Re-Accredited 'B++' 2.86 CGPA by NAAC
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
Tel : +91 - 261 - 2227141 to 2227146, Toll Free : 1800 2333 011, Digital Helpline No.- 0261 2388888
E-mail : info@vnsgu.ac.in, Website : www.vnsgu.ac.in

ક્રમાંકઃઓથો./પરિપત્ર/૧૦૦૪૨/૨૦૨૬
તા.૦૨/૦૬/૨૦૨૬

પ્રતિ,
વિભાગીય વડાશ્રી,
કોમ્પ્યુટર સાયન્સ વિભાગ,
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી,
સુરત.

વિષયઃ– Master of Computer Application (MCA) Sem-1 & 2 ના અભ્યાસક્રમ અંગે.

સુજ્ઞશ્રી,

સવિનય જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૬–૨૭ થી અમલમાં આવનાર MCA Semester-1 & 2 નો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ કોમ્પ્યુટર સાયન્સ વિષયની અભ્યાસ સમિતિની તા.૨૫/૦૩/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંકઃ૦૭ થી મંજૂર કરી કોમ્પ્યુટર સાયન્સ ફેકલ્ટીને કરેલ ભલામણ કોમ્પ્યુટર સાયન્સ ફેકલ્ટીની તા. ૨૯/૦૪/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંકઃ૦૪ થી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલ ની તા.૦૭/૦૫/૨૦૨૬ ની સભાનાં ઠરાવ ક્રમાંકઃ૪૭ થી મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

બિડાણઃ ઉપર મુજબ

કુલસચિવ(ઇ.ચા.)

પ્રતિ,
૧) ઈ.ચા.ડીનશ્રી, કોમ્પ્યુટર સાયન્સ વિદ્યાશાખા.
૨) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....તરફ જાણ તેમજ અમલ સારૂ.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

MASTER OF COMPUTER APPLICATIONS

Name of Program	**Master of Computer Applications**
Program Abbreviation	**MCA**
Duration	**2 Years**
Eligibility Criteria	B.C.A or B.Sc. (Computer Science) or B.Sc (IT) or B.E. (CSE) or B.Tech (CSE) or B.E. (IT) or B.Tech. (IT) or equivalent Degree OR Passed B.Sc./ B.Com./ B.A. with Mathematics at 10+2 Level or at Graduation Level (with additional bridge Courses as per the norms of the concerned University).
Pre-requisite	Fundamentals of Computers and Programming
Medium of Instruction	English
Objective of Program	The core objective of the MCA programme is to prepare the students for productive career in software industry and academia by providing an outstanding environment of teaching and research in the core and emerging areas of the discipline.
Program Outcome (PO)	**PO1: Fundamental Knowledge Enrichment** Program trains students with the core computer science and Information Technology (IT) knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2: Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3: Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry.. **PO4: Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5: Nurturing Research Oriented Approach** The program trains students for designing and conceptualizing the software architecture, planning and managing the product development process of complex and live software projects. It also makes students understand the decision making for selection of an appropriate project management capabilities. **PO6: Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7: Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the project management team.
Program Specific Outcomes (PSO)	**PSO1:** Develop and strengthen the fundamental core concepts that are required to solve complex problems **PSO2:** Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership

	PSO3: Nurture the students to investigate for the design and development of a workable solution for a real world problem **PSO4:** Develop students for self-learning and practicing challenging problem solution **PSO5:** Train students to apply managerial skills to develop business applications. **PSO6:** Train students to use recent computer science and application domain specific knowledge **PSO7:** Train students to take-up the real world challenges to develop workable solution to a domain specific problem **PSO8:** Inculcate the passion for continuous learning and doing research for making a successful professional career
Mapping between POs and PSOs	

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1	■		■		■		■	■
PO2	■	■	■		■		■	■
PO3		■	■	■		■	■	■
PO4		■	■	■		■	■	■
PO5		■	■		■	■		
PO6	■	■	■	■	■	■	■	■
PO7		■	■	■	■		■	

Structure of Program (Semester-wise) MCA Semester - I

Course Code	Course Title	Marksheet Title in English	Teaching Hours/Week		Exam Duration		Credit		Internal Marks		External Marks		Total Marks	
			TH	PR	TH	PR	TH	PR	TH	PR	TH	PR	TH	PR
101	Database Management Systems	Database Management Systems	4	-	3 Hrs.	-	4	-	30	-	70	-	100	-
102	Object Oriented Programming Methodology	Object Oriented Programming Methodology	4	-	3 Hrs.	-	4	-	30	-	70	-	100	-
103	Cloud Computing	Cloud Computing	4	-	3 Hrs.	-	4	-	30	-	70	-	100	-
104	Computer Network	Computer Network	4	-	3 Hrs.	-	4	-	30	-	70	-	100	-
105	Data Structures and Design and Analysis of Algorithms	Data Structures and Design and Analysis of Algorithms	4	-	3 Hrs.	-	4	-	30	-	70	-	100	-
106	Programming Skills - I	Programming Skills - I	--	3		2 Hrs.	-	3	-	30	70	-	-	100
107	Programming Skills – II	Programming Skills – II	-	3		2 Hrs.	-	3	-	30	70	-	-	100
108	Programming Skills – III	Programming Skills – III	-	4		2 Hrs.	-	4	-	30	70	-	-	100

Structure of Program (Semester-wise) MCA Semester - II

Course Code	Course Title	Marksheet Title in English	Teaching Hours/Week		Exam Duration		Credit		Internal Marks		External Marks		Total Marks	
			TH	PR	TH	PR	TH	PR	TH	PR	TH	PR	TH	PR
201	Artificial Intelligence	Artificial Intelligence	4	-	3 Hrs.	-	4	-	30	-	70	-	100	-
202	Front End Technologies	Front End Technologies	4	-	3 Hrs.	-	4	-	30	-	70	-	100	-
203	Programming in .NET	Programming in .NET	4	-	3 Hrs.	-	4	-	30	-	70	-	100	-
204	Python Programming Language OR Blockchain Technology	Python Programming Language OR Blockchain Technology	4	-	3 Hrs.	-	4	-	30	-	70	-	100	-
205	Cross-Platform Mobile Application Development	Cross-Platform Mobile Application Development	4	-	3 Hrs.	-	4	-	30	-	70	-	100	-
206	Programming Skills – IV	Programming Skills – IV	-	3	-	2 Hrs.	-	3	-	30	70	-	-	100
207	Programming Skills – V	Programming Skills – V	-	2	-	2 Hrs.	-	2	-	30	70	-	-	100
208	Programming Skills – VI	Programming Skills – VI	-	2	-	2 Hrs.	-	2	-	30	70	-	-	100
209	Programming Skills – VII	Programming Skills – VII		3	-	2 Hrs.	-	3	-	30	70	-	-	100

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	**Master of Computer Applications**					
Semester	**I**					
Course Code	**101**					
Course Title	**Database Management System**					
Credit	**Theory:**	**4**	**Practical:**	**0**	**Total:**	**4**
Effective From	**Academic Year : 2026-2027**					

Course Outcomes

CO1: Differentiate between relational, hierarchical, network, and NoSQL models and apply key DBMS concepts such as keys, functional dependencies, and referential integrity.
CO2: Explain Oracle Database Server architecture, including physical and logical structures, instance components, and startup/shutdown mechanisms.
CO3: Manage Oracle databases by configuring parameter files, creating databases, and working with different database modes.
CO4: Develop database applications using SQL and PL/SQL by writing stored procedures, functions, cursors, triggers, and packages.
CO5: Administer Oracle databases by managing user accounts, authentication, profiles, tablespaces, resource quotas, and performing backup and recovery.
CO6: Implement database security by configuring privileges, managing roles, and enforcing object and system-level security with appropriate authentication.

Mapping between Cos and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■			■		■		
CO2	■			■		■	■	
CO3	■		■	■	■	■	■	
CO4	■		■	■		■	■	
CO5	■			■	■	■	■	
CO6			■		■	■	■	

Course Content

Unit – 1: Database Computing Models & Fundamentals

1.1 Introduction to Data Models
- 1.1.1 Conceptual Data Model: E-R Model
- 1.1.2 Record-based Data Models: Hierarchical, Relational, Network

1.2 Introduction to NoSQL Data Models
1.3 Comparison of SQL and NoSQL
1.4 Important Terminologies in DBMS
- 1.4.1 Notion of Keys (Super Key, Candidate Key, Primary Key, Foreign Key)
- 1.4.2 Referential Integrity Constraint
- 1.4.3 Functional Dependencies

Unit – 2: Oracle Database Server Architecture & Management

2.1 Architecture of Oracle Database and Oracle Instance
2.2 Overview of Physical and Logical Structures
2.3 Oracle Server Start-up and Shutdown
2.4 Managing Databases
- 2.4.1 Parameter File
- 2.4.2 Creating Database

	2.4.3 Startup and Shutdown 2.4.4 Database Modes **Unit – 3: Oracle Tools and Utilities** 3.1 SQL 3.2 PL/SQL Procedural Extension 3.2.1 Overview, PL/SQL Data Types & Control Structures 3.2.2 Cursors 3.2.3 Stored Procedures & Functions 3.2.4 Database Triggers 3.2.5 Package Creation **Unit – 4: Database Administration & Security** 4.1 Managing Users 4.1.1 User Authentication Methods 4.1.1.1 Password Authentication 4.1.1.2 O.S Authentication 4.1.2 User Configuration Setup 4.1.2.1 Profiles 4.1.2.2 Default Tablespace 4.1.2.3 Temporary Tablespace 4.1.3 Resource Management 4.1.3.1 Quotas 4.1.4 Working with User Database Accounts 4.1.4.1 Creating, Modifying, and Deleting User Accounts 4.1.4.2 Changing Password 4.2 Backup & Recovery 4.3 Database Security 4.3.1 Authentication 4.3.2 Privileged Accounts & Privileges 4.3.3 Object Security 4.3.4 System Security 4.3.5 Database Roles
Reference Books	1 Oracle 9i PL/SQL Programming -Scott Urman-Oracle Press 2 Oracle DBA Fundamentals-I - Oracle Press 3 Effective PL/SQL: - Apress 4 Expert Oracle Database Architecture 9i and 10g-Tom Kyte- Apress 5 Effective Oracle by Design - Peter Norton - Tom Kyte-Oracle Press 6 Oracle 24 X 7 Tips and Techniques - Venkat Devraj- Oracle Press 7 Expert Oracle Database 11g Administration - Alpati- Wiley Student Edition 8 Fundamentals of Database Management System- Gilleneon-Wiley Student Edition 9 SQL & PL/SQL for Oracle 11g Black Book - Deshpande-McGraw Hill 10 Beginning Oracle Database 11g Administration from novice to professional-Iggy Fernandez - Apress/Springer 11 Oracle PL/SQL-Benjamin Rosenweig & Elena Silvestrova-4/e, Pearson 12 Database Systems Using Oracle: A simplified guide to SQL & PL/SQL- Shah Nilesh- PHI 13 Learning Oracle SQL & PL/SQL: A Simplified Guide- Chatterjee, Rajeeb C- PHI 14 NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Pramod J Sadalage, Martin Fowler, Wiley 15 Professional NoSQL, Shashank Tiwari, Wiley
Teaching Methodology	Class Work, Discussion, Self Study, Seminars and/or Assignment
Evaluation Method	Internal Assessment : __30_____ Marks External Assessment : _70_____ Marks

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	**Master of Computer Applications**					
Semester	**I**					
Course Code	**102**					
Course Title	**Object Oriented Programming Methodology**					
Credit	**Theory:**	**4**	**Practical:**	**0**	**Total:**	**4**
Effective From	**Academic Year : 2026-2027**					

Course Outcomes

CO1 - Apply C++ fundamentals including data types, pointers, and I/O operations to develop basic programs.
CO2 - Implement OOP concepts such as classes, objects, encapsulation, constructors, and destructors to design modular programs.
CO3 - Apply abstraction, inheritance, and polymorphism to build extensible and reusable object-oriented solutions.
CO4 - Utilize dynamic polymorphism through virtual functions, overriding, and abstract classes to design flexible software.
CO5 - Implement file handling, exception handling, and error management techniques in C++ applications.
CO6 - Develop generic programs using template classes, template functions, and STL components like containers, iterators, and algorithms.

Mapping between Cos and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■			■		■		
CO2	■		■	■		■	■	
CO3	■		■	■		■	■	
CO4	■		■	■		■	■	■
CO5	■		■	■	■	■	■	
CO6	■		■	■		■	■	■

Course Content

Unit – 1: Object Oriented Fundamentals

1.1 Data Types
1.2 Pointers
  1.2.1 Pointer Arithmetic
  1.2.2 Array of Pointers
  1.2.3 Dynamic Array
1.3 ios Class
1.4 Input and Output
1.5 Manipulators

Unit – 2: Object Oriented Programming Concepts

2.1 Structure, Classes and Objects
2.2 Encapsulation & Data Hiding
2.3 Constructors & Destructors
2.4 Friend Functions
2.5 Inline Functions
2.6 Dynamic Object Creation & Destruction
2.7 Static Members
2.8 this Pointer

	Unit – 3: Object Oriented Properties 3.1 Introduction to Object Oriented Properties 3.2 Abstraction 3.3 Polymorphism 3.3.1 Operator Overloading 3.3.2 Function Overloading & Type Conversions 3.4 Inheritance 3.4.1 Types of Inheritance 3.4.2 Constructor & Destructor Calls during Inheritance 3.5 Dynamic Polymorphism 3.5.1 Overriding 3.5.2 Virtual Functions 3.5.3 Abstract Class **Unit – 4: File Handling, Exception Handling & Generic Programming** 4.1 Streams 4.2 File Types and Modes 4.3 File Pointers & their Manipulations 4.4 Sequential Input & Output Operations 4.5 Random Access 4.6 Error Handling during File Operations 4.7 Exception Handling 4.8 Template Classes 4.9 Template Functions 4.10 Implementation of Object-Oriented Properties on Template Classes 4.11 STL 4.11.1 Algorithms 4.11.2 Containers 4.11.3 Functions 4.11.4 Iterators
Reference Books	1. The C++ Programming Language, Stroustrup, Addison Wesley 2. The Complete Reference C++, Schildt, Tata McGraw Hill 3. OOP in Turbo C++, Robert Lafore, Galgotia Publication 4. C++ Primer, Lippman, Addition Wesley 5. Object Oriented Programming with ANSI and Turbo C++, Kamthane, Pearson Education 6. Thinking in C++, Bruce Eckel, Pearson 7. Object Oriented Modelling & Design, Rumbaugh, PHI 8. Object Oriented Analysis & Design with Application, Grady Booch, LPE 9. Standard C++ with Object Oriented Programming, Paul S. Wang, Thomson 10. C++ Primer Plus, Stephan Prata, Addison Wesley 11. Programming with ANSI C++, Bhushan Trivedi, Oxford University Press
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	Internal Assessment : __30_____ Marks External Assessment : _70_____ Marks

[Subject code-2111040101030002]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS

Program Name	**Master of Computer Applications**					
Semester	**I**					
Course Code	**103**					
Course Title	**Cloud Computing**					
Credit	**Theory:**	**4**	**Practical:**	**0**	**Total:**	**4**
Effective From	**Academic Year : 2026-2027**					

Course Outcomes

CO1: Explain students about the cloud and cloud computing, History & Evolution, Properties & Characteristics, Advantages & Disadvantages of cloud computing.
CO2: Explain students about various service models and deployment models
CO3: To provide students a foundation of different cloud service models IAAS,PAAS and SAAS so that they are able to use Cloud Computing Services in real world problem
CO4: Understanding the concepts of cloud infrastructure security, data security and storage, Access control and authentication in the cloud.
CO5: Train students to use AWS, Microsoft Azure, Google workspace etc.
CO6: Explain students in brief about DevOps

Mapping between Cos and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■							
CO2		■	■	■	■	■		
CO3		■	■		■	■	■	
CO4	■	■	■			■		
CO5		■	■	■	■	■	■	■
CO6	■	■						

Course Content

Unit 1: Introduction to Cloud & its architecture

1.1 Introduction & Definitions
1.2 Cloud Computing (NIST)
- 1.2.1 History & Evolution
- 1.2.2 Properties & Characteristics
- 1.2.3 Advantages & Disadvantages

1.3 Cloud Architecture overview
1.4 Comparison with traditional system
1.5 Service Models
- 1.5.1 Infrastructure as a Service (IaaS)
- 1.5.2 Platform as a Service (PaaS)
- 1.5.3 Software as a Service (SaaS)

1.6 Deployment Models
- 1.6.1 Public Cloud
- 1.6.2 Private Cloud
- 1.6.3 Hybrid Cloud
- 1.6.4 Community Cloud

Unit 2: Cloud Service Models

2.1 Infrastructure as a Service (IAAS)
- 2.1.1 Introduction to Virtualization
  - 2.1.1.1 Hypervisors, Virtual Machine, Machine Image
  - 2.1.1.2 Virtual Machines Provisioning and Manageability

	2.1.1.3 Virtual Machine Migration Services 2.1.2 Resource Virtualization 2.1.2.1 Server, Storage, Network 2.1.3 Amazon EC2 2.2 Platform as a Service (PAAS) 2.2.1 Features and benefits of PASS 2.2.2 Introduction to SOA 2.2.3 Introduction to Google App Engine 2.3 Software as a Service (SAAS) 2.3.1 Features and benefits of SASS 2.3.2 Web Service 2.3.3 A case study of SaaS platforms such as Microsoft 365 and Google Workspace **Unit 3: Cloud Security** 3.1 Infrastructure Security 3.2 Security Issues to Cloud Computing 3.3 Data Security and Storage 3.4 Identity and Access Management (IAM) 3.5 Access Control 3.6 Authentication in Cloud **Unit 4: Cloud Databases (DBaaS) and DevOps** 4.1 AWS RDS 4.2 Microsoft SQL Azure 4.3 Introduction to BigTable 4.4 Introduction to DevOps 4.4.1 Why DevOps 4.4.2 DevOps Lifecycle 4.4.3 CI/CD pipeline 4.4.4 Cloud & DevOps
Reference Books	1. Cloud Computing Principles and Paradigms (Wiley), Rajkumar Buyya, James Broberg, Andrzej M. Goscinski 2. Cloud Computing: Principles, Systems and Applications, Nikos Antonopoulos, Lee Gillam (Springer) 3. Enterprise Cloud Computing: Technology, Architecture, Applications Gautam Shroff - Cambridge University Press 4. Cloud and Virtual Data Storage Networking, Greg Schulz - Auerbach 5. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L Krutz, Russel Dean Vines (John Wiley & Sons) 6. Cloud Computing , (David Crookes - TMH Education) 7. Cloud Computing Bible, Barrie Sosinsky (Wiley India) 8. Cloud Computing: Implementation, Management and Security, (James F Ransome, John W Rittinghouse - CRC Press) 9. Amazon Cloud Computing with Java, (Aditya Yadav - Lulu.com) 10. Grid and Cloud Database Management, Fiore, Sandro, Aloisio, Giovanni - Springer Building a Database Cloud for Dummies, Michael Wessler John Wiley & Sons
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	Internal Assessment : 30 Marks External Assessment : 70 Marks

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	**Master of Computer Applications**					
Semester	**I**					
Course Code	**104**					
Course Title	**Computer Network**					
Credit	**Theory:**	**4**	**Practical:**	**0**	**Total:**	**4**
Effective From	**Academic Year: 2026-27**					

Course Outcomes

CO1: Explain networking fundamentals, models, devices, and transmission techniques.
CO2: Apply classful and classless IP addressing and perform subnetting.
CO3: Analyze IPv4 packet structure, fragmentation, and checksum process.
CO4: Understand cryptography concepts and network security mechanisms.
CO5: Explain DNS, DHCP, network monitoring, and troubleshooting processes.

Mapping between Cos and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■							
CO2	■							
CO3	■							
CO4	■	■	■	■			■	■
CO5		■	■	■		■	■	■

Course Content

Unit 1: Fundamentals of Computer Networks

1.1 Introduction to Networks
- 1.1.1 Introduction to Networks
- 1.1.2 Internet and its Applications
- 1.1.3 Types of Networks

1.2 Network Models and Protocols
- 1.2.1 OSI Reference Model
- 1.2.2 TCP/IP Model
- 1.2.3 Basic Protocols of TCP/IP Model

1.3 Transmission and Network Architecture
- 1.3.1 Transmission Media
- 1.3.2 Network Topologies

1.4 Network Devices

1.5 Network Techniques and Security Basics
- 1.5.1 Multiplexing Techniques
- 1.5.2 Switching Techniques
- 1.5.3 Introduction to Proxy
- 1.5.4 Firewall
- 1.5.5 Types of Firewalls

Unit 2: IP Addressing Concepts

2.1 Introduction to IP Addresses
- 2.1.1 Address Space
- 2.1.2 Notation and Range of Addresses
- 2.1.3 Operations

2.2 Classful Addressing

2.2.1 Classes
2.2.2 Classes and Blocks
2.2.3 Two-Level Addressing
2.2.4 Three-Level Addressing: Subnetting
2.2.5 Supernetting
2.3 Classless Addressing
2.3.1 Variable-Length Blocks
2.3.2 Two-Level Addressing
2.3.3 Block Allocation
2.3.4 Subnetting
2.4 Special Addresses
2.4.1 Special Blocks
2.4.2 Special Addresses in Each Block
2.5 IPv6 Addressing
2.5.1 IPv6 Address
2.5.2 IPv6 Address Resolution

Unit 3: IPv4 Addressing and Packet Structure
3.1 Introduction to IPv4 Structure
3.1.1 Overview of IPv4 Structure
3.2 IPv4 Datagrams
3.2.1 IPv4 Datagram Format
3.3 Fragmentation
3.3.1 Maximum Transfer Unit (MTU)
3.3.2 Fields Related to Fragmentation
3.4 IP Options
3.4.1 Format
3.4.2 Option Types
3.5 Checksum
3.5.1 Checksum Calculation at Sender
3.5.2 Checksum Calculation at Receiver
3.5.3 Checksum in IP Packet

Unit 4: Cybersecurity
4.1 Cybersecurity Essentials
4.1.1 Data Compression Techniques
4.1.2 Cryptography
4.1.3 Types of Cryptography
4.1.4 Applications of Cryptography
4.1.5 Symmetric Key Cryptography
4.1.6 Asymmetric Key Cryptography
4.1.7 Public-Key Cryptography
4.1.8 PKI Architecture
4.1.9 Management of Public Keys
4.1.10 Certifying Authorities
4.1.11 Digital Certificates
4.1.12 Digital Signatures
4.1.13 Communication Security
4.2 Domain Name System (DNS)
4.2.1 Introduction to DNS
4.2.2 Types of Domains
4.2.3 Organization of Domain
4.2.4 Working of DNS
4.2.5 DNS Resolution
4.2.6 Authoritative DNS Server vs Recursive DNS Resolver
4.2.7 DNS Messages
4.2.8 Types of Records
4.2.9 DNS Lookup
4.2.10 Types of DNS
4.3 Network Services

	4.3.1 Dynamic Host Configuration Protocol (DHCP) 4.3.2 Network Time Protocol (NTP) 4.4 Network Monitoring 4.4.1 Simple Network Management Protocol (SNMP) 4.4.2 ICMP 4.5 Network Troubleshooting 4.5.1 Network Events 4.5.2 Troubleshooting Processes
Reference Books	1. TCP/IP Protocol Suite – Behrouz A. Forouzan, McGraw Hill Education 2 Networking Complete- 1st Edition 2002, BPB Publication (Text Book) 3. Data Communication and Networking: Forouzan, TMH 4. Computer Networks - A. S. Tanenbaum - Prentice-Hall 5. Computer Networks and Distributed Processing - Martin J. - Pretice-Hall 6. Local Area Networks: An Introduction - Stalling, William - Mc-Millan Publishing Co. 7. Computer Networks: Protocols, Standards and Interfaces - Black – Prentice-Hall 8. Data Networks: Concepts Theory and Practices - Black - PHI 9. N/W Architecture - Comer - Prentice-Hall
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	Internal Assessment : 30 Marks External Assessment : 70 Marks

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	**Master of Computer Applications**					
Semester	**I**					
Course Code	**105**					
Course Title	**Data Structures and Design and Analysis of Algorithms**					
Credit	**Theory:**	**4**	**Practical:**	**-**	**Total:**	**4**
Effective From	**Academic Year : 2026-27**					

Course Outcomes

CO1: Explain and implement linear data structures such as arrays, stacks, queues, and linked lists along with their operations and applications.
CO2: Implement and analyze non-linear data structures such as trees, binary search trees, AVL trees, and 2–3 trees for efficient data representation and manipulation.
CO3: Analyze the time and space complexity of algorithms using asymptotic notations including Big-O and evaluate algorithm efficiency.
CO4: Apply algorithm design techniques such as Divide & Conquer, Greedy method, Backtracking, and Branch & Bound to solve computational problems.
CO5: Design and compare various searching and sorting algorithms based on their computational complexity and suitability for applications.
CO6: Design and implement hash tables using appropriate hash functions and collision resolution techniques for real-world problem solving.

Mapping between Cos and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■							■
CO2	■	■	■			■		
CO3	■		■		■	■	■	
CO4		■	■		■	■	■	
CO5		■		■	■	■		■
CO6	■	■	■	■	■	■	■	■

Course Content

Unit - 1 Non-Primitive (Linear) Data Structures

1. Arrays - Storage structures & operations
2. Stacks
    1. Operations
    2. Applications
        1. Subprogram call return & Recursion,
        2. Polish expression - conversion and evaluation
3. Queues
    1. Types of queues, operations and applications.
    2. Linked lists
        1. Types of linked list
        2. Operations
        3. Applications

Unit – 2 Non-Primitive (Linear) Data Structures

1. Trees - Concept and Definitions
2. Representation of Binary Trees.

	1. linked & threaded storage 2. Operations 3. Applications of Trees - The manipulation of Arithmetic expressions, Symbol-table construction, Syntax Analysis etc. **Unit – 3 Algorithm Analysis & Searching and Sorting Algorithm** 1. Analysis of Algorithms 1. Prior analysis for the time complexity of algorithms 2. Asymptotic notation - Big-O 2. Basic techniques of algorithms 1. Divide & Conquer method 2. Greedy method 3. Backtracking 3. Searching techniques 1. Sequential search 2. Binary Search 3. Search Trees 1. Binary Search Tree 2. Height Balanced Tree – AVL tree, 2:3 tree 4. Sorting Algorithms 1. Internal sorting - Insertion, Selection, Quick, 2-way merge and Heap 2. External sorting - k-way merging **Unit – 4 Hash Data Structure** 1. Introduction to Hash Tables 2. Hash functions 1. Division method 2. Multiplication method 3. Collision resolution techniques 1. Open Hashing (Separate chaining) 2. Closed Hashing (Open Addressing) 4. Application
Reference Books	1. An Introduction to Data Structures with Applications - Trembley – McGraw Hill 2. Theory and Problems of Data Structure – Lipschutz Semour – McGraw Hill 3. Algorithms + Data Structure Programs - Wirth, Niclaus - PHI. 4. Fundamentals of Data Structures, Horwitz, E. and Sahni S. – Computer Science Press. 5. Data Structures and Algorithms - Aho A.V., Hopcroft and Ullman - Addiso Wesley 6. Data Structures and Algorithms in Java, Lafore, Pearson 7. Data Structures and Algorithm Analysis in Java, Mark Allen Weiss, Pearson 8. Data Structures and Algorithms in Java, Micheal T Goodrich, Roberto Tamassia, Wiley 9. Data Structures, Algorithms And Object Oriented Programming – TataMcGraw Hill edition Geogory L. Heileman. 10. Data Structures and the Standard Template Library - William J. Collins, Tata McGraw Hill edition. 11. Programming with C++ and Data Structures - Maria Litvin & Gary Litvin, Vikas Publishing House Pvt. ltd. 12. Data Structures using C & C++ - Y. Langsam Moshe J. Angensterin & A.M. Tenenbaum 13. Data Structures and Algorithms in C++ - Adam Drozdek, Thomson Learning

	ata Structures & Program Design in C - Robert Kruse, C.L. Tondo, Brnceleing PHI Pvt Ltd.
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	Internal Assessment : __30_____ Marks External Assessment : _70_____ Marks

[Subject code-2111040101060002]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	**Master of Computer Applications**					
Semester	**I**					
Course Code	**106**					
Course Title	**Programming Skills - I**					
Credit	**Theory:**	**-**	**Practical:**	**3**	**Total:**	**3**
Effective From	**Academic Year : 2026-27**					
Course Outcomes	After studying the course, students will be able to understand how Oracle Database works and the importance of various components of Oracle. This course will also help students to understand the role of a database administrator. After successful completion, students will be able to manage Oracle database and will be able to write codes in SQL & PL/SQL necessary for an application.					
Course Content	Practical based on paper no. 101 (DBMS)					
Reference Books	As per paper no. 101 (DBMS)					
Teaching Methodology	Lab. Work					
Evaluation Method	Internal Assessment : __30_____ Marks External Assessment : _70_____ Marks					

[Subject code-2111040101070002]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	**Master of Computer Applications**					
Semester	**I**					
Course Code	**107**					
Course Title	**Programming Skills - II**					
Credit	**Theory:**	**-**	**Practical:**	**3**	**Total:**	**3**
Effective From	**Academic Year : 2026-27**					
Course Outcomes	After studying the course, students will be able to practically solve common and complex programming problems using object-oriented paradigm. This course also helps students learn practical implementation of data files and operations upon them using object-oriented approach.					
Course Content	Practical based on paper no. 102 (OOPM)					
Reference Books	As per paper no. 102 (OOPM)					
Teaching Methodology	Lab. Work					
Evaluation Method	Internal Assessment : __30_____ Marks External Assessment : _70_____ Marks					

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	**Master of Computer Applications**					
Semester	**I**					
Course Code	**108**					
Course Title	**Programming Skills - III**					
Credit	**Theory:**	**-**	**Practical:**	**4**	**Total:**	**4**
Effective From	**Academic Year : 2026-27**					
Course Outcomes	After studying the course, students will be able to use data structures and their application in sorting, searching and comparison of algorithms. Students will also learn analysis of the algorithms.					
Course Content	Practical based on paper no. 105 (Data structures and Design and analysis of Algorithms					
Reference Books	As per paper no. 105 (Data structures and Design and analysis of Algorithms)					
Teaching Methodology	Lab. Work					
Evaluation Method	Internal Assessment : __30_____ Marks External Assessment : _70_____ Marks					

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS

Program Name	**Master of Computer Applications**					
Semester	**II**					
Course Code	**201**					
Course Title	**Artificial Intelligence**					
Credit	**Theory:**	**4**	**Practical:**	**0**	**Total:**	**4**
Effective From	**Academic Year : 2026-2027**					

Course Outcomes

CO1: Explain students the insight of the historical and fundamental aspects the artificial intelligence.
CO2: Train students to represent declarative knowledge in the form of symbolic knowledge through various Knowledge Representation (KR) techniques like First Order Predicate Logic (FOPL), Semantic Network, Conceptual Graphs, Scripts, and Frames.
CO3: Train students to apply various searching algorithms fall under informed and uninformed search methods to solve complex problem of AI domain.
CO4: Explain and train students to deal with the uncertainty that inherently lies within many AI problem.
CO5: Expose the students with the analysis and development process of the knowledge based system development.
CO6: Explain students to utilize the AI problem solving techniques in the advanced AI problem domain like Natural Language Processing (NLP) and Computer Vision (CV)

Mapping between Cos and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■							
CO2	■		■					
CO3	■	■	■		■			
CO4		■	■	■		■	■	■
CO5	■		■		■	■		
CO6	■	■		■		■	■	■

Course Content

Unit 1: Introduction to AI

1.1 Introduction to Artificial Intelligence
- 1.1.1 Definition of Artificial Intelligence
- 1.1.2 History of Artificial Intelligence
- 1.1.3 Application of Artificial Intelligence
- 1.1.4 Introduction to Knowledge-Based System

1.2 Turing Problem

1.3 Knowledge Representation
- 1.3.1 knowledge and Knowledge Base
- 1.3.2 First Order Predicate Logic (FOPL)
- 1.3.3 Inference Rules

Unit 2: Knowledge Representation and Searching Techniques

2.1 Structured Knowledge Representation
- 2.1.1 Associative network and Conceptual graphs
- 2.1.2 Frames and Scripts
- 2.1.3 Conceptual Dependencies

2.2 Searching
- 2.2.1 Search Problem
- 2.2.2 Initial State, action, transition model, goal test, the cost function
- 2.2.3 Uninformed Search

	2.2.3.1 Depth First Search 2.2.3.2 Breadth-First Search 2.2.3.3 Iterative Deepening Search 2.2.4 Informed Search 2.2.4.1 Heuristics 2.2.4.2 A* Search 2.2.4.3 Minimax 2.2.4.5 Hill-Climbing Method 2.2.4.6 Constraint Satisfaction Search **Unit 3: Probability using AI** 3.1 Uncertainty 3.1.1 Probability 3.1.2 Conditional Probability 3.1.3 Baye's Rule 3.1.4 Joint Probability 3.1.5 Probability Rules 3.2 Introduction to Hidden Markov Model **Unit 4: Knowledge Acquisition and Expert Systems** 4.1 Introduction to Knowledge Acquisition 4.1.1 Knowledge gathering 4.1.2 Learning Models 4.1.2.1 Introduction to Supervised Learning 4.1.2.2 Introduction to Unsupervised Learning 4.1.2.3 Reinforcement Learning 4.1.3 Performance of Learning Model 4.2 Expert System 4.2.1 Introduction to Expert System 4.2.2 Characteristics of Expert System 4.2.3 Architecture of Expert System 4.2.4 Application of AI in Natural Language Processing 4.3 Application of AI in Computer Vision
Reference Books	1. Artificial intelligence, 3rd Edition, Kevin Knight, Elaine Rich, B. Shivashankar Nair, McGraw Hill 2. Russell Stuart Jonathan and Norvig Peter, Artificial Intelligence: A Modern Approach, 3rd Edition, Prentice-Hall, 2010 3. A First Course in Artificial Intelligence, Deepak Khemani, McGraw Hill 4. Introduction to artificial intelligence, Akerkar, Rajendra, PHI Learning 5. Foundation of Artificial Intelligence and Expert Systems by V.S. Janakiraman, K. Sarukesi, P. Gopalakrishnan, Mc Millan 6. Expert Systems Principles and Programming (3rd Edition) by Giarratano & Riley, Thomson (Vikas Publishing House)
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	Internal Assessment : __30_____ Marks External Assessment : _70_____ Marks

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS

Program Name	**Master of Computer Applications**					
Semester	**II**					
Course Code	**202**					
Course Title	**Front End Technologies**					
Credit	**Theory:**	**4**	**Practical:**	**-**	**Total:**	**4**
Effective From	**Academic Year : 2026-27**					

Course Outcomes

CO1: Design and develop structured and semantic web pages using HTML5 and CSS3 with proper layout techniques including Flexbox and Grid.
CO2: Apply styling, responsive design principles, and Bootstrap framework components to build mobile-friendly web interfaces.
CO3: Implement client-side scripting using JavaScript fundamentals and advanced ES6+ features to create interactive web applications.
CO4: Develop asynchronous and dynamic web functionalities using AJAX, Promises, Async/Await, Fetch API, JSON, and Web APIs.
CO5: Design and build Single Page Applications (SPA) using the Angular framework with components, modules, routing, services, and dependency injection.
CO6: Integrate Angular applications with RESTful services, implement form validation, manage state and navigation, and deploy production-ready applications.

Mapping between Cos and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								
CO6								

Course Content

Unit 1: Web Fundamentals

1.1 HTML5
- 1.1.1 Introduction to HTML and Web Standards
- 1.1.2 Basic HTML Tags and Document Structure
- 1.1.3 Text Formatting, Lists, Tables, and Hyperlinks
- 1.1.4 HTML Forms and Form Controls
- 1.1.5 HTML5 New & Semantic Elements
- 1.1.6 HTML5 Form Input Types and Attributes
- 1.1.7 Audio and Video Embedding

1.2 CSS3
- 1.2.1 Introduction to CSS3 and Types of CSS
- 1.2.2 Selectors, Classes, IDs, Pseudo-classes and Specificity Rules
- 1.2.3 Box Model, Border, Margin, Padding
- 1.2.4 Positioning, Float, Display Properties
- 1.2.5 Colors, Gradients, Backgrounds and Masks
- 1.2.6 Fonts, Text Effects, Shadows
- 1.2.7 Transitions and Transformations
- 1.2.8 Flexbox and CSS Grid

Unit 2: JavaScript

2.1 JavaScript Fundamentals
- 2.1.1 Syntax and Structure
- 2.1.2 Variables, Data Types, Operators
- 2.1.3 Control Statements and Loops
- 2.1.4 Functions and Scope

2.2 Advanced JavaScript Concepts
2.2.1 Objects and Prototypes
2.2.2 ES6+ Features (let/const, Arrow Functions, Destructuring, Spread Operator)
2.2.3 Callback Functions and Closures
2.2.4 DOM Manipulation and Event Handling
2.2.5 Bind, Call and Apply
2.3 Asynchronous JavaScript
2.3.1 AJAX Introduction
2.3.2 Promises
2.3.3 Async/Await
2.3.4 Fetch API
2.4 Web APIs and Storage
2.4.1 Web Storage (LocalStorage & SessionStorage)
2.4.2 Geolocation API
2.4.3 JSON (Syntax, Parse, Stringify)
2.4.4 Introduction to Single Page Applications (SPA)

Unit 3: Responsive Web Design with Bootstrap
3.1 Introduction to Bootstrap
3.1.1 What is Bootstrap
3.1.2 Responsive Web Design Concepts
3.1.3 Features and Advantages of Bootstrap
3.1.4 Environment Setup and Integration
3.2 Bootstrap Layout and Utilities
3.2.1 Grid System
3.2.2 Typography
3.2.3 Tables, Forms, Buttons, Images
3.2.4 Responsive Utilities
3.3 Bootstrap Components
3.3.1 Introduction to Components
3.3.2 Navigation, Navbar
3.3.3 Dropdowns and Button Groups
3.3.4 Pagination and Breadcrumbs
3.3.5 Cards and Modals
3.3.6 Alerts and Toasts

Unit 4: Modern Angular Framework
4.1 Introduction to Angular
4.1.1 Evolution of Angular
4.1.2 SPA Architecture
4.1.3 Features and Advantages
4.1.4 Introduction to TypeScript
4.2 Angular Setup and Architecture
4.2.1 Angular CLI Installation
4.2.2 Project Structure and Folder Architecture
4.2.3 Modules and Modular Architecture
4.2.4 AppModule and AppRoutingModule
4.3 Components and Data Binding
4.3.1 Creating Components
4.3.2 Component Lifecycle
4.3.3 Data Binding (Interpolation, Property, Event, Two-way)
4.3.4 Directives (Structural & Attribute)
4.4 Services and Dependency Injection
4.4.1 Services
4.4.2 Dependency Injection Concept
4.4.3 Singleton Services
4.5 Routing and Navigation

	4.5.1 Router Configuration 4.5.2 Route Parameters 4.5.3 Lazy Loading 4.5.4 Route Guards 4.6 Forms and Validation 4.6.1 Template-driven Forms 4.6.2 Reactive Forms 4.6.3 Form Validation Techniques 4.7 HTTP and API Integration 4.7.1 Angular HTTP Client 4.7.2 REST API Integration 4.7.3 Error Handling 4.8 Angular Pipes and UI 4.8.1 Built-in Pipes 4.8.2 Custom Pipes 4.8.3 Introduction to Angular Material 4.9 Build and Deployment 4.9.1 Production Build 4.9.2 Deployment Concepts
Reference Books	1 Responsive Web Design with HTML5 and CSS, Fifth Edition, Ben Frain, Packt Publishing, ISBN: 978-1837028238, 2025. 2 Creating Responsive Websites Using HTML5 and CSS3, Varun Gor, Apress, ISBN: 978-1-4842-9782-7, 2023. 3 JavaScript in Depth (Upcoming/2026), James M. Snell, Manning Publications, ISBN: TBD, 2026 (latest JS reference). 4 Secrets of the JavaScript Ninja, 3rd Edition (2026), Trevor Burnham, Bear Bibeault, Josip Maras, John Wiley & Sons, ISBN: TBD, 2026 (modern JS techniques). 5 TypeScript for Beginners: Mastering TypeScript Fundamentals, Meta Brains, ISBN: TBD, 2024 (for Angular's TypeScript base). 6 Pro Angular 16, Adam Freeman, Manning Publications, ISBN: 978-1-6338-3544-51, 2024. 7 Modern Angular, Armen Vardanyan, Manning Publications, ISBN: 978-1-6334-3692-3, 2024. 8 Modern Web Development with Angular, Duncan Faulkner & Pierre Bouillon, ISBN: 978-8196815097, 2024. 9 Bootstrap 5 Quick Start, Jacob Lett, Packt Publishing, ISBN: 978-1800564527, 2021 (latest focused Bootstrap reference). 10 Creating Responsive Websites Using HTML5, CSS3 & JavaScript (Integrated perspective)-for holistic view, Neo D. Truman, 2023.
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	Internal Assessment : __30_____ Marks External Assessment : _70_____ Marks

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS

Program Name	**Master of Computer Applications**					
Semester	**II**					
Course Code	**203**					
Course Title	**Programming in .NET**					
Credit	**Theory:**	**4**	**Practical:**		**Total:**	**4**
Effective From	**Academic Year : 2026-27**					

Course Outcomes

CO1: Study .Net Architecture.
CO2: Design and develop a console and window-based .NET application.
CO3: To learn basic syntax and implement small applications in C# programming language.
CO4: Create and manipulate GUI components in C#.
CO5: Create applications in C# using Object Oriented Properties.
CO6: Design and implement Database connectivity using ADO.Net.
CO7: Identify and resolver problems in C# applications.

Mapping between Cos and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■		■	■			■	
CO2	■		■	■		■	■	
CO3	■	■		■		■	■	
CO4	■			■		■		
CO5				■	■	■	■	
CO6			■	■		■	■	
CO7		■	■	■	■		■	■

Course Content

Unit - 1: Overview of Microsoft .NET & C#

1.1 Microsoft .NET Framework
- 1.1.1. Introduction to Building Blocks of the .NET Platform
- 1.1.2. Overview of .Net Assemblies
- 1.1.3. Common Type System
- 1.1.4. Common Language Specification
- 1.1.5. Common Language Runtime

1.2 Overview of C# Programming Language
- 1.2.1. Literals, Variables, Data Types
- 1.2.2. Operators
- 1.2.3. Expressions and Looping
- 1.2.4. Constants, Arrays, Array Class, List
- 1.2.5. String, String Builder
- 1.2.6. Boxing and UnBoxing
- 1.2.7. Events, Errors and Exceptions

Unit - 2: Object-Oriented Aspects of C#

2.1 Creating Classes, Encapsulation, Object Construction & Destruction
2.2 Inheritance
2.3 Polymorphism
2.4 Abstraction
2.4 Interfaces and Abstract Classes
2.5 Delegates

Unit - 3: Application Development

3.1 Creating Windows Forms with Events and Controls
3.2 Menu Creation

	3.3 Inheriting Windows Forms 3.4 SDI and MDI Application 3.5 Dialog Boxes (Modal and Modeless) **Unit - 4: Accessing Data** 4.1 ADO.NET Architecture 4.2 Disconnected Data Access 4.2.1 Data Adapter 4.2.2 Data Set 4.2.3 Data Row 4.3 Direct Data Access 4.3.1 Connection 4.3.2 Command 4.3.3 Data Reader
Reference Books	1. .NET Framework Essentials, Hoand Lam, Thuan L. Thai, O'REILLY 2. Microsoft .NET Framework 4.5 Quickstart Cookbook, Jose Luis Latorre Millas, PACKT Publishing 3. Pro C# 5.0 and the .NET 4.5 Framework, Andrew Troelsen, Apress 4. C# IN DEPTH, Jon Skeet, Manning Publications 5. Beginning C# 7 Programming with Visual Studio 2017, Benjamin Perkins, wrox 6. Illustrated C#, Daniel Solis, Cal Schrotenboer, Apress 7. The C# Programmer's Study Guide, Ali Asad, Hamza Ali, Apress 8. Microsoft Visual c#.net Steep by Step, Sharp,John & Jagger Jon, Microsoft Press 9. Introducing.Net 6, Vermeir, Nico, Apress Publications
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	Internal Assessment : __30_____ Marks External Assessment : _70_____ Marks

[Subject code-2111040102040002]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS

Program Name	**Master of Computer Applications**					
Semester	**II**					
Course Code	**204**					
ourse Title	**Python Programming Language**					
Credit	**Theory:**	**4**	**Practical:**	**0**	**Total:**	**4**
Effective From	**Academic Year : 2026-27**					
Course Outcomes	CO1: Students will be able to Write, Test and Debug Python Programs. CO2: Students will be able to Implement Conditionals and Loops, use functions and represent Compound data using Lists, Tuples and Dictionaries in Python programs. CO3: Students will be able to Read and write data from & to files in Python and develop Real World Application. CO4: Students will be able to Design and implement programs to solve real-world problems using Python Programming Language. CO5: Students will learn essential packages like NumPy and Matplotlib, which are necessary for Machine Learning, Data Analytics, and AI.					

Mapping between Cos and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■							
CO2				■			■	
CO3			■	■		■	■	
CO4			■			■	■	■
CO5	■		■	■		■	■	

Course Content

Unit 1: Fundamentals of Python Programming

1.1 Introduction to Python
- 1.1.1 Features of Python
- 1.1.2 Python's Integrated Development and Learning Environment (IDLE)
- 1.1.3 Python Identifiers

1.2 Data Types and Operators
- 1.2.1 Python Operators
- 1.2.2 Python Data Types:
  - 1.2.2.1 Numeric: Integer, Float, Complex
  - 1.2.2.2 Sequence: List, Tuple, Range
  - 1.2.2.3 Sets
  - 1.2.2.4 Text
  - 1.2.2.5 Binary: Bytes, Bytearray
  - 1.2.2.6 Mapping: Dictionary

1.3 Input and Output Operations
- 1.3.1 Input in Python
- 1.3.2 Output in Python

Unit 2: Control Structures and Functions

2.1 Program Control Structures
- 2.1.1 Conditional Statements: if, if–else, nested if, shorthand if, shorthand if–else
- 2.1.2 Iterative Statements: while loop
- 2.1.3 for loop
- 2.1.4 Loop Control Statements: break, continue, pass

2.2 Functions in Python

	2.2.1 Function Declaration 2.2.2 Passing Arguments to Functions 2.2.3 Return Values 2.2.4 Variable Scope and Namespace 2.2.5 Lambda Functions 2.2.6 Recursive Functions **Unit 3: Modules, File Handling and Exception Handling** 3.1 Python Modules 3.1.1 Creation of Module 3.1.2 Importing a Module 3.1.3 Date and Time Module 3.2 File Handling 3.2.1 Reading from a File 3.2.2 Writing to a File 3.2.3 Creation of New File 3.2.4 Deletion of a File 3.3 Exception Handling 3.3.1 try, except, finally 3.3.2 Multiple Exception Handling 3.3.3 Raising Exceptions using raise **Unit 4: Object-Oriented Programming and Python Packages** 4.1 Classes and Objects 4.1.1 Creation of Class and Object 4.1.2 The init() Function 4.1.3 Self Parameter 4.1.4 Modifying the Property of a Class 4.1.5 Inheritance and Encapsulation 4.2 Python Packages 4.2.1 NumPy 4.2.1.1 Installing NumPy 4.2.1.2 NumPy Array: dtype, shape, reshape, ndim, itemsize, empty, zeros, ones, arange, linspace 4.2.1.3 Indexing, Slicing and Broadcasting 4.2.1.4 Array Manipulation: Changing shapes, transpose, changing dimension, joining and splitting arrays, adding and removing elements 4.2.1.5 Mathematical Functions and Matrix Library 4.2.2 Matplotlib 4.2.2.1 Installing Matplotlib 4.2.2.2 Components of a Plot 4.2.2.3 Drawing a Plot 4.2.2.4 Drawing Scatter Diagram
Reference Books	1. Python Programming, Anurag Gupta, G Biswas,, Mc Graw Hill 2. Exploring Python, Timothy A. Budd, McGraw Hill Publication 3. Core Python Programming, R. Nageswara Rao, Dreamtech Press 4. Learning Python, 5th Edition, Mark Lutz, O'Reilly Media 5. Python Projects, Laura Cassell, Alan Gauld, Wrox Publication 6. NumPy: Beginner's Guide, 3rd Edition, Ivan Idris, Packt Publishing 7. NumPy Essentials, Leo Chin, Tanmay Dutta, Packt Publishing 8. Matplotlib 2.x By Example, Allen Yu, Claire Chung, Aldrin Yim, Packt Publishing
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	Internal Assessment : __30_____ Marks External Assessment : _70_____ Marks

[Subject code-2111040102040003]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS

Program Name	**Master of Computer Applications**					
Semester	**II**					
Course Code	**204**					
Course Title	**Blockchain Technology**					
Credit	**Theory:**	**4**	**Practical:**	**0**	**Total:**	**4**
Effective From	**Academic Year : 2026-2027**					
Course Outcomes	CO1: Students will be able to Understand Blockchain Technology. CO2: Students will learn Importance of Security and Consensus in Blockchain. CO3: Students will be able to Develop a Blockchain base applications for a specific domain. CO4: Expose the students to various sectors where Blockchain Technology can be implemented and how it will bring the transformation. CO5: Explain students about concept of Hyperledger, web 3.0 and Smart Contracts using Solidity.					

Mapping between Cos and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■					■		
CO2	■	■				■		
CO3		■	■	■			■	■
CO4		■	■		■		■	
CO5	■			■		■	■	■

Course Content

Unit 1: Introduction to Blockchain

1.1 History of Blockchain
1.2 Types of Blockchain
1.3 Blockchain Generations
1.4 Structure of Blockchain : Block, Hash, Nonce
1.5 Characteristics of Blockchain and its Advantages
1.6 Blockchain use cases in various Sectors

Unit 2: Cryptography and Consensus

2.1 PKI and Cryptography
- 2.1.1 Private key Cryptography
- 2.1.2 Public key Cryptography
- 2.1.3 Cryptographic Hash Function
- 2.1.4 SHA – 256
- 2.1.5 Digital Signature

2.2 Consensus
- 2.2.1 Byzantine Fault
- 2.2.2 Proof of Work
- 2.2.3 Proof of Stake
- 2.2.4 Double-Spending

Unit 3: Building the Blockchain

3.1 Deciding on the Blockchain Architecture
3.2 Creating Blocks and Links
3.3 Inserting Hashes
3.4 Implementing Consensus Mechanism

	Unit 4: Smart Contracts, Solidity, Web 3.0 and Hyperledger 4.1 Introduction to Ethereum and Smart Contracts 4.2 Data Types and Control Structures 4.3 Storage, Memory, Stack data locations 4.4 Global Variables 4.5 Object Oriented Properties 4.6 Functions, Modifiers and Fallback 4.7 Exceptions and Events 4.8 Implementing Smart Contracts 4.9 Introduction to Web 3.0 4.9.1 Development Frameworks 4.9.2 Decentralize Applications (DApps) 4.10 Hyperledger as a protocol 4.10.1 Reference Architecture 4.10.2 Hyperledger Fabric
Reference Books	1. The Blockchain Developer : A Practical Guide for Designing, Implementing, Publishing, Testing and Securing Distributed Blockchain-based Projects- Elad Elrom, Apress 2. Mastering Bitcoin : Programming the Open Blockchain, Andreas M. Antonopoulos, O'REILLY 3. The Book of Satoshi : The Collected Writings of Bitcoin Creator, Phil Champangne, E53 Publishing LLC 4. Blockchain : The Blockchain for beginners guide to Blockchain technology and leveraging Blockchain programming, Josh Thompson, Create Space independent Publishing Platform 5. "Mastering Blockchain: Distributed Ledger Technology, Decentralization, and Smart Contracts Explained", Imran Bashir, Second Edition, Packt Publishing, 2018 6. "Block Chain: The Block Chain for Beginners – Guide to Blockchain Technology and Leveraging Block Chain Programming", Josh Thompsons 7. "Block Chain: Blueprint for a New Economy", Melanie Swan, O'Reilly, 2015
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	Internal Assessment : __30_____ Marks External Assessment : _70_____ Marks

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	**Master of Computer Applications**					
Semester	**II**					
Course Code	**205**					
Course Title	**Cross-Platform Mobile Application Development**					
Credit	**Theory:**	**4**	**Practical:**	**0**	**Total:**	**4**
Effective From	**Academic Year : 2026-27**					

Course Outcomes

CO1- **Explain the fundamentals of Flutter framework and Dart programming concepts for cross-platform application development.-**

CO2 - **Design and develop responsive user interfaces using Flutter widgets and layout mechanisms.**

CO3 - **Implement state management techniques and integrate REST APIs and local databases within mobile applications.**

CO4 - **Develop and deploy mobile applications integrated with Firebase services, including authentication, database, and cloud messaging.**

CO5 **– Apply testing, debugging, and deployment strategies to publish applications on Android and iOS platforms.**

CO6 **– Design and develop a complete cross-platform application to solve a real-world problem using modern tools and technologies.**

Mapping between Cos and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■			■		■		■
CO2	■	■		■	■	■		■
CO3	■	■	■		■	■	■	
CO4		■	■		■	■	■	
CO5		■		■	■	■		■
CO6	■	■	■	■	■	■	■	■

Course Content

Unit-1: Flutter Framework & Dart Programming Fundamentals

1.1 Flutter Framework
- 1.1.1 Overview of Cross-Platform Development
- 1.1.2 Flutter Architecture
- 1.1.3 Flutter Project Structure
- 1.1.4 CLI Tools and IDE Configuration

1.2 Dart Programming
- 1.2.1 Data Types, Variables, Operators
- 1.2.2 Control Statements and Loops
- 1.2.3 Functions and Anonymous Functions
- 1.2.4 Object-Oriented Programming in Dart
  - 1.2.4.1 Classes & Objects
  - 1.2.4.2 Inheritance
  - 1.2.4.3 Polymorphism
  - 1.2.4.4 Encapsulation

Unit-2: Widgets System & UI Development

2.1 Flutter Widgets
- 2.1.1 Stateless and Stateful Widgets
- 2.1.2 Widget Lifecycle
- 2.1.3 Build Context

2.2 Layout & UI Design
- 2.2.1 Row, Column, Container, Expanded, Flexible

	2.2.2 ListView, GridView, Stack 2.2.3 MediaQuery and Responsive Design 2.3 User Interface Components 2.3.1 Text, Image, Icon, Button Widgets 2.3.2 Forms, TextField, Validation 2.3.3 Navigation & Routing 2.3.4 Dialogs, Snackbars, Bottom Sheets **Unit -3: State Management & Local Databases** 3.1 State Management 3.1.1 setState 3.1.2 Provider 3.1.3 Bloc / Riverpod (Overview) 3.1.4 MVVM Architecture 3.2 Data Storage 3.2.1 Shared Preferences 3.2.2 SQLite using sqflite 3.2.3 Hive Database **Unit -4: API Integration, Firebase, Testing & Deployment** 4.1 API Integration 4.1.1 HTTP Requests 4.1.2 JSON Parsing 4.1.3 RESTful Services 4.2 Firebase Services 4.2.1 Firebase Setup & Authentication 4.2.2 Introduction to Firestore Database 4.2.3 Introduction to Cloud Storage 4.3 Testing & Deployment 4.3.1 Debugging Tools 4.3.2 Unit & Widget Testing 4.3.3 Android APK & Play Store Deployment 4.3.4 iOS Build & App Store Deployment
Reference Books	1. Flutter & Dart: Up and Running, 2022 Edition, Dr. Deepti Chopra and Roopal Khurana, BPB Publications 2. Flutter in 7 Days, 2022 Edition, Ipsi Patro, BPB Publications 3. Ultimate Flutter Handbook, 1st Edition, Lahiru Rajeendra Mahagamage, AVA™ (Orange Education Pvt. Ltd.) 4. Flutter Development Cookbook, 1st Edition, Simone Alessandria and Brian Kayfitz, Packt Publishing 5. Beginning Flutter: A Hands-On Guide, 1st Edition, Marco L. Napoli, Wiley (Wrox)
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	Internal Assessment : __30_____ Marks External Assessment : _70_____ Marks

[Subject code-2511040102060003]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT SYLLABUS						
Program Name	**Master of Computer Applications**					
Semester	**II**					
Course Code	**206**					
Course Title	**Programming Skills - IV**					
Credit	**Theory:**	**-**	**Practical:**	**3**	**Total:**	**3**
Effective From	**Academic Year : 2026-27**					
Course Outcomes	After completion of this course, the student will be able to design and develop web pages and Interactive UI for Web Applications					
Course Content	Practical based on paper no 202 (Front End Technologies)					
Reference Books	As per paper no. 202 (Front End Technologies)					
Teaching Methodology	Lab. Work					
Evaluation Method	Internal Assessment : __30_____ Marks External Assessment : _70_____ Marks					

[Subject code-2511040102070003]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT SYLLABUS						
Program Name	**Master of Computer Applications**					
Semester	**II**					
Course Code	**207**					
Course Title	**Programming Skills - V**					
Credit	**Theory:**	**-**	**Practical:**	**2**	**Total:**	**2**
Effective From	**Academic Year : 2026-27**					
Course Outcomes	After studying the course, students will be able to understand how .NET Technology works and the importance of object-oriented programming. This course will also help students to appreciate the C#.NET programming.					
Course Content	Practical based on paper no. 203 (Programming in .NET)					
Reference Books	As per paper no. 203 (Programming in .NET)					
Teaching Methodology	Lab. Work					
Evaluation Method	Internal Assessment : __30_____ Marks External Assessment : _70_____ Marks					

[Subject code-2511040102080003]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT SYLLABUS						
Program Name	**Master of Computer Applications**					
Semester	**II**					
Course Code	**208**					
Course Title	**Programming Skills - VI**					
Credit	**Theory:**	**-**	**Practical:**	**2**	**Total:**	**2**
Effective From	**Academic Year : 2026-27**					
Course Outcomes	After completion of this course, the student will be capable to develop applications using Python Programming Language/Blockchain Technology.					
Course Content	Practical based on paper no 204 (Python Programming Language) OR Practical based on paper no 204 (Blockchain Technology – practical implementation in C++ and Solidity)					
Reference Books	As per paper no. 204 (Python Programming Language) OR As per paper no. 204 (Blockchain Technology)					
Teaching Methodology	Lab. Work					
Evaluation Method	Internal Assessment : __30_____ Marks External Assessment : _70_____ Marks					

[Subject code-2111040102090001]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT SYLLABUS						
Program Name	**Master of Computer Applications**					
Semester	**II**					
Course Code	**209**					
Course Title	**Programming Skills - VII**					
Credit	**Theory:**	**-**	**Practical:**	**3**	**Total:**	**3**
Effective From	**Academic Year : 2026-27**					
Course Outcomes	After completion of this course, the student will be capable to develop, manage and maintain mobile device-based applications.					
Course Content	Practical based on paper no. 205(Cross-Platform Mobile Application Development)					
Reference Books	As per paper no. 205 (Cross-Platform Mobile Application Development)					
Teaching Methodology	Lab. Work					
Evaluation Method	Internal Assessment : __30_____ Marks External Assessment : _70_____ Marks					