# PROGRAMME PROJECT REPORT

**(includes curriculum and syllabus)**

# M.C.A.

**Submitted**

**To**

**The UGC – DEB**

*(ODL) - MODE*

**MADHYA PRADESH BHOJ (OPEN) UNIVERSITY,**

**Raja Bhoj Marg Kolar Road, BHOPAL (M.P.)**

**Madhya Pradesh Bhoj Open University, Bhopal**

**PROGRAMME PROJECT REPORT**

**Name of the Programme: M.C.A.**

**Introduction :**

M.C.A. is a postgraduate program that focuses on developing the skills and knowledge required to manage and analyze information technology in various industries. The program covers a wide range of topics such as software development, database management, computer networks, cybersecurity, and artificial intelligence.

Students who enroll in an M.C.A. program are typically individuals who already have an undergraduate degreein computer science, information technology, or a related field. The program typically takes one to two years to complete, and students are required to complete coursework, research projects, and a dissertation.

The program is designed to equip graduates with the necessary skills to become IT professionals, and prepares them for roles such as systems analyst, database administrator, network administrator, cyber security specialist, and software developer. An M.C.A. degree is highly valued in the job market, and graduates can expect to earn competitive salaries in their chosen field.

**(i) (a) Programme's Mission**: The mission of an M.C.A. program is to provide students with a comprehensive understanding of information technology and its applications in various industries. The program aims to equip students with the necessary skills to analyze, design, and develop IT systems that are efficient, effective, and secure.

The program is designed to prepare students for careers in the rapidly evolving field of information technology, where there is a constant demand for professionals who can adapt to new technologies and solve complex problems. The program emphasizes practical, hands-on experience, and encourages students to engage in research and development activities.

In addition, the program aims to develop students' communication and teamwork skills, as these are essential for success in the field of IT. Graduates of the program are expected to be leaders in their field, with the ability to innovate, manage and lead IT projects.

Overall, the mission of an M.C.A. program is to produce graduates who are well-rounded IT professionals, capable of contributing to the growth and success of organizations in various industries.

**(b) Objectives:**

The objectives of an M.C.A. in IT (Information Technology) program vary depending on the specific program and institution offering it. However, some common objectives of M.C.A. programs include:

- Developing advanced knowledge and skills: M.C.A. programs aim to provide students with advanced knowledge and skills in areas such as computer networks, database management, programming, artificial intelligence, cybersecurity, and more.
- Preparing for leadership roles: M.C.A. programs often prepare students for leadership roles in the IT industry by providing them with the knowledge, skills, and confidence to lead teams and make strategic decisions.
- Promoting innovation: M.C.A. programs encourage students to think creatively and innovatively by exposing them to cutting-edge technologies and research.
- Enhancing career prospects: M.C.A. programs are designed to enhance students' career prospects by providing them with specialized knowledge and skills that are in high demand in the IT industry.
- Encouraging lifelong learning: M.C.A. programs promote a culture of lifelong learning by providing students with the tools and resources they need to stay up-to-date with the latest advancements in the IT industry.

**(ii) Relevance of the Programme with HEI's Mission and Goals**: The relevance of an M.C.A. program with an HEI's (Higher Education Institution) mission and goals depends on the specific institution's mission and goals. However, in general, M.C.A. programs are highly relevant to many HEI's missions and goals for the following reasons:

Meeting the needs of the IT industry: Many HEIs aim to prepare their graduates to meet the needs of the industries they will work in. M.C.A. programs do exactly that by equipping students with advanced knowledge and skills in areas such as computer networks, cybersecurity, and artificial intelligence, which are highly sought after by employers in the IT industry.

Supporting research and innovation: Many HEIs aim to support research and innovation by providing their students with access to cutting-edge technologies and research facilities. M.C.A. programs often involve research projects, internships, and other opportunities for students to explore and develop innovative solutions to real-world problems.

Enhancing the institution's reputation: Many HEIs aim to enhance their reputation by offering high-quality academic programs that produce successful graduates. M.C.A. programs are highly regarded in the IT industry, and graduates of these programs are often sought after by employers, which can enhance the institution's reputation.

Encouraging lifelong learning: Many HEIs aim to promote a culture of lifelong learning by providing their students with the tools and resources they need to continue learning throughout their careers. M.C.A. programs often involve ongoing professional development opportunities and access to industry experts, which can help students stay up-to-date with the latest advancements in the IT industry.

Overall, an M.C.A. program can be highly relevant to an HEI's mission and goals, particularly if the institution aims to prepare its graduates for successful careers in the IT industry, support research and innovation, and promote lifelong learning.

**(iii) Nature of prospective target group of learners:**

The prospective target group of learners for an M.C.A. program can vary depending on the specific program and institution offering it. However, in general, the target group of learners for an M.C.A. program are individuals who:

- Have an undergraduate degree in computer science, information technology, or a related field: M.C.A. programs typically require applicants to have an undergraduate degree in a relevant field. This ensures that students have a solid foundation in IT fundamentals before embarking on more advanced coursework.
- Are interested in advancing their knowledge and skills in IT: M.C.A. programs are designed for individuals who want to deepen their understanding of IT concepts, technologies, and applications. Prospective students may be interested in pursuing careers in areas such as software development, network administration, cybersecurity, or data analytics.
- Are motivated and self-directed learners: M.C.A. programs require a high level of self-direction and motivation, as students must complete complex coursework, research projects, and other assignments with minimal supervision.
- Have strong analytical and problem-solving skills: M.C.A. programs involve complex problem-solving and require students to think critically and analytically. Prospective students should have strong analytical and problem-solving skills to succeed in the program.
- Are interested in pursuing leadership roles in the IT industry: M.C.A. programs often prepare students for leadership roles in the IT industry by providing them with the knowledge, skills, and confidence to lead teams and make strategic decisions. Prospective students who are interested in pursuing leadership roles in the IT industry may find an M.C.A. program particularly appealing.

Overall, the target group of learners for an M.C.A. program is typically composed of motivated, self-directed learners with a strong foundation in IT fundamentals who are interested in advancing their knowledge and skills in IT and pursuing careers in the field.

**(iv) Appropriateness of programme to be conducted in the Open and Distance Learning mode to acquire specific skills and competence:**

The M.C.A. program can be appropriately conducted in the Open and Distance Learning (ODL) mode to acquire specific skills and competence. Here are some reasons why:

- Flexibility: The ODL mode provides flexibility in terms of time, pace, and place of learning, which is especially important for learners who are already working or have other commitments. This mode allows learners to design their own study schedules and access course materials at their convenience, which can help them to balance their work, family, and educational commitments.
- Access to learning resources: ODL mode can provide access to a wide range of learning resources, including digital textbooks, audio and video lectures, interactive simulations, and virtual laboratories. This mode allows learners to access these resources from anywhere, which can help them to deepen their understanding of key concepts and develop specific skills and competencies.
- Personalized learning: ODL mode can provide personalized learning experiences to learners by using adaptive learning technologies, providing individual feedback, and offering personalized tutoring. This mode can help learners to focus on their specific needs and interests and acquire the skills and competence they need to succeed in their chosen field.
- Cost-effective: ODL mode can be a cost-effective option for learners who are unable to attend traditional, on-campus programs. This mode can reduce the cost of tuition, accommodation, and transportation, making it more accessible to learners from diverse socioeconomic backgrounds.
- Practical components: Although some practical components of the M.Sc. Information Technology program may require access to laboratory equipment, there are still many theoretical components of the program that can be delivered effectively through the ODL mode. Furthermore, some universities offer online laboratories and simulations that can be used to supplement or replace the practical components of the program.

Overall, the M.C.A. program can be appropriately conducted in the ODL mode, providing learners with the opportunity to acquire specific skills and competence in a flexible, accessible, personalized, and cost-effective manner.

**(v) Instructional Design:** The M.C.A.. programme is a two-year degree programme of 90 credits. The course material for the programme has been developed in-house with contributions from seasoned academicians as well. The instructional design comprises all learning activities i.e., reading and comprehending the SLM, availing audio-visual aids to enhance knowledge, attending counselling sessions and preparing assignments.

The Programme is of 2 year duration with semester examinations. The maximum period allowed is 4 years(double the duration). The Programme structure is as below.

## M.C.A Programme code: 315

**Courses of Study M.C.A**

| S.No | Course Code | Title of the Course | CIA Marks Max | ESE Marks Max | TOT Marks Max | C Max. |
|---|---|---|---|---|---|---|
| **FIRST YEAR** | | | | | | |
| **I Semester** | | | | | | |
| 1 | 31511 | Digital Techniques | 30 | 70 | 100 | 4 |
| 2 | 31512 | Object Oriented Programming and C++ | 30 | 70 | 100 | 4 |
| 3 | 31513 | Data Structure and Algorithms | 30 | 70 | 100 | 4 |
| 4 | 31514 | Discrete Mathematics | 30 | 70 | 100 | 4 |
| 5 | 31515 | Data Structures using C++ Lab | 30 | 70 | 100 | 4 |
| | | Total | **150** | **350** | **500** | **20** |
| II Semester | | | | | | |
| 6 | 31521 | Numerical Methods & Statistical Analysis | 30 | 70 | 100 | 4 |
| 7 | 31522 | Relational Database Management Systems (RDBMS) | 30 | 70 | 100 | 4 |
| 8 | 31523 | Computer Graphics | 30 | 70 | 100 | 4 |
| 9 | 31524 | Visual Programming with ●NET | 30 | 70 | 100 | 4 |
| 10 | 31525 | VB.NET and RDBMS Lab | 30 | 70 | 100 | 4 |
| | | **Total** | **150** | **350** | **500** | **20** |
| **SECOND YEAR** | | | | | | |
| **III Semester** | | | | | | |
| 11 | 31531 | Software Engineering | 30 | 70 | 100 | 4 |
| 12 | 31532 | Operating System | 30 | 70 | 100 | 4 |
| 13 | 31533 | Internet and Java Programming | 30 | 70 | 100 | 4 |
| 14 | 31534 | Computer Networks | 30 | 70 | 100 | 4 |
| 15 | 31535 | Data Mining and Warehousing | 30 | 70 | 100 | 4 |
| 16 | 31536 | Internet and Java Programming Lab | 30 | 70 | 100 | 4 |
| | | **Total** | **180** | **420** | **600** | **24** |
| **IV Semester** | | | | | | |
| 17 | 31541 | Internet of Things (IoT) | 30 | 70 | 100 | 4 |
| 18 | 31542 | Artificial Intelligence and Soft Computing | 30 | 70 | 100 | 4 |
| 19 | 31543 | Big Data Analytics and R Programming | 30 | 70 | 100 | 4 |
| 20 | 31544 | Mobile Application Development | 30 | 70 | 100 | 4 |
| 21 | 31545 | Project Work | 100 | 100 | 200 | 10 |
| | | **Total** | **220** | **380** | **600** | **26** |
| | | **Grand Total** | **600** | **1500** | **2100** | **90** |

**CIA :** Continuous Internal Assessment **ESE :** End semester Examination **Max**. Maximum Marks; **C :**

**(a) Duration of the Programme:** The Duration of the Programme is two years.

**(b) Faculty and Support Staff Requirement:** At present, there are three faculty members in the Department. The Department have all support staff for its the smooth functioning.

**(c) Instructional Delivery Mechanism:**

The instructional delivery mechanisms of the program should be designed to cater to the diverse needs of the learners, provide flexibility, and ensure effective learning outcomes. The program should also provide adequate support services such as academic counselling, technical support, and mentorship to ensure that learners receive the necessary guidance and assistance throughout the program.

As the University functions in the Open and Distance Learning mode, the programmes that we offer are designed to meet the varied requirements of the distant learner. Keeping this in view, the course material developed by the Department is learner friendly. Each course is divided into four to five blocks, which are further divided into units. Each Block consists of three to four units. This number has been determined taking into consideration the learning capabilities of our learners. The structure of the unit is in line with the guidelines laid down by the DEB-UGC, the apex regulatory body of Open and Distance Learning. The content is kept simple and lucid and follows the self-instructional pattern. Each lesson includes a number of self-assessment questions along with hint answers so that the students are able to track their progress as they proceed with the lesson. At the end of each unit, a list of other relevant books is also provided. Besides providing quality study material to our learners, the Department, following the ODL pattern, has defined its programmes in the terms of credits. In the ODL system, one credit is equivalent to 30 study hours i.e. the study input required for completion of the programme. Normally the M.C.A. programme is a 90-credit programme. This comprises all learning activities ie., reading and comprehending the SLM, availing audio-visual aids to enhance knowledge, attending counselling sessions and preparing assignments. Thus, in the M.C.A. programme, a learner is expectedto put in 2160 study hours to complete the programme in two years' time.

**(vi) Procedure for admission, curriculum transaction and evaluation:**

**Admission Process :**

Notification issued by the University in Regional and National Newspapers and in the official website. Admission process is online through the MPOnline Portal. Payment of fee through online (various options like net banking etc.). Submission of the printout of the application by the candidate to concern study center along with original documents for eligibility, date of birth etc., and along with fee paid receipt. After the Verification of applications- for fulfillment of eligibility criteria (marks cards) documents, fee paid details. Approval of the admission and issue of self-learning material (Study Materials) to the students.

**Contact Programmes :**

The personal contact programme in every course shall extend over a period of 13 working days in each semester and is usually conducted at the beginning of the session. The students are expected to come prepared in the class in order to discuss their problems meaningfully. 75% attendance in the personal contact programme is mandatory.

**Eligibility:** B.Sc. with Mathematics

**Fee Structure: M.C.A.**

Rs. 9000: Per Year

**Evaluation norms:** A learner will be evaluated on the basis of Assignments and term-end examination. Assignments carry 30% weightage whereas the term end examination carry 70% weightage.

**Evaluation system:**

- Students shall have a minimum of 50% of total marks of the University examinations in each Course. The overall passing minimum is 50% both in aggregate of Continuous Internal Assessment and External Examination in each Course.
- Every course shall have two components of assessment namely,
  - Continuous Internal Assessment "CIA": This assessment will be carried out throughout the semester as per the Academic Schedule.
  - End Semester Examination "ESE": This assessment will be carried out at the end of the Semester as per the Academic Schedule.

**Continuous Internal Assessment "CIA":**

- Continuous Internal Assessment for each Course shall be by means of Written Tests/ Assignments, and Class Tests for a total mark of 30.
- Continuous Internal Assessment for each Course shall be the responsibility of the concerned CourseFaculty.

- The valued answer papers/assignments shall be given to the students after the valuation is completed and they be asked to check and satisfy themselves about the marks they scored.
- All records in respect of Continuous Internal Assessments shall be in the safe custody of the PI for at least one year after the assessment.

**Theory course assessment weightages:**

The general guidelines for the assessment of Theory Courses, Department Electives and Non – Department Electives shall be done on a continuous basis as given in Table.

**Table : Weightage for Assessment**

| S.No. | Assessment | Weightage | Duration |
|---|---|---|---|
| 1. | First Periodical Assessment | 10% | 2 periods |
| 2. | Second Periodical Assessment | 10% | 2 Periods |
| 3. | Practical/Project/ Lab | 5% | -- |
| 4. | End Semester Exam | 70% | 2 to 3 hours |

**Grading System**

Based on the student's performance in each semester, grade is awarded with a final letter grade at the end of the exam evaluation of each Course. The letter grades and the corresponding grade points are as follows.

**Table 3: Grading system**

| **Range of Marks** | **Letter Grade** | **Grade Points** | **Remarks** |
|---|---|---|---|
| 90 – 100 | S | 10 | Outstanding |
| 80-89 | A | 09 | Excellent |
| 70-79 | B | 08 | Very Good |
| 60-69 | C | 07 | Good |
| 50-59 | D | 06 | Average |
| 40-49 | E | 05 | Pass |
| <40 | U | 00 | To Reappear for End-Semester Examination |

**GPA and CGPA**

Grade Point Average (GPA) is the ratio of the sum of the product of the number of credits Ci of course "i "and the grade points Pi earned for that course taken over all courses "i" registered and successfully completed by the student to the sum of Ci for all "i". That is,

$$GPA = \frac{\sum_1^n \quad C_i \;\; P_i}{\sum_1^n \quad C_i}$$

Cumulative Grade Point Average (CGPA) will be calculated in a similar manner, in any semester, considering all the courses enrolled from the first semester onwards. The Grade card will not include the computation of GPA and CGPA for courses with letter grade "U" until those grades are converted to the regular grades.

**Grade Sheet**

Based on the performance, each student is awarded a final letter grade at the end of the semester in each course. The letter grades and corresponding grade points are given in Table 3. A student is considered to have completed a course successfully and earned credits if he/she secures a letter grade other than U in that course. After results are declared, grade sheet will be issued to each student which will contain the following details:

- Program and discipline for which the student has enrolled.
- Semester of registration.
- The course code, name of the course, category of course and the credits for each course registered in that semester
- The letter grade obtained in each course
- Semester Grade Point Average (GPA)
- The total number of credits earned by the student up to the end of that semester in each of the course categories.
- The Cumulative Grade Point Average (CGPA) of all the courses taken from the first semester.
- Credits earned under Non – CGPA courses.
- Additional credits earned for the respective UG degree or respective Degree with Minor specialization

**Class/Division**

Classification is based on as follows: CGPA ≥ 8.0: First Class with Distinction

**6.5** ≤ CGPA <8.0: First Class

5.0 ≤ CGPA <6.5: Second Class

(i) Further, the award of 'First class with distinction' is subject to the candidate becoming eligible for the award of the degree, having passed the examination in all the courses in his/her first appearance with effect from II semester and within the minimum duration of the programme.

(ii) The award of 'First Class' is further subject to the candidate becoming eligible for the award of the degree, having passed the examination in all thecourses within 5 years.

(iii) The period of authorized break in study will not be counted for the purpose of the above classification.

**Eligibility For The Award of Degree**

A student will be declared to be eligible for the award of the M.C.A. degree ifhe/she has Registeredand successfully obtained credit for all the core courses:

- Successfully acquired the credits in the different categories as specified in the curriculum corresponding to the discipline of his/her study within the stipulated time:
- Has no dues to all sections of the institute including hostels and has no disciplinaryaction pending against him/her.
- The award of the degree must be recommended by the Academic Council and approved bythe Board of Management of the university.

**Re-View Of Answer Scripts / Single Valuation**

If any student feels aggrieved on the final outcome of the assessment in any course, the student shall apply to the Controller of Examinations, along with the prescribed fee, for the review of Tern End examination answer script, within the stipulated time after the announcement of the results of the examinations. The Controller of Examinations shall facilitate the review of the answer script jointly to be carried out by the student and the faculty detailed for this purpose. If any discrepancy is noticed during review the same shall be rectified and the originally awarded grade accordingly amended.

**(vii) Requirement of the laboratory support and library resources:**

**Internet Leased Line**

**Computer Lab:** The University has most modern high-tech Computer Lab with 24 hrs. Internet facility

for studying and R&D activities. The state-of-the-art facility features hardware & software that is geared to specific academic programmes.

**Research Lab:** University equipped with round the clock available Hi-tech research Lab. which includes latest configured systems with Hi-speed internet facility loaded with latest software for research purpose.

**Library:** The University library is the hub of knowledge with more than 105832 books, Online Journals/Magazines, Back Volumes:, Thesis & Dissertations:, News Papers: 12, Book Bank: 25850 are conveniently accessible for the students and staff of MPBOU. Library includes Main reading area, separate reading area and reference section.

The MPBOU system consists of a Central Library and Departmental Libraries which collectively support the teaching, research and extension programmes of the Institute. All students, faculty members and employees of the Institute are entitled to use the Library facilities enrolling membership.

**Internet Facilities:** One Gbps – Lease Line Link are available at the university. University is fully networked with a campus wide network interconnecting all departments. Campus is fully Wi-Fi with high Speed internet connection available round-d-clock.

**MS TEAMS Platform:** The University has acquired the Zoom platform license and has gone 100% virtual in terms of delivering the regular classes during the COVID lockdown. This has given enough experience for the faculty and expertise to handle the platform for online learning. More than 150 guest lecturers have been organised in the brief period of three weeks inviting industry experts. The MPBOU team is now digitally empowered to conduct OL classes on this virtual platform on a regular basis which shall make the learning process very effective.

**LMS:** The Institute is using MOODLE and Microsoft Teams for Online teaching andto conduct test and Assignments

**(Viii) Cost estimate of the Programme and the provisions:**

The M.C.A. in English has been prepared in-house. The internal faculty has made contribution through units. The Department has utilized the acumen and expertise of seasoned academicians in the development of the course material. The expenses incurred in outsourcing units is as follows:

Cost Estimates for Development of the Programme:

| **Programme** | **Programme Development** | **Delivery** | **Total** |
|---|---|---|---|
| M.Sc. Information Technology | 5,00000/- | 3,00000/- | 8,00000/- |

**(ix) Quality Assurance Mechanism and expected programme outcomes:**

Quality assurance mechanisms are important in ensuring that M.C.A. programs meet the desired standards and deliver the expected outcomes. The following are some of the quality assurance mechanisms that can be put in place for an M.C.A. program:

- Curriculum design and review: The curriculum of an M.C.A. program should be designed to meet the needs of the industry and reflect the latest developments and trends in the field. Regular reviews should be conducted to ensure that the curriculum remains relevant and up-to-date.
- Faculty qualifications and training: Faculty members should have the necessary qualifications and experience to teach the courses in the program. They should also receive regular training to enhance their teaching skills and keep up with the latest developments in the field.
- Student assessment: A variety of assessment methods should be used to evaluate student learning and mastery of the course material. These assessments should be aligned with the program's learning outcomes.
- Student support: Adequate support should be provided to students, including academic advising, mentoring, and counseling services. The program should also provide access to resources such as a library, online databases, and study materials.
- Continuous improvement: The program should have a process in place for continuous improvement, which involves gathering feedback from students, alumni, and employers to identify areas of strengthand weakness and make necessary adjustments.

The expected program outcomes of an M.C.A. program may include the following:

- Advanced knowledge and skills in IT: Graduates of an M.C.A. program should have advanced knowledge and skills in areas such as software development, network administration, cyber security, and data analytics.
- Critical thinking and problem-solving skills: Graduates should be able to apply critical thinking and problem-solving skills to analyze complex IT problems and develop effective solutions.
- Effective communication skills: Graduates should be able to communicate effectively with both technical and non-technical stakeholders, including colleagues, clients, and managers.
- Leadership and teamwork skills: Graduates should be able to work effectively in teams and demonstrate leadership skills in managing projects and teams.
- Ethical and professional conduct: Graduates should be aware of ethical and professional standards in theIT industry and demonstrate ethical and professional conduct in their work.

Overall, an M.C.A. program should aim to produce graduates who are well-prepared for careers in the IT industry and can make significant contributions to the field. Quality assurance mechanisms can help ensure that the program meets these goals and delivers the expected outcomes.

**Detailed Syllabus**

**FIRST YEAR**
**I Semester SYLLABUS**
**31511:Digital Techniques**

**UNIT 1 : INTRODUCTION TO NUMBER SYSTEMS**
Learning Objectives, Introduction, Number System, Decimal Number System, Binary Number System, Octal Number System, Hexadecimal Number System,Number System Conversion, Binary to Decimal Conversion, Decimal to Binary Conversion, Octal to Decimal Conversion, Decimal to Octal Conversion, Hexadecimal to decimal Conversion, Decimal to Hexadecimal Conversion, Let Us Sum Up, Further Reading, Answers to Check Your Progress, Model Questions

**UNIT 2 : BINARY ARITHMETIC**
Learning Objectives, Introduction, Complement of Numbers, (r–1)'s Complement, r's Complement, BinaryArithmetic, Addition, Subtraction, Multiplication, Division, Let Us Sum Up, Further Reading, Answers to Check Your Progress, ModelQuestions

**UNIT 3 : INTRODUCTION TO DATA REPRESENTATION**
Learning Objectives, Introduction, Data Representation, Fixed Point Representation, Floating Point Representation, Let Us Sum Up, Further Reading, Answers to Check Your Progress, Model Questions

**UNIT 4 : CODE CONVERSION**
Learning Objectives,Introduction, Computer Code, BCD number, ASCII Code, EBCDIC, Gray Code, Let Us Sum Up, Further Reading, Answers to Check Your Progress, Model Questions

**UNIT 5 : BOOLEAN ALGEBRA**
Learning Objectives, Introduction, Boolean Operators, Basic Theorems and Postulates of BooleanAlgebra, Let Us Sum Up, Further Reading, Answers to Check Your Progress, Model Questions

**UNIT 6 : LOGIC GATES**
Learning Objectives, Introduction, LogicGates, OR Gate, ANDGate, NOT Gate, NAND Gate NOR Gate, XOR Gate, XNORGate, De Morgan's Theorem, Truth Table, Conversion of the Logic Gates, Let Us Sum Up, Further Reading, Answer to Check Your Progress, Model Questions

**UNIT 7 : FLOATING POINT NUMBER REPRESENTATION**
Learning Objectives, Introduction, Floating Point Number, Normalization of Floating Point Number, Overflow and Underflow, IEEE standard for Floating Point Representation, Floating-Point Arithmetic, Addition and Subtraction, Multiplication, Division, Let Us Sum Up, Further Reading, Answers to Check Your Progress, Model Questions

**UNIT 8 : LOGIC FAMILY**
Learning Objectives,Introduction, Logic Family, Resistor Transistor Logic (RTL), Integrated Injection Logic (I2L), Diode-Transistor Logic (DTL), Emitter-Coupled Logic (ECL), Transistor-Transistor Logic (TTL), Tri State Logic, Metal Oxide Semiconductor Field-Effect Transistor (MOSFET), Let Us Sum Up, Further Reading, Answers to Check Your Progress, Model Questions

## 31512:Object Oriented Programming and C++

**UNIT-I**

Principal of OOP ,Procedure oriented Vs Object oriented, OOP paradigm, Features of OOP , Basic Data types Tokens, Keywords, Constant ,Variables, Operator I/O statements , Structure of C++ program, Arrays, pointers, Object modelling technique (OMT)

**UNIT-II**

Function, Object and Class, Defining class, Abstract class ,Function prototype, Function with parameter ,Passing object as a parameter, Constructor function ,Types of constructor, Destructor Friend function , Friend class, Dynamic allocation operator new and delete.

**UNIT-III**

Polymorphism and Inheritance ,Types of polymorphism, Constructor overloading ,Operator overloading, Template function Template class, Types of inheritance ,Private ,protected and public derivation of class ,Resolving ambiguity Pointer to object, This pointer ,Virtual class , virtual function

**UNIT-IV**

Input - output and File handling I/O classes ,File and stream classes ,Opening and closing file Detecting end of file, String I/O**,** Char I/O, Object I/O, I/O with multiple object ,File pointer, Disk I/O**.**

**UNIT-V**

Exception handling, Name spaces and Standard Template library (STL), Need of Exception handling, try, catch and throws keywords, defining namespace, benefit of namespace, Component of STL.

**References:**


1. Object Oriented Programming with C++ programming ,E.Balaguruswamy,Mc GrawHill .
2. C++ Complete reference. By Herbert Schildt, Mc Graw Hill
3. Principles and Practices using C++ , Bjarne Stroustrup, Addison Wesley
4. Mastering C++ b, Venugopal , Mc Graw Hill
5. Object Oriented Programming in C++ , Robert Lafore, Galgotia Pub.

## 31513:Data Structure and Algorithms

### Unit I

Basics: Basic terminologies; introduction to basic data Structures: Arrays, linked list, trees, stack, queue, Graph; Data structure operations; Algorithm complexity: definition, types and notations .

### Unit II

Stacks, Queues and Recursion: Stacks; Array representation of stack; Linked representation of stack; Various polish notation's-Prefix, Postfix, infix; Evaluation of a postfix & Prefix expression; Conversion from one another; Application of stack; Recursion; Towers of Hanoi; Implementation of recursive procedures by stacks; Queues; Linked representation of queues; Dequeues; Circular queue; Priority queue; Singly Linked list- Operation on it; Doubly linked list- Operation on it; Circular linked list.

### Unit III

Trees: Binary trees; Representation of binary tree in memory; Traversing binary tree; Traversing using stack; Header nodes; Binary search trees; Searching and inserting in binary search trees; Deleting in a binary search tree; AVL search trees; Insertion and deletion in binary search trees; m-way search trees: searching, insertion, deletion;
B trees: searching, insertion, deletion; Heap.

### Unit IV

Algorithm Design techniques: Divide and Conquer, Greedy, Dynamic programming, backTracking. Searching algorithm: linear search, binary search; Sorting algorithms: Bubble sort, Insertion sort, Selection sort, Quick Sort, Merge sort and Heap sort, Hashing, Hash function.

### Unit- V

Graphs: Terminology & representation; Linked representation of graph; Operation on graph; Traversing a graph. Depth First Search, BFS, Warshall algorithm, Dijkstara algorithm,

Minimum spanning tree; Kruskal & Prim's algorithm,

### References:


1. Data Structure , Lipschutz , Mc Graw Hill.
2. Data Structures with C++", John R. Hubbard, Schaum's Outline, Tata McGraw
3. Hill.
4. Data Structure using C, AM Tanenbaum, Y Langsam and MJ Augenstein, Prentice-Hall, India

Data structures, Algorithms, and Applications in Java", Sahani, McGraw Hill

## 31514:Discrete Mathematics

**Unit - I**

**Arithmetic Progression,** Sequence, Series, Arithmetic Progression, The General Term or *n*th Term of an AP., The Sum of *n* terms of an AP., Arithmetic Mean, AM. of two Given Numbers, Insertion of N AM. Between Two Given Numbers Properties of A P.

**Geometric Progression**, Definition, The *n*th Term of G.P., The Sum of N Terms of a G.P., The Sum of an Infinite G.P., Recurring Decimal an Infinite G.P., Geometric Means, Geometric Mean of Two Given Numbers A and B Insertion of N Geometric Means Between Two Quantities Properties of G.P., To Find the Sum of N Terms of the Series.

**Harmonic Progression,** Definition, Harmonic Mean (H.M) of Two Given Numbers Relation between AM., G.M. and H.M.

**Unit - II**

**Miscellaneous Series,** Arithmetic - Geometric Series, The Sum of *n* Terms of the Arithmetic - Geometric Series Sigma (CE) Notation, Sum of first *n* Natural Numbers, The Sum of the Squares of First *n* Natural Numbers, The Sum of the Cubes of First *n* Natural Numbers Method of Difference.

**Set Theory,** The Concept of a Set, Notations, Representation of a Set, Types of Sets, Theorem on Subsets, Number of Subsets of a Set, Venn Diagram, Set Operations, Laws of Union of sets, Laws of Intersection of Sets, Law of Complement of a Set, Theorem (on Symmetric Difference) De-Morgan's Laws, Applications of Venn Diagrams.

**Unit - III**

**Ordered Pairs, Relations & Functions,** Ordered Pairs, Equality of Ordered Pairs, Cartesian Product of Sets, Theorems on Cartesian Products' Relation, Domain and Range of a Relation, Inverse Relation, The Inverse of an Inverse Relation, *Binary* (or Dyadic) relations , Type of Relations, Equivalence Relations, Equivalence Class, Properties of Equivalence Classes Composition of Two Relations, Partition of a Set, Partial Order, Theorem, Functions (Mapping), Types of Mapping, Other Specific Mappings, Types of Binary Operations, Algebraic Structure, Graph of a Function, Real Valued Map., Product of 'Functions, Method of Construction of Operation Table Countable and-Uncountable Sets.

**Group Theory,** Introduction-Algebraic Structures, Groups: Definition, Abelian Group, Order of a Group, Semi-group, Some General Properties of Groups, Some Important Theorems on Groups, Theorem on Subgroups, Homomorphism (Definition), Isomorphism (Definition), Theorems on Homomorphism, Definition (Kernel of *f*), Theorems on Homomorphism, Definition (Cyclic Groups), Fundamental Theorem of Homomorphism,

**Unit - IV**

**Rings and Fields,** Quotient Spaces, Rings in General, Some Special Classes of Rings, Field and its Axioms, Sub-ring and Sub-fields, **Vector Space**, Definition, Linear Combination, Linear Independence and linear Dependence, Basis of Vector Space, Vector Space of linear Transformation, Linear Algebra, Algebra of Quaternions

**Unit - IV**

**Posets and lattices,** Partially Ordered Sets (Posets), Totally Order Set, Diagrammatic Representation of a Poset: (Hasse Diagram) Definitions, Maximal Element, Minimal Element, Duality, Product of Two Posets, lattice, Duality and the Idempotent Law, Semi-lattices, Complete lattices, Sub lattice, Convex Sub lattice, Distributive lattice, Complements, Complemented lattices.

**FIRST YEAR**
**II Semester SYLLABUS**

**31521:Numerical Methods & Statistical Analysis**

## UNIT 1 REPRESENTATION OF NUMBERS

Introduction , Objectives , Introduction to Numerical Computing , Limitations of Number Representations, Arithmetic Rules for Floating Point Numbers , Errors in Numbers and Measurement of Errors , Generation and Propagation of Round-Off Error , Round-Off Errors in Arithmetic Operations , Errors in Evaluation of Functions, Characteristics of Numerical Computation , Computational Algorithms , Solving Equation , Bisection Method and Convergence of the Iterative Method , Newton-Raphson Method , Secant Method , Regula-Falsi Method , Descarte's Rule , Answers to 'Check Your Progress' , Summary , Key Terms , Self-Assessment Questions and Exercises, Further Reading

## UNIT 2 INTERPOLATION AND CURVE FITTING

Introduction , Objectives, Interpolation , Iterative Linear Interpolation , Lagrange's Interpolation , Finite Difference for Interpolation , Symbolic Operators , Shift Operator , Central Difference Operator , Differences of a Polynomial, Newton's Forward Difference Interpolation Formula , Newton's Backward Difference Interpolation Formula , Extrapolation , Inverse Interpolation , Truncation Error in Interpolation , Curve Fitting , Method of Least Squares, Trigonometric Functions , Regression , Linear Regression , Polynomial Regression , Fitting Exponential , Answers to 'Check Your Progress' ,Summary , Key Terms , Self-Assessment Questions and Exercises ,Further Reading

## UNIT 3 NUMERICAL DIFFERENTIATION AND INTEGRATION

Introduction , Objectives , Numerical Differentiation Formula , Differentiation Using Newton's Forward Difference Interpolation Formula , Differentiation Using Newton's Backward Difference Interpolation Formula , Numerical Integration Formule , Simposon's One-Third Rule , Weddle's Formula , Errors in Itegration Formulae

Gaussian Quadrature, Solving Numerical , Taylor Series Method , Euler's Method , Runge-Kutta Methods , Higher Order Differential Equations , Answers to 'Check Your Progress' , Summary , Key Terms ,Self-Assessment Questions and Exercises , Further Reading

## UNIT- 4- STATISTICAL COMPUTATION AND PROBABILITY DISTRIBUTIONA

Introduction , Objectives , History and Meaning of Statistics ,Scope of Statistics, Various Measures of statistical computations , Average , Mean , Median ,Mode , Geometric Mean , Harmonic Mean , Quartiles, Percentiles and Deciles , Box Plot , Measures of Dispersion , Range , Quartile Deviation , Mean Deviation ,Standard Deviation , Calculation of Standard Deviation by Short-cut Method, Combining Standard Deviations of Two Distributions , Comparison of Various Measures of Dispersion , Probability ,Probability Distribution of a Random Variable , Axiomatic or Modern Approach to Probability , Theorems on Probability4.6.4 Counting Techniques

Mean and Variance of Random Variables , Standard Probability Distribution , Binomial Distribution , Poisson Distribution , Exponential Distribution , Normal Distribution , Uniform Distribution (Discrete Random and Continous Variable) , Answers to 'Check Your Progress', Summary , Key Terms , Self-Assessment Questions and Exercises , Further Reading

## UNIT 5 ESTIMATION AND HYPOTHESIS TESTING

Introduction , Objectives , Sampling Theory, Parameter and Statistic , Sampling Distribution of Sample Mean, Sampling Distribution of the Number of Successes ,The Student's Distribution , Theory of Estimation, Point Estimation, Interval Estimation , Hypothesis Testing , Test of Hypothesis Concerning Mean and Proportion , Test of Hypothesis Conerning Standard Deviation , Answers to 'Check Your Progress', Summary , Key Terms ,Self-Assessment Questions and Exercises, Further Reading

## 31523: Computer Graphics

**Unit -I**

Overview of Graphics Systems: Video Display Devices , Refresh cathode ray tubes, Refresh scan displays, Random scan displays, color CRT Monitors, DVST, Flat- Panel displays, Three Dimensional viewing devices, Raster scan systems, Input Devices: Keyboards, Mouse, Track ball, Joysticks, Data Glove, Touch Panels, Light pens.

**UNIT –II**

Curves and Surfaces:Line Drawing Algorithm, DDA Algorithm, Bresenham's Line Drawing Algorithm, Bresenham's Circle Drawing Algorithm, Ellipse Drawing Algorithm, Pixel Addressing and object geometry: Screen Grid coordinates, Maintaning Goemetry propertiesof Displayed objects.

**UNIT –III**

Geometric Transformation:Homogeneous Coordinate System for 2D and 3D, Various 2D, 3D Transformation matrices (Translation, Scaling, Rotation, Shear), Rotation about an arbitrary point (2D), Rotation about an arbitrary axis (3D), Computing location of V.P, Clipping Algorithms, Sutherland-Cohen Clipping Algorithm.

**UNIT-IV**

Curves and Visible Surface Detection Methods: Bezier Curves, 4 point and 5 point Bezier curves using Bernstein Polynomials, B-Spline Curves, Computing control points given end slopes for a specified curve segment. Back Face Detection, Depth Buffer (Z-Buffer, A- Buffer) Method, Scan Line Method, Depth Sorting Method, Area Subdivision Method.

**UNIT –V**

Illumination Model and Surface Rendering: Basic Illumination models, shading models for curve surfaces, Half tone Pattern and Dithering Techniques, Rendering, Color Models: XYZ Color Model, RGB, YIQ, CMY, HSV, HLS.

**References:**


1. Computer Graphics, D. Hearn and P. Baker, Prentice Hall.
2. Computer Graphics, R. Plastock and Z.Xiang, Schaum's Series, McGraw Hill.
3. Computer Graphics Principles & Practice, Foley et. al., Addison Wesley.
4. Procedural Elements for Computer Graphics, David F. Rogers, McGraw Hill.
5. Principles of Interactive Computer Graphics, W. Newman and R. Sproul, McGraw-Hill.