.3	Able to understand about the Software Design and Architecture, Design Patterns
C303.4	Able to understand about the Software Testing, Software Project Management, Software Process Models

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20303 OBJECT ORIENTED SOFTWARE ENGINEERING

Instruction:4Periods/week	Time: 3Hours	Credits:4
Internal:25Marks	External:75Marks	Total: 100Marks

UNIT I

Introduction to Object Oriented Software Engineering: Nature of the Software, Types of Software, Software Engineering Activities, and Software Quality.

Introduction to Object Orientation: Data Abstraction, Inheritance & Polymorphism, Reusability in Software Engineering.

Requirements Engineering: Domain Analysis, Problem Definition and Scope, Types of Requirements, Techniques for Gathering and Analyzing Requirements, Requirement Documents, Reviewing Requirements

UNIT II

Unified Modeling Language & Use Case Modeling: Introduction to UML, Modeling Concepts, Types of UML Diagrams with Examples; User-Centered Design, Characteristics of Users, Developing Use Case Models of Systems, Use Case Diagram, Use Case Descriptions, The Basics of User Interface Design, Usability Principles.

Class Design and Class Diagrams: Essentials of UML Class Diagrams, Associations and Multiplicity, Generalization, Instance Diagrams, Advanced Features of Class Diagrams, Process of Developing Class Diagrams, Interaction and Behavioral Diagrams: Interaction Diagrams, State Diagrams, Activity Diagrams, Component and Deployment Diagrams.

UNIT III

Software Design and Architecture: Design Process, Principles Leading to Good Design, Techniques for Making Good Design Decisions, Good Design Document, Software Architecture, Architectural Patterns: The Multilayer, Client-Server, Broker, Transaction Processing, Pipe & Filter And MVC Architectural Patterns.

Software Testing: Testing Fundamentals: Error, Defect, Failure, Role of software testers, Effective and Efficient Testing, Black box and white box testing, Levels of testing: Unit testing, Integrated testing, System Testing and Acceptance Testing, Regression testing, Testing Strategies for Large Systems, Debugging.

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UNIT IV

Software Project Management: Introduction to Software Project Management, Activities of Software Project Management, Software Engineering Teams, Software Cost Estimation, Project Scheduling, Tracking and Monitoring.

Software Process Models: Waterfall Model, The Phased Released Model, The Spiral Model, Evolutionary Model, The Concurrent Engineering Model, Rational Unified Process.

Text Book:

1. Object Oriented Software Engineering: Practical Software Development using UML and Java. Timothy C Lethbridge & Robert, Langaneire, Mc Graw Hill

Reference Books:

1. The Unified Modeling Language User Guide. Grady Booch, James Rumbaugh and Ivar Jacobson. Addison-Wesley.

2. Software Engineering; A Practitioner's Approach. Roger SPressman.

3. Object-Oriented Software Engineering: Using UML, Patterns and Java, Bernd Bruegge and Allen H. Dutoit, 2nd Edition, Pearson Education.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20303 OBJECT ORIENTED SOFTWARE ENGINEERING

Time:3Hrs Max Marks: 75

SECTION- A (4 X 15 = 60 M)

Answer ALL Questions

1. **a)** What is software engineering? Explain software engineering activities **15M**

Or

b) What is requirement engineering? Explain requirements engineering activities **15M**

2. **a)** Discuss how usability principles play a significant role in user interface design? **15M**

Or

b) Explain about UML class diagrams? Draw the class diagram for library management system? **15M**

3. **a)** What is software architecture? Explain architectural patterns with examples. **15M**

Or

b) Define Software Testing? Explain the levels of software testing? **15M**

4. **a)** Explain COCOMO model for software project cost estimation? **15M**

Or

b) Explain Spiral model with its advantages and disadvantages? **15M**

SECTION – B (5X3=15 Marks)

Answer any FIVE Questions

5. **Write a Short note on**
   - **a)** Software Quality.
   - **b)** Domain Analysis.
   - **c)** Significance of use case diagram.
   - **d)** Specialization and Generalization.
   - **e)** Software Design principles.
   - **f)** Testing strategies for large systems.
   - **g)** Software Project Management activities.
   - **h)** Rational Unified Process model

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

Blue print for Theory Semester - End Examinations:

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							**75**

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester III (Second Year) Curriculum

Course Code & Title: MCA-20304 WEB TECHNOLOGIES
Semester: III
Course Index: C304

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn about Web Basics, Markup languages for processing, identifying, and presenting information in web pages, introduction of XML and processing of XML Data with Java.
Learn about the Client side scripting with JavaScript.
Learn about the concept of Server side programming with Java Servlets and JSP
Learn about PHP language for server side scripting and able to design Web based applications.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C304.1	Understand the concept of Web Basics, Markup languages for pro cessing, identifying, and presenting information in web pages, introduction of XML and processing of XML Data with Java.
C304.2	Understand about the concept of Server side programming with Java Servlets and JS.
C304.3	Understand about the concept of Server side programming with Java Servlets and JSP.
C304.4	Understand about the concept of PHP language for server side scripting and ableto design Web based applications.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20304 WEB TECHNOLOGIES

Instruction:4Periods/week **Time: 3Hours** **Credits:4**

Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

Web Basics- Introduction, Concept of Internet- History of Internet, Protocols of Internet, World Wide Web, URL, Web Server, Web Browser. HTML- Introduction, History of HTML, Structure of HTML Document: Text Basics, Structure of HTML Document: Images, Links, Lists, Creating Forms, Frames and Tables, Cascading Style Sheets.

XML Introduction- Introduction of XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

UNIT II

JAVA Script: What is Dynamic HTML – Java Script Basics – Variables – String Manipulation – Mathematical Functions – Control Statements – Operators – Arrays – Functions – Data and Objects – Regular Expressions –Exception Handling – Built-in Objects – Events –Dynamic HTML with Java Script.

UNIT III

Introduction to Servlets: Common Gateway Interface (CGI), Microsoft's Active Server Pages (ASP), Basics of ASP Technology, ASP Example, Modern Trends in ASP, Java and the Concept a Virtual Machine, Life Cycle of a Servlet, Deploying a Servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.

Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, connecting to database in JSP.

Active Web Pages: Active Web pages is a Better Solution,Why are Active Web Pages Powerful? When not to use Active Web Pages,

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UNIT IV

PHP & MySQL: Why PHP and MySQL - Server-Side Web Scripting - Getting Started with PHP - Adding PHP to HTML -Syntax and Variables - Control and Functions - Passing Information between Pages – Strings – Arrays and Array Functions – Numbers - MySQL Database Administration - PHP/MySQL Functions -Displaying Queries in Tables - Building Forms from Queries.

Text Book:

1) Web Technologies, Uttam K Roy, Oxford University Press.

2) The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill.

3) PHP5 and MySQL Bible, Tim Converse and Joyce Park with Clark Morgan, Wiley Publishing.

Reference Books:

1) Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dreamtech.

2) Java Server Pages —Hans Bergsten, SPD O'Reilly.

3) Java Script, D.Flanagan

4) Beginning Web Programming-Jon Duckett WROX.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20304 WEB TECHNOLOGIES

Time:3Hrs Max Marks: 75

SECTION – A (4X15=60 Marks)

Answer ALL Questions

1. a) Define HTML. Explain about Structure of HTML with an example. [15M]

(OR)

b) What is CSS? Explain various Cascading Style Sheets and give an example. [15M]

2. a) Define JavaScript. Explain about Variables and Operators in JavaScript with examples. [15M]

(OR)

b)What is DHTML? Explain about Functions in JavaScript with an example. [15M]

3. a) Define Servlet. Explain about Life Cycle of Servlet. [15M]

(OR)

b) What is JSP? Discuss about Anatomy of a JSP Page and give an example. [15M]

4. a) Define PHP? Explain about syntax and variables in PHP with an example. [15M]

(OR)

b) What is MySQL? Explain about Functions of MySQL. [15M]

SECTION– B (5X3=15Marks)

Answer any FIVE Questions

5. a) Write a short note on Forms in HTML.

b) Write a short note on XML.

c) Write about Arrays in JavaScript.

d) Write about Events in JavaScript.

e) Write about Handling Http Request & Responses.

f) Write about JSP Directives.

g) Write a short note on Strings in PHP.

h) Write about displaying queries in tables in MySQL.

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MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

Blue print for Theory Semester - End Examinations:

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							**75**

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L. Prabhu

M. Kanishka

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester III (Second Year) Curriculum

Course Code &Title: MCA- 20305 CLOUD COMPUTING (ELECTIVE-II)
Semester: III
Course Index: C305

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the Cloud Computing basics, Intranet and Cloud, Services and Business Applications, Salesforce.com, Organization and Cloud Computing
To learn about the Hardware and Infrastructure , Overview of Software as a Service, Overview of Industries Software plus Services, Mobile device Integration
To learn about Developing the Applications like Google, Microsoft, Intuit QuickBase, Local Clients and thin clients
To learn about Migrating the Cloud, Cloud Services

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C305.1	Able to understand about the Cloud Computing basics, Intranet and Cloud, Services and Business Applications, Salesforce.com, Organization and Cloud Computing
C305.2	Able to understand about the Hardware and Infrastructure , Overview of Software as a Service, Overview of Industries Software plus Services, Mobiledevice Integration
C305.3	Able to understand about Developing the Applications like Google, Microsoft, Intuit QuickBase, Local Clients and thin clients
C305.4	Able to understand about the Migrating the Cloud, Cloud Services

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20305 CLOUD COMPUTING

Instruction:4Periods/week	**Time: 3Hours**	**Credits:4**
Internal:25Marks	**External:75Marks**	**Total: 100Marks**

UNIT I

Cloud Computing Basics - Cloud Computing Overview, Applications, Intranets and the Cloud, First Movers in the Cloud. The Business Case for Going to the Cloud - Cloud Computing Services, Business Applications, Deleting Your Datacenter, Salesforce.com, Thomson Reuters.

Organization and Cloud Computing - When You Can Use Cloud Computing, Benefits, Limitations, Security Concerns, Regulatory Issues, Cloud Computing with the Titans - Google, EMC, NetApp, Microsoft, Amazon, Salesforce.com, IBM Partnerships.

UNIT II

Hardware and Infrastructure - Clients, Security, Network, Services. Accessing the Cloud - Platforms, Web Applications, Web APIs,Web Browsers. Cloud Storage - Overview, Cloud Storage Providers, Standards - Application, Client, Infrastructure, Service.

Software as a Service - Overview, Driving Forces, Company Offerings, Industries Software plus Services - Overview, Mobile Device Integration, Providers, Microsoft Online.

UNIT III

Developing Applications - Google, Microsoft, Intuit QuickBase, Cast Iron Cloud, Bungee Connect, Development, Troubleshooting, Application Management.

Local Clouds and Thin Clients - Virtualization in Your Organization, Server Solutions, Thin Clients, Case Study: McNeilus Steel.

UNIT IV

Migrating to the Cloud - Cloud Services for Individuals, Cloud Services Aimed at the Mid-Market, Enterprise-Class Cloud Offerings, Migration. Best Practices and the Future of Cloud Computing - Analyze Your Service, Best Practices, How Cloud Computing Might Evolve.

Text Books:

1. Cloud Computing-A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGrawHill.

Reference Books:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, MKElsevier.
2. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, University Press

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20305 CLOUD COMPUTING

Time:3Hrs Max Marks: 75

SECTION – A (4X15=60 Marks)

Answer ALL Questions

1. a) What is Cloud Computing? Explain about Cloud Computing Services? 8M

(OR)

b) Explain about Cloud Computing with the Titans in detail. 7M

2. a) Define Hardware and Infrastructure. Explain about Cloud Storage in detail. 8M

(OR)

b) Explain about Software plus Services in detail. 7M

3. a) Explain about Developing Applications in Cloud Computing with examples. 7M

(OR)

b) What is Virtualization? Explain the Case Study McNeilus Steel. 8M

4. a) Explain about Cloud Services Aimed at the Mid Market and Enterprise-Class Cloud Offerings. 8M

(OR)

b) Define Migration. Explain about the process of Migration. 7M

SECTION– B (5X3=15Marks)

Answer any FIVE Questions

5. **a)** Write a short note on First Movers in the Cloud

b) Write about Cloud Computing Benefits and Limitations.

c) Write about Security and Network in Cloud Computing

d) Write a short note on Web APIs

e) Write about Troubleshooting.

f) Write about Thin Clients in cloud Computing.

g) Write about Cloud Services for individuals.

h) Write about Best Practices and Future of Cloud Computing. .

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

Blue print for Theory Semester - End Examinations:

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							**75**

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester III (Second Year) Curriculum

Course Code &Title: MCA-20306 FOUNDATIONS OF DATA SCIENCE(ELECTIVE III)
Semester: III
Course Index: C306

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about Key concepts in data science, including tools, approaches, and application scenarios
To learn about Topics in data collection, sampling, quality assessment and repair
To learn about Topics in statistical analysis and machine learning
To learn about State-of-the-art tools to build data-science applications for different types of data, including text and CSV data

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C306.1	Understand about Key concepts in data science, including tools, approaches, and application scenarios
C306.2	Understand about Topics in data collection, sampling, quality assessment and repair
C306.3	Understand about Topics in statistical analysis and machine learning
C306.4	Understand about State-of-the-art tools to build data-science applications for different types of data, including text and CSV data

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20306 FOUNDATIONS OF DATA SCIENCE (ELECTIVEIII)

Instruction:4Periods/week | Time: 3Hours | Credits:4

Internal:25Marks | External:75Marks | Total: 100Marks

UNIT I

INTRODUCTION TO DATA SCIENCE: Data science process – roles, stages in data science project, setting expectations, loading data into R – working with data from files, working with relational databases. Exploring data – Using summary statistics to spot problems, spotting problems using graphics and visualization. Managing data – cleaning and sampling formodelling and validation.

UNIT II

MODELING METHODS: Choosing and evaluating models – mapping problems to machine learning tasks, evaluating models, validating models – cluster analysis – Kmeans algorithm, Naïve Bayes, Memorization Methods – KDD and KDD Cup 2009, building single variable models, building models using multi variable, Linear and logistic regression, unsupervised methods – cluster analysis, association rules.

UNIT III

INTRODUCTION TO R Language: Reading and getting data into R, viewing named objects, Types of Data items, the structure of data items, examining data structure, workingwith history commands, saving your work in R.

PROBABILITY DISTRIBUTIONS in R - Binomial, Poisson, Normal distributions. Manipulating objects - data distribution.

UNIT IV

DELIVERING RESULTS: Documentation and deployment–producing effective presentations–Introduction to graphical analysis – plot()function – displaying multivariate data– matrix plots– multiple plots in one window - exporting graph – using graphics parameters in R Language.

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Text Books:-

1. Nina Zumel, John Mount, "Practical Data Science with R", Manning Publications,2014.
2. Jure Leskovec, Anand Rajaraman, Jeffrey D.Ullman, "Mining of Massive Datasets", Cambridge University Press,2014.
3. Mark Gardener, "Beginning R - The Statistical Programming Language", John Wiley &Sons, Inc.,2012.

Reference Books:-

1. W. N. Venables, D. M. Smith and the R Core Team, "An Introduction to R",2013.
2. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, AbhijitDasgupta, "PracticalData Science Cookbook", Packet Publishing Ltd.,2014.
3. Nathan Yau, "Visualize This: The FlowingData Guide to Design, Visualization, andStatistics", Wiley,2011.
4. Boris lublinsky, Kevin t.Smith, Alexey Yakubovich,"Professional Hadoop Solutions",Wiley, ISBN: 97881265510 71,2015.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20306 FOUNDATIONS OF DATA SCIENCE (ELECTIVEIII)

Time:3Hrs Max Marks: 75

SECTION- A(4 X 15 = 60 M)

Answer ALL Questions

1. a) Explain concepts of relational database in data science with examples. **(15M)**

OR

b) Explain the concept of managing data in data science with examples. **(15M)**

2. a) Explain modeling methods in data science with examples. **(15M)**

OR

b) Explain linear and logistic regression in data science with examples? **(15M)**

3. a) Explain R language operations with examples. **(15M)**

OR

b) Explain probability distribution in R language with examples. **(15M)**

4. a) Explain concept of documentation and deployment in data science with examples. **(15M)**

OR

b) Explain the graphical analysis in data science with examples. **(15M)**

SECTION-B (5 X 3 =15 M)

5. Write a Short Note on any FIVE of the following

a. Explain stages in data science with examples.

b. Explain spotting problems in data science

c. Explain machine learning tasks on modeling.

d. Explain k-means algorithms.

e. Explain types of data items in R Language

f. Explain Normal distribution in Data Science

g. Explain Graphics parameters in R language.

h. Explain Matrix plots in delivering data science

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

Blue print for Theory Semester - End Examinations:

Max. Marks: 75 **Time: 3 hrs.**

S.No.	Type of question	Given in the question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	Section – A Essay Question	4+4 (either or choice)	15	60	4(One from each Unit)	15	60
2	Section – B Short Answer Question	8	3	24	5	3	15
TOTAL							**75**

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester III (Second Year) Curriculum

Course Code & Title: MCA-20307 WEB TECHNOLOGIES AND OBJECT ORIENTED SOFTWARE ENGINEERINGLAB

Semester: III

Course Index: C307

Course Objectives:

The learning objectives of this course are:

Course Objectives
Learn how to create Web pages using HTML/DHTML and using CSS in it.
Learn how to write Java Script Programs to demonstrate the working of conditional, looping statements, arrays, functions, event handling, validation controls.
Learn how to develop simple applications like client server programming using Java Script, Servlets, ASP, JSP and a web application with database connectivity.

Course Outcomes:

By the end of the course, the student will be

Course Index	Course Outcomes
C307.1	Students can able to create Web pages using HTML/DHTML and using CSS in it.
C307.2	Students can able to write Java Script Programs to demonstrate the working of conditional, looping statements, arrays, functions, event handling, validation controls.
C307.3	Students can able to develop simple applications like client server programming using Java Script, Servlets, ASP, JSP and a web application with database connectivity.

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20307 WEB TECHNOLOGIES AND OBJECT ORIENTED SOFTWAREENGINEERING LAB

Instruction: 3 Periods/week	Time: 3 Hours	Credits: 2
Internal: 50 Marks	External: 50 Marks	Total: 100 Marks

Web Technologies Lab

1. Create web pages for an application demonstrating the working of different features ofHTML and DHTML.
2. Demonstrate the use of CSS in organizing the layout of webpages

Implement at least two Java Script programs to demonstrate the working of

3. Conditional statements
4. Looping statements.
5. Arrays
6. Functions.
7. Event handling
8. Validation controls.

Develop simple applications for the following

9. Exercise client server programming using Java Script, Servlets, ASP, JSP.
10. Create a web application with database connectivity and work on different queries for datamanipulation.

REFERENCES:

1. Web Technologies, Godbole, Kahate, 2ndEd, TMH
2. Internet & World Wide Web How to program, Dietel&Deitel Fourth Edition, PHI

Object Oriented Software Engineering Lab

Document the Software Project Management and Software Engineering activities for any two of the following projects. Any other project of interest also can be chosen.

1. Student Result Management System
2. Library Management System
3. Payroll System
4. Bank Loan System
5. Railway Reservation System
6. Automatic Teller Machine
7. Hospital Management System
8. Online Shopping System

Software Project Management and Software Engineering activities specified below can be customized according to the features of the project.

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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester III (Second Year) Curriculum

Course Code &Title: MCA-20308 BIG DATA ANALYTICS LAB
Semester: III
Course Index: C308

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn how to implement data structures, generic types
Learn how to setup and install Hadoop
Learn how to implement file management tasks and programs in Hadoop

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C308.1	Able to implement data structures, generic types
C308.2	Able to setup and install Hadoop
C308.3	Able to implement file management tasks and programs in Hadoop

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MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20308 BIG DATA ANALYTICS LAB

Instruction: 3 Periods/week	Time: 3 Hours	Credits: 2
Internal: 50 Marks	External: 50 Marks	Total: 100 Marks

List of Experiments:

1. Write a Java Program to implement Linked Lists, Stacks and Queues.
2. Write Java Program that implements Generic Types, which collects pair of elements ofdifferent types.
3. Write a Java Program that uses object serialization and deserialization.
4. Know about setting up and Installing Hadoop in its three operating modes and implementin Standalone.
5. Implement the following file management tasks in Hadoop: Adding, Retrieving anddeleting files.

Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copiesthem into HDFS using one of the above command line utilities.

6. Write a Map-Reduce Program to find average of numbers.
7. Implement Matrix Multiplication with Hadoop Map Reduce
8. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

REFERENCES:

1. Big Java Fourth Edition Cay Horstmann Wiley, John Wiley & Sons
2. www.hadoop.apache.org
3. www.gist.github.com

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MCA II YEAR SEMESTER III

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MCA-20308 BIG DATA ANALYTICS LAB

Instruction: 3 Periods/week	Time: 3 Hours	Credits: 2
Internal: 50 Marks	External: 50 Marks	Total: 100 Marks

List of Experiments:

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1. Big Java Fourth Edition Cay Horstmann Wiley, John Wiley & Sons
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MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. 2020 Admitted Batch)

Semester III (Second Year) Curriculum

Course Code &Title: MCA-20309 INNOVATION, ENTREPRENEURSHIP AND INTELLECTUAL PROPERTY RIGHTS Semester: III Course Index: C309	
Course Objectives: The learning objectives of this course are:	
Course Objectives	
To learn about Role and importance Technology developments, Innovation in Current Environment	
To learn about Entrepreneurship and Its Evolution	
To learn about Intellectual Property Law	
To learn about Patent Law – Rights and Limitations	
Course Outcomes: By the end of the course, the student will be	
Course Index	**Course Outcomes**
C309.1	Able to understand Role and importance Technology developments, Innovation in Current Environment
C309.2	Able to understand Entrepreneurship and Its Evolution
C309.3	Able to understand Intellectual Property Law
C309.4	Able to understand Patent Law – Rights and Limitations

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20309 INNOVATION, ENTREPRENEURSHIPAND INTELLECTUALPROPERTY RIGHTS

Instruction: 2 Periods/week **Time: 3 Hours** **Credits: 0**

Internal: 50 Marks **Total: 50 Marks**

UNIT I

Introduction - Role and importance -Technology developments – TLC - Diffusion and Growth of Technologies. Innovation and Creativity: An Introduction, Innovation in Current Environment, Types of Innovation, Idea Management System, Divergent Vs Convergent Thinking, Levers of Idea Management. Experimentation in Innovation Management: Idea Championship,Participation for Innovation, Co-creation for Innovation, Proto typing to Incubation.

UNIT II

Introduction to Entrepreneurship andits Evolution – Roles of an Entrepreneur -Idea Generation, Screening, Selection and Managing Resources -Leading and Building the team in an enterprise

- Forms of Ownership - Entrepreneurship in the era of Globalization - Entrepreneurship, Creativity and Innovation - Social entrepreneurship - Start- ups, early venture issues - Family business and entrepreneurship - Women entrepreneurship: issues, challenges - Financing the entrepreneurial business - Entrepreneurship Institutions in India

Unit III

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics - Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement - Regulatory – Over use or Misuse of Intellectual Property Rights - Compliance and Liability Issues.

Unit IV

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings - Valuation of Intellectual Property: Need for IP Valuation – Approaches of IP Valuation

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Text Books:

1. Sunita K. Sreedhararn , An Introduction to Intellectual Asset Management.
2. Patrick H. Sullivan, Profiting from Intellectual Capital: Extracting Value from Innovation
3. TulikaRastogi, IP Audit: Your Way to Healthy Organisation.
3. Gordon V. Smith and Russell L. Parr, Valuation of Intellectual Property and Intangible Assets, 3rd Edition.
4. Bruce Berman, From Assets to Profits: Competing for IP Value and Return (Intellectual Property-General, Law, Accounting & Finance, Management, Licensing, Special Topics).

References:

5. Loganathan, E.T. "IPR" (IPRS), TPIPS Agreement and Indian Laws.
6. Ceserani. J &Greatwood. P: Innovation & Creativity, Kogan Page, London, 1995.
7. Ziman. J: Technological Innovation as an Evolutionary Process, Cambridge University Press, Cambridge, 2000
8. Deborah E.Bouchoux: "Intellectual Property". Cengage learning, New Delhi
9. PrabhuddhaGanguli: 'Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi

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MASTER OF COMPUTER APPLICATIONS (MCA)

MCA II YEAR SEMESTER III

(W.e.f. 2020 – 2021 Admitted Batch)

CERTIFICATE COURSE - MANAGEMENT AND LEADERSHIP

Course Objectives:

To impart knowledge about the skills and process of Management and Leadership to the students and make them aware of the successful business leaders.

Unit-I: Concept of Organizations – Features, Types of Organizations- Concept of Management – Nature and Functions of Management – Levels of Management – Branches of Management-Managerial Skills – Technical, Human & Conceptual Skills – Managerial Roles.

Unit-II: Leadership – Definition, Importance – Leader Vs Manager – Approaches to Leadership – Traits of Leaders – Leadership styles.

Unit-III: Profiles of a few Inspirational Leaders in Business – Jemshedji Tata – Aditya Birla – Dhirubhai Ambani – NR Narayana Murthy- Azim Premji.

Reference Books:

Harold Koontz & Wahrich, Essentials of Management, 11th edition, Tata McGraw Hill.

Course Outcomes:

After studying the course the students will become aware of

- The concept and types of Organizations
- The concept, nature and functions of Management
- The Managerial skills and roles
- The traits of successful Leaders
- Various styles of leadership
- The profiles of some successful business leaders

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Semester IV (Second Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		Internal	External		Theory	Practical	
MCA-20401	Project	150	200	350	-	-	10
	Total Credits						10

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