APPENDIX –B

Master of Commerce (Computer Management) – (MCCM)

Semester – III & IV

(A) Project and Classification of Marks on Project

Towards the end of the second year of study, a student will be examined in the course ―Project Work‖.

- **a.** Project Work may be done individually or in groups (Maximum 3 students) in case of bigger projects. However if project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to monitor the progress of individual student.
- **b.** The Project Work should be done using the tools covered in Master of Computer Management.
- **c.** The Project Work should be of such a nature that it could prove useful or be relevant from the commercial / management angle.
- **d.** The project work will carry 100 marks.
- **e.** Project Work can be carried out in the Institute or outside with prior permission of the Institute.
- **f.** The external viva-voce examination for Project Work would be held as per the Examination Time Table of the second year of study, by a panel of one external and one Internal Examiner.

Types of Project

As majority of the students are expected to work out a project in some industry/research and development laboratories/educational institutions/software export companies, it is suggested that the project is to be chosen which should have some direct relevance in day-today activities of the candidates in his/her institution. The Applications Areas of project - Financial/Marketing/Database Management

System/ Relational Database Management System / E-Commerce / Internet / Manufacturing/ web Designing / Scientific / ERP etc.

Project Proposal (Synopsis) The project proposal should be prepared in consultation with the guide. The project guide must be a person having minimum Qualification MCM / M.Sc. (Computer Science + Information Technology) / M.Sc. (Mathematics / Electronics / Statistics / Physics + Post B.Sc. Diploma in Computer Science & Application) / MCA. The project proposal should clearly state the objectives and environment of the proposed project to be undertaken. It should have full details in the following form:

Format of Synopsis for Desktop Application

1. Title of the Project.
2. Objectives of the Project.
3. Project Category (DBMS/RDBMS/OOPS etc.)
4. Tools/Platform and Languages to be used.
5. Complete Structure of the System:
    i. Numbers of Modules and its Description.
    ii. Modular Chart / System Chart.
    iii. Data Structures or Tables.
    iv. Process Logic of each Module.
    v. Types of Report Generation.
6. References.

    Note: Synopsis should not be more than 3-4 pages.

Format of Synopsis for Web Application

1. Title of the Project.
2. Objectives of the Project.
3. Project Category (DBMS/RDBMS/OOPSetc.).
4. Tools/Platform and Languages to be used.
5. Complete Structure of the System:
    i. Number of pages and links their short description.

ii. Use / Information of Pages.

iii. Feedback Form (if any).

6. References. Note: Synopsis should not be more than 3-4 pages.

Project Report Formulation

Front Page.

College Certificate Page.

Declaration Page.

Acknowledgment Page.

Project Profile.

Index or Content Page.

i. *Contents ————————————.

Appendices

i. List Figures, Tables& Charts.

ii. Approved copy of Synopsis. Glossary

Content Page

1. Introduction
2. Objective
3. Preliminary System Analysis
    - Preliminary Investigation.
    - Present System in Use.
    - Flaws in Present System.
    - Need of New System.
    - Feasibility Study.
    - Project Category
4. Software Engineering Paradigm Applied
    - Modules

- System / Modular Chart.

5. Software & Hardware Requirement Specification.
6. Detailed System Analysis.
    - Data Flow Diagram.
    - Numbers of Modules and Process Logic.
    - Data Structures and Tables.
    - Entity-Relationship Diagram.
7. System Design.
    - Page Design.
    - Source Code.
    - Input screen & Output Screen.
8. System Security Measures.
9. Implementation, Evaluation and Maintenance.
10. Future Scope of the project.
11. Suggestion & Conclusion
12. Bibliography& References.

Research Project – (Minor / Major Project) Rubrics

	Learning Outcome
LO1	Developing a technical artifact requiring new technical skills and effectively utilizing a new software tool to complete a task.
LO2	Writing requirements documentations, selecting appropriate technologies, identifying for systems.
LO3	Demonstrating understanding of professional customs & practices and working with professional standards.
LO4	Improving problem-solving, critical thinking skills and report writing
LO5	Learning professional skills like exercising leadership, behaving professionally, behaving ethically and listening effectively.

Evaluation Parameters

Rubric	Parameters	Weightage (Assessment Marks)	Learning Outcomes	Weightage
R1	Objective of Mini Project	10% (05)	LO-1	10%
R2	Project Undertaken	10% (05)	LO-1, LO-3	5% and 5%
R3	Technical Knowledge	20% (10)	LO2, LO3	15% and 5%
R4	Presentation Skills	20% (10)	LO-5	20%
R5	Viva-voce	20% (10)	LO4, LO5	15% and 5%
R6	Report	20% (10)	LO4	20%
Total		**100% (100)**		

Rubric	Parameter	Level of Achievement			
		Excellent	**Good**	**Average**	**Poor**
R1	**Objective of Mini Project**	Objectives of the proposed work are well defined and steps to be followed to solve the defined problem are clearly specified	Good justification to the objectives and methodology to be followed is specified but detailing is not done	Incomplete justification to the objectives proposed and steps are mentioned but unclear; without justification to objectives	Limited information only, some objectives of the proposed work are defined
R2	**Project Undertaken**	Project completed in very systematic manner.	Project completed in appropriate manner. Illustrated	Project completed in but not systematically. Illustrated	Project not completed. No project implementation details.

		Illustrated complete project implementation details.	some project implementation details.	some project implementation details.	
R3	**Technical Knowledge**	Extensive knowledge of technology implemented	Fair knowledge of technology implemented	Lacks sufficient knowledge of technology implemented	No knowledge of technology implemented
R4	**Presentation Skills**	Loud and clear with proper eye contact	Clear speech bot no eye contact	Average presentation skills	Unclear
R5	**Viva-voce**	Answers effectively in a satisfied manner to queries by the examiner.	Answers appropriately to queries by the examiner	Non-satisfactory answers to the queries by the examiner	Does not answer to queries by the examiner
R6	**Report**	Report as per specified format and completed	Report completed with very few contents not as per format.	Report completed but formatting not done properly.	Report not prepared as per format.

Parameter Measurement Slab

Excellent	**Very Good**	**Good**	**Average**	**Poor**
90% & Above of Marks	**80-90% of Marks**	**70-80% of Marks**	**60-70% of Marks**	**50-60% of Marks**

Master of Commerce (Computer Management) – (MCCM)

Semester – III

Paper – I

Course Code - **Course Name – Advance Database Management System**

	Learning Outcome
LO1	Given the information on various types of Database Management System, database architecture and normalization techniques student will be able to **identify** the features provided by database systems and will also be able to **execute** its scope for organization and also able to **Create** Database for organization**.**
LO2	Given the information on Structured Query Language, student will be able to **analyze** an information storage problem and **derive** an information model expressed in the form of entity relation diagram.
LO3	**Analyzing** the different types of schema's student will be able to **use** and **implement** the processing through DBMS, to **understand** the role of database administrator and manager.
LO4	**Describe** the concept of data warehousing and data mining so that student will be able to **formulate** the techniques for analytical processing, so that students will able to handle the backup and recovery techniques.

Advance Database Management Systems

UNIT – I

Introduction to Database Management System(DBMS) – Introduction, Why a Database, Characteristic of Data in a Database, Database Management System, Why DBMS, Types of Database Management System, Object-Oriented Model, Object- Relational Model, Deductive/Inference Model, Compression Between the various Database Model. **Introduction to Relational Database Management System(RDBMS)-** Introduction , RDBMS Terminologies, The Relational Data Structure, Relational Data Integrity, Relational Data Manipulations, Codd's Rule. **Database Architecture and Data Modeling** – Introduction, Conceptual, Physical and Logical Database Model, External or Logical Level. **Entity-Relationship Modeling**- Introduction, E-R Model, Components of an E-R Model, E-R Modeling Symbols. **Data Normalization-** Introduction, First Normal Form(1NF), Second Normal Form(2NF), Third Normal Form(3NF), Boyce-Codd Normal Form(BCNF), Fourth Normal Form(4NF), Fifth Normal Form(1NF), Domain-Key Normal Form(DKNF), Renormalizations. **Relational Algebra and Relational Calculus**- Relational Algebra, Relational Calculus.

UNIT - II

Introduction to Structured Query Language(SQL) – Introduction, History of SQL, Characteristic SQL, Advantages of SQL, SQL in Action, SQL Data Types and Literals, Types of SQL Commands, SQL Operators, Arithmetic Operators, Compression Operators, Logical Operators, Set Operators, Operators Precedence. **Tables, View and Index** – Tables, View , Index. **Nulls** – Introduction, Nulls in Action, When not to Use Nulls, Effect of Nulls, Null Indicators, Null and Compression Operator, Testing of Nulls, Tests of true, False and

Unknown, BETWEEN, LIKE and IN Condition, ALL and ANY Condition, EXITS Condition, ORDERED BY Clause. **Query And Subqueries** - Query , Subqueries. **Aggregate Function** – Introduction, General Rule, COUNT() and COUNT(*), SUM(), AVG(), MAX() and MIN(). **Insert, Update and Delete Operation** – Introduction, Insert Statement, Bulk Insert of Data, Update Statement, Delete Statement **Cursors** – Introduction, Cursor

UNIT - III

Programming with SQL- Introduction, Query Processing, Embedded SQL, Dynamic SQL. **Query-By-Example(QBL)** – Introduction, Select Query in QBE, Make-Table Query, DELETE Query, UPDATE Query, APPEND Query, QBE and SQL. **QUEL**Introduction, Data Definition in QUEL, Data Retrieval in QUEL, Data UPDATE Operation in QUEL. **Triggers** – Introduction, What is Trigger?, Types of Triggers, Triggers Syntax, Combining Triggers Types, Setting Inserted Value, Disabling and Enabling Triggers, Replacing Triggers, Dropping Triggers, Advantages and Limitations of Triggers. **Introduction-** PL/SQL Blocks, PL/SQL Architecture, SQL Support, PL/SQL Variables, PL/SQL Data Types, PL/SQL Precompilers, Conditional And Sequential Control Statements, Control Statements, Cursors, Iterative Control Statements, PL/SQL Exceptions, PL/SQL Blocks, PL/SQL Triggers, Types Of Triggers, Procedures And Packages.

UNIT - IV

Data Ware House and Data Marts – Introduction, Data in the Data Ware House, Data Ware House, Design Issues, OLTP vs. Data Ware House, Configuration of Data Ware House Process, Data Ware House Components, Structure of Data Ware House, Data Ware House Life Cycle, Data Ware House Environment, Data Architecture Data Ware House Operation, How much Data?, Data Integration and Transformation Process. **Data Mining** - Introduction, What is Data Mining?, Evaluation of Data Mining, Data Mining Verification vs. Discovery, Tasks Solve by Data Mining, Advantages of Data Mining. On-Line Transaction Processing (OLTP) - Introduction, Designing Criteria OLTP Features, Practical Application of OLTP, Future trends in OLTP. **On-Line Analytical Processing(OLAP)** – Introduction, OPAP and OPAP, OLAP and Data Ware Housing, Use of OLAP, Benefits of OLAP, Evaluation of OLAP, OLAP Concept and Characteristic, Cood‘s OPLAP Product Evaluation Rules, Different Style of OLAP.

Text Book:

1. Alexis Leon, Mathews Leon, Database Management System, Leaon Vikas.
2. Dr. Sarang Javkhedkar, Prashant Dupare, Advance Database Management System – Preface publications.

Reference Books:

1. Rini Chakrabarti, Shilbhadra Dasgupta & Subhash K. Shinde, Advance Database Management System, Dreamtech Press.
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, McGraw-Hill.
3. G. K. Gupta, Database System Concepts, McGraw-Hill.
4. Dr. P. S. Deshpande, SQL & PL/SQL for Oracle 11g, Dreamtech Press.
5. Ivan Bayross, SQL, PL/SQL, BPB Publications.

Practical List of SQL & PL/SQL

1. Write a SQL Query to create a table**"employee"**:

Field Name Datatype Size
Emp_no varchar2 5
Emp_name varchar2 25
Address varchar2 50
Phone_number number 10
Designation varchar2 15
Salary number 15

1. Display the structure of table.
2. Add qualification field at the end of employee table.
3. Modify the size of the name field 25 to 30.
4. Display the employee name whose salary is greater than 20,000.
5. Display the employee details whose name starts with ―A‖.

2. Write a SQL Query to create a table **"student"**:

Field Name Datatype Size Constraint
Roll number 5 primary key
Name varchar2 30 first letter must start with _A'
Address varchar2 30 not null
City varchar2 30
DOB date
Phone number 11 unique key
Class varchar2 10 All upper letter
Marks number (10, 2) Not null can't be 0

1. Display the structure of database and insert 10 records.
2. Display student information for all student in city Pune and Nagpur.
3. Display student information where marks greater than 80 and less than 90.
4. Display student name where first two character of student name _An'.
5. Change student name to Ashish where student roll number A001.

3. Write a SQL Query to create a table **"sales_details"**:
Field Name Datatype Size
S_id varchar2 8
P_id varchar2 8
P_name varchar2 15
Price number 10
Qty number 8

1. Drop foreign key constraint on column p_no in table sales_details.
2. Add foreign key constraint on column sale_no in table sales_details.
3. Modify the column qty to include not null constraint.
4. Insert 10 records in sale_details.
5. Display p_id and total of quantity qty for each product.
6. Display p_id and total of price for all the products.

4. Write a SQL Query to create a table **"customer"**:

FieldName Datatype Size
Cust_no varchar2 10
Cust_name usertype
Address varchar2 10
Salary number 10

1. Modify address field with not null.
2. Add city field as it must keep city name Mumbai, Delhi and Kolkata.
3. Add salary field where salary greater than 20,000.
4. Display the structure of table customer.
5. Insert 10 records into the table customer.
6. Display all the customer details who lives in Mumbai and Kolkata.
7. Display all the customer records whose salary>20,000 and salary<30,000.
8. Modify the address field where customer number is _C001‘.

5. Write a SQL query to create **c_master** with fields c_no, name, address, city, state and pin_code:

Field Name Datatype Size
C_no varchar2 10
Name varchar2 10
Address varchar2 10
State varchar2 20
City varchar2 20
Pin_code number 10

1. Create sequence which will generate number from 1..999 in ascending order, with an interval of 1 and in cyclic order.
2. Insert 10 records.
3. Create index on c_master which column name c_no and state.
4. Create view on c_master .
5. Select columns c_no, city which belongs to Nagpur and Mumbai.

6. Write a SQL query to create a syntax seq_order which generating numbers from 1…9999 in ascending will number with an interval of 1 in cyclic order.

Field Name Datatype Size
P_no varchar2 10
P_name varchar2 20
Qty varchar2 10
P_rate varchar2 10

1. Display next value of sequence seq_order.
2. Display current value of sequence seq_order.
3. Insert values in sal_order table must be generated using sal_order sequence.
4. Display all records of sal_order table.
5. Change a cache memory of 50 seq_order sequence having interval 2.
6. Drop sequence.

7. Write a SQL Query to-
1. Create an index employee_index depends on employee table using field name.
2. Create a view depends on employee table.

3. Display the records from the view where city as Delhi and Mumbai.
4. Update the view where employee id is _E006‘.

8. Write a SQL query to illustrate numeric function.
1. Sqrt 2. Ceil 3. Power 4. Floor 5. Round
6. Mod 7. Abs 8. Exp 9. Greatest 10. Least

9. Write a SQL query to create tablespace datauser or data where size of file 100MB extend it by 10MB reach upto 250MB in size. Create user data1 with default tablespace and temporary tablespace. Create role acc_create with create session, create user, alter user and assign role to user. Assign profile to user where user should fail after 5 attempt and valid for 3 days. Destroy user data1 and tablespace from system.

10. Write a SQL query for join, inner join, outer join, self join and Cartesian join.

11. Write an algorithm, draw a flowchart and develop a PL/SQL program to check given number is odd or even.

12. Write an algorithm, draw a flowchart and develop a PL/SQL program to check number is reverse or not.

13. Write an algorithm, draw a flowchart and develop a PL/SQL program to check number is palindrome or not.

14. Write an algorithm, draw a flowchart and develop a PL/SQL program to find the number is Armstrong or not.

15. Write an algorithm, draw a flowchart and develop a PL/SQL program to find the addition of all the number in the given range.

16. Write an algorithm, draw a flowchart and develop a PL/SQL program to find the number is prime or not.

17. Write an algorithm, draw a flowchart and develop a PL/SQL program to calculate factorial of a given number.

18. Write an algorithm, draw a flowchart and develop a PL/SQL program to generate Fibonacci series.

19. Write an algorithm, draw a flowchart and develop a PL/SQL program to insert a new element in a given position in the array.

20. Write an algorithm, draw a flowchart and develop a PL/SQL program to delete the duplicate element from the array.

21. Write an algorithm, draw a flowchart and develop a PL/SQL program to sort the data in ascending order.

22. Write an algorithm, draw a flowchart and develop a PL/SQL program to find reverse of a string.

23. Write an algorithm, draw a flowchart and develop a PL/SQL program to find palindrome of a string.

24. Write an algorithm, draw a flowchart and develop a PL/SQL program to calculate number of char, spaces, words from given string.

25. Write an algorithm, draw a flowchart and develop a PL/SQL program to find largest and smallest element of given array using function concept.

26. Write an algorithm, draw a flowchart and develop a PL/SQL program to print ASCII table.

27. Write an algorithm, draw a flowchart and develop a PL/SQL program to change sale_price of product_master table where pro_no is _C001‘ and insert records with date on which price was changed last in new_master table whose fields are prod_no, date, sale_price.

28. Write an algorithm, draw a flowchart and develop a PL/SQL program to accept the employee whose job is programmer and update the salary of the employee. Display how many rows are affected.

29. Write an algorithm, draw a flowchart and develop a PL/SQL program to display the name, dept, name and salary of first 10 employees getting the highest salary using explicit cursor.

30. Write an algorithm, draw a flowchart and develop a PL/SQL program to check whether emp_no of employees exists or not using procedure.

Paper – II

Course Code - **Course Name – Management Information System**

	Learning Outcome
LO1	Given the information on Management Information System in a digital firm, Business Performance, and Security challenges for E-enterprises student will be able to **describe** the role of information technology / system and **analyze** its impact on firm.
LO2	Given the information on Decision making, Business Intelligence and system engineering student will be able to **understand** the decision making concepts and its importance in business and **Analyze and design** the model accordingly.
LO3	Given the information on various processes of MIS, Strategic Design and Business process reengineering student will be able to **Ascertain** and **determines** the class and requirement of information and Implement the Business strategies for various Business Process Re-engineering using different models.
LO4	Given the information on application areas, Support System and ERP Concepts of Management information system, student will be able to **interpret** how to use information technology to solve business problems and **illustrate** the impact of information systems in society.

Management Information Systems

UNIT - I

Strategic View of MIS:
Management information system in a digital firm: Management Information System (MIS): Concept, Definition, Role of MIS, Impact of the MIS, MIS and the user, Management as a control system, MIS: A support to the management, Management effectiveness and MIS, Organization as a System, MIS: Organization Effectiveness, MIS for a digital firm. **E-Business Enterprise:** A digital firm - Introduction, Organization of business in a digital firm, E-Business, E-Commerce, E-Communication, E-Collaboration, Real Time Enterprise. **Strategic Management Of Business Performance:** Concept of corporate planning, Essentiality of strategic planning, Development of the business strategies, Types of strategies, Short range planning, Tools of planning, Strategic analysis of business, Balance score card, Score card and dash board, MIS: Strategic business planning. **Information security challenges in E-Enterprises:** Introduction, Security threats and vulnerability, Controlling security threats and vulnerability, Managing security threat in EBusiness, Disaster management, Information security.

UNIT - II

Basic of Management Information Systems:
Decision-Making: Concept, Process, Decision analysis by analytical modeling, **Behavioral concepts in Decision -** Making, Organizational Decision Making. **Information, Knowledge, Business Intelligence:** Information concepts, Information: A quality product, Classification of the information, Methods of data and information collection, Value of the information, General model of a human as an information processor, Summary of information concept and their implications, Knowledge and knowledge management systems, Business intelligence MIS and the information and knowledge. **System Engineering: Analysis And Design:** System concepts, System control, Types of system, Handling system complexity, Classes of systems, General model of MIS, The need for system analysis, System analysis of the

existing system, System analysis of a new requirement, System development model, Structured system analysis and design (SSAD), Object oriented analysis (OOA), System development through OOT: A use case model, OOSAD development life cycle.

UNIT – III

Development process of MIS: Development of long range plans of the MIS, Ascertaining the class of information, Determining the information requirement, Development and implementation of the MIS, Management of information quality in MIS, Organization for development of MIS, MIS: Development Process Model. **Strategic Design of MIS:** Strategic management of the business, Why strategic design of MIS?, Balance score card, Score card, and dash board, Strategic design of MIS, Development process steps for strategic design(SD) of MIS, illustrating SD of MIS for Big Bazzar, Strategic management of business and SD of MIS, Business strategy determination, Business strategy implementation. **Business Process Re-Engineering (BPR):** Introduction, Business process, Process model of organization, Value stream model of the organization, What delays the Business Process? Relevance of information technology (IT), MIS and BPR.

UNIT – IV

Applications of Management Information Systems to E-Business: Application in manufacturing sector: Introduction, Personnel management (PM), Financial management (FM), Production management (PM), Raw material management(RMM), Marketing management, Corporate overview. **Application in Service Sector:** Introduction to service sector, Creating a distinctive service, Service concept, Service process cycle and analysis, Customer service design, Service management system , MIS application in service industry, MIS: Service industry. **Decision support systems and knowledge management: Decision support systems (DSS):** Concept and philosophy, Group decision support system(GDSS), DSS application in E-Enterprise, Knowledge management , Knowledge management systems, Knowledge based expert system (KBES), MIS and the benefits of DSS. **Enterprise Management Systems:** Enterprise management systems(Ems), Enterprise resource planning (ERP) system, ERP models and modules, Benefits of the ERP, ERP product evaluation, ERP implementation, Supply chain management (SCM), Information management in SCM, Customer relationship management (CRM), EMS and MIS.

Text Book:

1. Waman S. Jawadekar, Management Information Systems, McGraw-Hill.

Reference Books:

1. D. P. Goyal, Management Information Systems, Vikas Publishing.
2. D. P. Nagpal, Management Information Systems, S. Chand.
3. S. Sadagopan, Management Information Systems, PHI.
4. A. K. Gupta, Management Information Systems, S. Chand.
5. Mahesh Halale, Management Information Systems, Himalaya publishing house.
6. Kanter, Managing with Information, PHI.

Paper – III

Course Code - **Course Name – Data Communication & Computer Network**

	Learning Outcome
LO1	Given information on data communication concepts students will be able to **understand** the basic terminologies used in computer network and able to **categorize** networks according to size, purpose, design issues, and transmission technologies.
LO2	Given information on components and media used in networking students will be able to **analyze** network performance parameters and transmission impairments.
LO3	Given information on different layers, issues and error control, students will be able to **apply** error control methods including error detection and correction, and sliding windows flow control protocols.
LO4	Given information on algorithms, diagram subnets, students will be able to **describe** network layer services and its scheduling.

Data Communication & Computer Network

UNIT-I

Network Characterization: Goals and Applications; Categorization according to Size, Purpose, Design issues & Transmission Technologies; Network Architecture and Service Models; Design issues for the Layers; OSI and TCP/IP Reference Models; Functions of layers and protocols of TCP/IP; Comparison of OSI & TCP/IP; Data Transmission using TCP/IP. **Networking Models & Applications:** Centralized, Decentralized, and Distributed; Client-Server and Peer-to-Peer; File sharing & Web- based; Content Distribution Networks. **Introduction to Example Networks:** The Internet and its Conceptual View; Accessing The Internet; Connection-Oriented Networks: X.25, Frame Relay and ATM.

UNIT-II

Data Communication Concepts & Components: Digital and Analog Data and Signals, synchronous and Synchronous transmission; bit rate, baud, bandwidth & Channel Capacity; Nyquist Bit Rate, Shannon Capacity; Network Performance Parameters; Transmission Impairment. **Connecting Devices & Transmission Media**: Network Interface Cards, Connectors, Hubs, Transceivers & Media Connectors; Link-Layer Switches, Bridge, Routers, Gateways, Virtual LANs; Guided Transmission Media; Wireless transmission; Satellite communication. **Data Encoding & Modulation Techniques:** NRZ, NRZ-I, Manchester and Differential Manchester encoding; 4B/5B ; Pulse Code Modulation & Delta Modulation; Digital to Analog encoding. **Switching and Bandwidth Utilization:** Methods of Switching; Virtual Circuit & Datagram Networks; Multiplexing; Spread Spectrum. **Wired Networks and The Local Loop:** Telephone Networks; Modems and Modulation Techniques; Broadband and ADSL; Internet over Cable; ADSL Versus Cable; Hybrid Fiber-Coaxial Network; Fiber-to-the-Home Broadband.

UNIT-III

Data Link Layer: Communication at the Data Link Layer; Nodes and Links; Link Layer Addressing; Examples of Data Link layer protocols. **Design Issues:** Framing techniques: Byte Oriented and Bit Oriented Protocols; **Error Control:** Error Detection and Correction; Sliding Window Flow Control Protocols. Media Access Control: Aloha, CSMA, CSMA/CD,

CSMA/CA; Collision free protocols with Controlled Access; Limited Contention Protocols; Channelization: FDMA, TDMA, CDMA; Wavelength Division Multiple access for Fiber-Optic Data Communication. IEEE LAN standards: Ethernet (Physical specifications, Encoding, Frame Format & MAC protocol); Binary Exponential Backoff algorithm; Token Ring and FDDI. **Introduction to Wireless Networks:** IEEE 802.11 Wireless LAN; Wi-Max; Bluetooth and other wireless PAN technologies & their applications; **Cellular Networks:** Generations; GSM & CDMA Technologies.

UNIT-IV

Transport layer: Addressing, Services and Protocols; TCP and UDP services & header formats. Network Layer: Services, **Routing Algorithms:** Shortest path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Multi Cast Routing, Routing for Mobile hosts. **Network layer in TCP/IP:** Basic characteristics of IP protocol; addressing and header format of IPv4 ; IPv6: Major goals& features. Congestion Control & **Quality of Service:** General Principals; Congestion control in Virtual – Circuit Subnets; **Congestion Control in Datagram Subnets:** Choke packets, Load Shedding; Random Early Detection, Jitter Control; Over provisioning, Buffering, Traffic Shaping, Leaky bucket, token bucket, Resource Reservation, Admission Control, Packet Scheduling.

Text Book-

1. Data and Computer Communications by William Stallings.
2. Computer Networking: A Top-Down Approach by James F. Kurose and Keith W. Ross

Reference Book

1. TCP/IP Illustrated, Volume 1: The Protocols by W. Richard Stevens
2. Computer Networking: Principles, Protocols and Practice by Olivier Bonaventure
3. The Internet and Its Protocols: A Comparative Approach by Adrian Farrel
4. Interconnections: Bridges, Routers, Switches, and Internetworking Protocols by Radia Perlman

Paper – III

Course Code - **Course Name – Intelligent System (AI)**

	Learning Outcome
LO1	Given information on basics of Artificial Intelligence, students will be able to understand its environments for problem solving techniques.
LO2	Given information on searching for solution students will be able to understand and apply the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services
LO3	Given information on representation issues and predicate logic students will be able apply the different theories in program by including rules
LO4	Given information on first order logic students will be able to define and understand different types of learning and its resolution.

Intelligent System (AI)

UNIT-I

Introduction–Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents–Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

UNIT-II

Problem solving Methods – Search Strategies- Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems -Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games

UNIT-III

Knowledge Representation **First Order Predicate Logic** – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering-Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories -Reasoning with Default Information

UNIT-IV

Software Agents Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems. **AI applications** – Language Models – Information Retrieval- Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware –Perception – Planning – Moving

Text Books:

1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach, Prentice Hall, Third Edition, 2009.

2. Artificial Intelligence: A Modern Approach, 4th Edition, Stuart Russell, peter Norvig University of California at Berkeley, Pearson education, 2020.
3. I. Bratko, ―Prolog: Programming for Artificial Intelligence, Fourth Edition, Addison-Wesley Educational Publishers Inc., 2011.

References:

1. M. Tim Jones, ―Artificial Intelligence: A Systems Approach (Computer Science),
2. Jones and Bartlett Publishers, Inc.; First Edition, 2008
3. Nils J. Nilsson, ―The Quest for Artificial Intelligence, Cambridge University Press, 2009.
4. William F. Clocksin and Christopher S. Mellish, Programming in Prolog: Using the ISO Standard,
5. Fifth Edition, Springer, 2003.
6. Gerhard Weiss, ―Multi Agent Systems, Second Edition, MIT Press, 2013.
7. David L. Poole and Alan K. Mackworth, ― Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.

Semester – IV

Paper – I

Course Code - **Course Name – Software Engineering**

	Learning Outcome
LO1	Given information on basic knowledge of SW engineering methods and practices, Students will able to **find** the appropriate application to ensure good quality software.
LO2	Given information of software engineering tools such that Students will able to specify and **analyse** the function oriented software-designing techniques for adopting recent and advance system.
LO3	Given information on the concept of Unified modelling language, design and developed the software application, so that students will **reanalysing** the existing system for better performance.
LO4	Given information to analyse the existing system, with computer added software techniques so that students will able to **reuse** and **maintenance** the software code for creating real application.

Software Engineering

UNIT – I

Introduction- The software engineering discipline evolution and impact, Programs Vs. software product, Why study software engineering?, Emergence of software engineering, Notable changes in software development practices, Computer systems engineering. **Software Life Cycle-** Why use a life cycle model?, Classical waterfall model, Interactive waterfall model, Prototyping model, Evolutionary model, Spiral model, Comparison of different life cycle models. **Software Product Management**- Responsibilities of a software project manager, Project planning, Matrices for project size estimation, Project estimation techniques, Empirical project techniques, COCOMO- A heuristic estimation technique, Halstead‘s software science- An analytical technique, Staffing level estimation, Scheduling, Organization and team structures, Staffing, Risk management, Software configuration management, Miscellaneous plans.

UNIT – II

Requirement Analysis and Specifications - Requirement gathering and specifications, Software requirement specification, Formal system development techniques, Axiomatic specification, Algebraic specification, Executable specification and 4GLs. **Software Design**- What is a software design?, Cohesion and coupling, Neat arrangement, Software design approaches, Object oriented Vs. function oriented design. **Function Oriented Software Design**- Overview of SA/SD methodology, structured analysis, Data flow diagrams (DFDs), Extending DFD techniques to real-time systems, Structured design, Detailed design, Design review.

UNIT - III

Object Modeling Using UML - Overview of object oriented concept, Unified-modelling language (UML), UML diagrams, Use case models, Class diagrams, Interaction diagrams, Activity diagrams, State chart diagrams. **Object Oriented Software Development-** Design pattern, A generalized object oriented analysis and design process, Odd goodness criteria.

UNIT – IV

Computer Aided Software Engineering- Case and its scope, Case environment, Case support in software life cycle, Other characteristics of case tools, Towards second generation case tools, Architecture of a case environment. **Software Maintenance-**Characteristics of software maintenance, Software reverse engineering, Software maintenance process model, Estimation of maintenance cost. **Software Reuse**- What can be reused?, Why almost no reuse so far?, Basic issue in any reuse program, A reuse approach, Reuse at organization level.

Text Book:

1. Rajib Mall, Fundamentals of Software Engineering, PHI.

Reference Books:

1. Rajesh Narang, Software Engineering Principles & Practices, McGraw-Hill.
2. Roger Pressman, Software Engineering – A Practitioner Approach, McGraw-Hill.
3. Dr. Sajan Mathew, Software Engineering, S. Chand.
4. S. Thangasamy, Essentials of Software Engineering, Wiley-India.
5. Pankaj Jalote, Software Engineering – A Precise approach, Wiley.

Paper – II

Course Code - **Course Name – Mobile Computing**

	Learning Outcome
LO1	Given information on mobile computing students will comprehend the fundamentals and advancements in mobile computing, techniques and technology
LO2	Given information on mobile telecommunication system students will be able to understand the architecture, protocols, and operational aspects of cellular systems.
LO3	Given information on mobile network layer students will comprehend the protocols and dynamics of mobile network layers, encompassing Mobile IP, routing, and security.
LO4	Given information on mobile transport and application, layer students will understand the characteristics and development environments of major mobile device operating systems their specific constraints and requirements for application development.

Mobile Computing

UNIT-I

INTRODUCTION

Introduction to Mobile Computing — Applications of Mobile Computing- Generations of Mobile Communication Technologies- Multiplexing — Spread spectrum -MAC Protocols — SDMA- TDMA- FDMA- CDMA

UNIT-II

MOBILE TELECOMMUNICATION SYSTEM

Introduction to Cellular Systems — GSM — Services & Architecture — Protocols — Connection Establishment — Frequency Allocation — Routing — Mobility Management — Security — GPRS- UMTS — Architecture — Handover — Security

UNIT-III

MOBILE NETWORK LAYER

Mobile IP — DHCP — AdHoc– Proactive protocol-DSDV, Reactive Routing Protocols — DSR, AODV , Hybrid routing –ZRP, Multicast Routing- ODMRP, Vehicular Ad Hoc networks (VANET) –MANET Vs VANET — Security. Mobile TCP– WAP — Architecture — WDP — WTLS — WTP –WSP — WAE — WTA Architecture — WML

UNIT-IV

MOBILE PLATFORMS AND APPLICATIONS

Mobile Device Operating Systems — Special Constraints & Requirements — Commercial Mobile Operating Systems — Software Development Kit: iOS, Android, BlackBerry, Windows Phone — MCommerce — Structure — Pros & Cons — Mobile Payment System — Security Issues

Text Books

1. Mobile Computing: Implementing Pervasive Information and Communications Technologies by Stefan Poslad.
2. Mobile Computing – Dr. Sarang Javkhedkar, Prashant Dupare – Preface Publication.

Reference Books

1. Fundamentals of Mobile and Pervasive Computing by Frank Adelstein, Sandeep KS Gupta, Golden Richard III, and Loren Schwiebert.
2. Mobile Computing: Technology, Applications, and Service Creation by Asoke K. Talukder, Hasan Ahmed, and Roopa R. Yavagal.
3. Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML by Reza B'Far

Paper – III

Course Code - **Course Name – Big Data & Hadoop**

	Learning Outcome
LO1	Given information on the basic structure and framework of big data & hadoop Student will able to **apply** computer skills to **design** the database.
LO2	Given information on advance database technologies Student will able to **compare** and **create** database applications used as advance reporting tool.
LO3	Given information on various platforms suitable for database application Student will able to **use** and **implement** advance programming tools while creating robust database application.
LO4	Given information on advance database management system by using Hive, pig, as well as various report tools Students will able to **process** the data for generating reports from the database.

Big Data & Hadoop

UNIT – I

Types of Digital Data - Classification of Digital Data. **Introduction to Big Data -** Characteristics of Data, Evolution of Big Data, Definition of Big Data, Challenges with Big Data, What is Big Data?, Other Characteristics of Data Which are not Definitional Traits of Big Data, Why Big Data?, Are We Just an Information Consumer or Do we also Produce Information?, Traditional Business Intelligence (BI) versus Big Data, A Typical Data Warehouse Environment, A Typical Hadoop Environment, What is New Today?, What is changing in the Realms of Big Data?. **Big Data Analytics -** Where do we Begin?, What is Big Data Analytics?, What Big Data Analytics Isn‘t?, Why this Sudden Hype Around Big Data Analytics?, Classification of Analytics, Greatest Challenges that Prevent Businesses from Capitalizing on Big Data, Top Challenges Facing Big Data, Why is Big Data Analytics Important?, What Kind of Technologies are we looking Toward to Help Meet the Challenges Posed by Big Data?, Data Science, Data Scientist…Your New Best Friend!!!, Terminologies Used in Big Data Environments, Basically Available Soft State Eventual Consistency (BASE), Few Top Analytics Tools.

UNIT - II

The Big Data Technology Landscape - NoSQL (Not Only SQL), Hadoop. **Introduction to Hadoop -** Introducing Hadoop, Why Hadoop?, Why not RDBMS?, RDBMS versus Hadoop, Distributed Computing Challenges, History of Hadoop, Hadoop Overview, Use Case of Hadoop, Hadoop Distributors, HDFS (Hadoop Distributed File System), Processing Data with Hadoop, Managing Resources and Applications with Hadoop YARN (Yet another Resource Negotiator), Interacting with Hadoop Ecosystem. **Introduction to MongoDB -** What is MongoDB?, Why MongoDB?, Terms Used in RDBMS and MongoDB, Data Types in MongoDB, MongoDB Query Language.

UNIT - III

Introduction to Cassandra - Apache Cassandra - An Introduction, Features of Cassandra, CQL Data Types, CQLSH, Keyspaces, CRUD (Create, Read, Update and Delete) Operations, Collections, Using a Counter, Time to Live (TTL), Alter Commands, Import and Export, Querying System Tables, Practice Examples. Introduction to MAPREDUCE Programming – Introduction, Mapper, Reducer, Combiner, Partitioner, Searching, Sorting, Compression. Introduction to Hive - What is Hive?, Hive Architecture, Hive Data Types, Hive File Format, Hive Query Language (HQL), RCFile Implementation, SerDe, User-Defined Function (UDF).

UNIT - IV

Introduction to Pig - What is Pig?, The Anatomy of Pig, Pig on Hadoop, Pig Philosophy, Use Case for Pig: ETL Processing, Pig Latin Overview, Data Types in Pig, Running Pig 10.9 Execution Modes of Pig, HDFS Commands, Relational Operators, Eval Function, Complex Data Types, Piggy Bank, User-Defined Functions (UDF), Parameter Substitution, Diagnostic Operator, Word Count Example using Pig, When to use Pig?, When not to use Pig?, Pig at Yahoo!, Pig versus Hive. Jasper Report using Jasper soft - Introduction to Jasper Reports, Connecting to MongoDB NoSQL Database, Connecting to Cassandra NoSQL Database. Introduction to Machine Learning - Introduction to Machine Learning, Machine Learning Algorithms.

Text Book:

1. Seema Acharya & Subhashini Chellappan, Big data and Analytics, Wiley.

Reference Books:

1. Radha Shankarmani & M. Vijayalakshmi, Big data Analytics, Wiley.
2. Chuck Lam, Hadoop in Action, Dreamtech Press.
3. Philip Kromer & Russell Jurney, Big Data for Chimps, Shroff Publishers, O'Reilly.
4. Chandrakant Naikodi, Managing Big Data, Vikas publishing.
5. Chriss Eaton, Dirik Deroos, Tom Deutsch, George Lapis, Paul Zikopoulos,Understanding Big Data, McGraw-Hill.

Paper – IV

Course Code - **Course Name – Ruby on Rail**

	Learning Outcome
LO1	Given information on basic program structure, data types and objects Students will be able to **use** it in program.
LO2	Given information on expressions, operators, control structure, lambdas and closures Students will be able to **apply** the logic in functional programming techniques.
LO3	Given information on classes, modules, reflection and meta programming Students will be able to **create** and manage classes, modules, and **apply** object-oriented principles in Ruby.
LO4	Given information on Ruby Environment and platform, Students will be able to **utilize** it while creating I/O expression and system interactions.

Ruby on Rail

UNIT - I

Introduction - A Tour of Ruby, Try Ruby, A Sudoku Solver in Ruby. **The Structure and Execution of Ruby Programs -** Lexical Structure, Syntactic Structure, File Structure, Program Encoding, Program Execution. **Data types and Objects -** Numbers, Text, Arrays, Hashes, Ranges, Symbols, True, False, and Nil, Objects.

UNIT - II

Expressions and Operators - Literals and Keyword Literals, Variable References, Constant References, Method Invocations, Assignments, Operators. **Statements and Control Structures -**Conditionals, Loops, Iterators and Enumerable Objects, Blocks, Altering Control Flow, Exceptions and Exception Handling, BEGIN and END, Threads, Fibers, and Continuations. Methods, Procs, **Lambdas, and Closures -** Defining Simple Methods, Method Names, Methods and Parentheses, Method Arguments, Procs and Lambdas, Closures, Method Objects, Functional Programming.

UNIT - III

Classes and Modules - Defining a Simple Class, Method Visibility: Public, Protected, Private, Subclassing and Inheritance, Object Creation and Initialization, Modules, Loading and Requiring Modules, Singleton Methods and the Eigenclass, Method Lookup, Constant Lookup. **Reflection and Meta programming -** Types, Classes, and Modules, Evaluating Strings and Blocks, Variables and Constants, Methods, Hooks, Tracing, ObjectSpace and GC, Custom Control Structure, Missing Methods and Missing Constants, Dynamically Creating Methods, Alias Chaining, Domain-Specific Languages.

UNIT - IV

The Ruby Platform – Strings, Regular Expressions, Numbers and Math, Dates and Times, Collections, Files and Directories, Input/Output, Networking, Threads and Concurrency. **The**

Ruby Environment - Invoking the Ruby Interpreter, The Top-Level Environment, Practical Extraction and Reporting Shortcuts, Calling the OS, Security.

Text Book:

1. David Flanagan, Yukihiro Matsumoto, The Ruby Programming language, O'Reilly.

Reference Books:

1. Noel Rappin, Professional Ruby on Rails, Wrox.
2. Michael Fitzgerald, Ruby – Pocket Reference, O'Reilly.
3. Timothy Fisher, Ruby on Rails – Bible, Wrox.
4. Daniel Kehoe, Learn Ruby on Rails, Book One.
5. MichaelHartl, Ruby on Rail Tutorial,

Practical List

1. Write a program of Ruby on Rail to find the largest number between three numbers.
2. Write a program of Ruby on Rail to swap the values of two variables with and without using third variable.
3. Write a program of Ruby on Rail to perform the following arithmetic operations using arithmetic operators in switch statement. The Arithmetic operations are addition (+), Subtraction (-), Multiplication (*), Integer Division (/) Real Division (/), modulo (%) andRaise to power (^).
4. Write a program of Ruby on Rail to generate and print Fibonacci series of a given range.
5. Write a program of Ruby on Rail to calculate LCM & HCF of two numbers.
6. Write a program of Ruby on Rail to check the entered number is Armstrong numberor not.
7. Write a program of Ruby on Rail to check the entered number is Palindrome or not.
8. Write a program of Ruby on Rail to perform parallel iteration with external iterators.
9. Write a program of Ruby on Rail to find factorial of given number using function.
10. Write a program of Ruby on Rail to find reverse of given number using function.
11. Write a program of Ruby on Rail to demonstrate class and object.
12. Write a program of Ruby on Rail to demonstrate after and every method.
13. Write a program of Ruby on Rail to demonstrate thread.
14. Write a program of Ruby on Rail to tracing method invocations with method_missing.
15. Write a program of Ruby on Rail to perform attribute methods with define_method.
16. Write a program of Ruby on Rail to perform Alias chaining for thread safety.

17. Write a program of Ruby on Rail to check the string is palindrome or not.
18. Write a program of Ruby on Rail to calculate number of characters, words and blankspaces from a sentence.
19. Write a program of Ruby on Rail to insert and modify the data into the database.
20. Write a program of Ruby on Rail to upload a file on the server.

Paper – IV

Course Code - **Course Name – Web with Word Press**

	Learning Outcome
LO1	Given information on basics of word press student will gain a comprehensive understanding of WordPress setting up a local development environment, installing WordPress, and creating and managing site content using themes and plugins.
LO2	Given information on design and customisation student will be able to explore, install, and customize WordPress themes and templates.
LO3	Given information on content management student will be able to create and manage posts and pages, organizing content, handling media files, and extending site functionality with essential and custom plugins.
LO4	Given information on advance features and SEO student will be able to learn to set up and manage an online store.

Web with Word Press

Unit - I

Introduction: - Installation - Overview of WordPress: History and Features, Setting Up a Local Development Environment, Installing WordPress on a Local Server, Overview of the WordPress Dashboard. **Basics -** WordPress Settings: General, Writing, Reading, Discussion, Media, and Permalinks, Creating and Managing User Accounts, Introduction to Themes and Plugins. **Site Setup -** Setting Up Site Identity and Permalinks, Creating and Managing Basic Pages, Understanding the WordPress Editor.

Unit – II

Design and Customization : - Themes and Templates - Exploring Free and Premium Themes, Installing and Activating Themes, Customizing Themes Using the Customizer. **Page Builders and Custom Layouts -** Introduction to Page Builders (e.g., Elementor, Divi), Creating Custom Layouts with Page Builders, Best Practices for Responsive Design. **Advanced Theme Customization -** Introduction to Child Themes, Editing Theme Files (HTML, CSS, PHP), Using Widgets and Menus for Custom Navigation.

Unit III

Content Management: - Posts and Pages - Creating and Managing Blog Posts, Categories and Tags: Organizing Your Content, Using the Block Editor (Gutenberg) for Advanced Content. **Media Management -** Uploading and Managing Media Files, Creating and Using Image Galleries, Embedding Videos and Other Media. **Plugins and Functionality -** Installing and Managing Plugins, Must-Have Plugins for WordPress Sites, Extending Functionality with Custom Plugins.

Unit IV

Advanced Features and SEO : - E-commerce with WordPress - Introduction to WooCommerce, Setting Up an Online Store, Managing Products, Orders, and Payments. **Website Optimization -** Basics of WordPress SEO, Using SEO Plugins (e.g., Yoast SEO, All in One SEO Pack), Performance Optimization: Caching, Image Optimization, and Minification. **Security and Maintenance -** Securing Your WordPress Site, Regular Maintenance Tasks, Backups and Restorations.

Resources:

- **Textbook:** WordPress for Beginners 2023 by Dr. Andy Williams
- **Online Resources:** WordPress Codex, WPBeginner, Yoast Blog
- **Tools:** Local by Flywheel, WordPress.org, Elementor, WooCommerce

Practical List of Web with WordPress

1. Write a WordPress program to create a custom WordPress theme template for displaying a single post.
2. Write a WordPress program to customize a theme using the WordPress Customizer API to add a setting for changing the background color.
3. Write a WordPress program to create a custom layout using Elementor page builder.
4. Write a WordPress program to create a custom section using Divi page builder.
5. Write a WordPress program to ensure responsive design by adding a custom media query to your theme's CSS file.
6. Write a WordPress program to create a child theme for a WordPress theme.
7. Write a program to change the WordPress login URL for added security.
8. Write a WordPress program to create a custom menu and display it in a theme using the wp_nav_menu function.
9. Write a WordPress program to create a new category and assign it to a post.
10. Write a WordPress program to create a new tag and assign it to a post.
11. Write a WordPress program to enforce strong passwords for all users.
12. Write a WordPress program to create an image gallery shortcode.
13. Write a WordPress program to embed a YouTube video using a shortcode.
14. Write a WordPress program to resize images on upload to specific dimensions.
15. Write a WordPress program to create a custom plugin that adds a shortcode to display the current date and time.
16. Write a WordPress program to create a new WooCommerce product using WP-CLI.
17. Write a WordPress program to create a custom WooCommerce product category and assign it to a product.
18. Write a WordPress program to create a WooCommerce custom email notification.
19. Write a WordPress program to add image optimization settings to the WordPress theme.

20. Write a WordPress program to add a custom color palette to the Gutenberg editor.

QUESTION PAPER PATTERN

First / Second / Third / Fourth Semester

Master of Commerce (Computer Application) – M.Com.(C.M.) - (MCCM)

NEP Examination

Time: 3 Hours **Total Marks: 80**

N. B. - a) Draw well labeled diagram wherever necessary.

b) All questions are compulsory.

Q1. **8 x 2 = 16**

N. B. – 1. Each question carries two marks.

2. Answers should not more than five lines.

A. Unit I

B. Unit I

C. Unit II

D. Unit II

E. Unit III

F. Unit III

G. Unit IV

H. Unit IV

Q2. **8 x 3 = 24**

N. B. – 1. Each question carries three marks.

2. Answers should not more than ten lines.

A. Unit I

B. Unit I

C. Unit II

D. Unit II

E. Unit III

F. Unit III

G. Unit IV

H. Unit IV

N. B. – 1. Each question carries five or ten marks.

2. Answers should not more than 250 words for 5 marks questions and 600 words for 10 Marks questions respectively.

Q3. **Either**

(A) 5 Unit I

(B) 5 Unit I

OR

(C) 10 Unit I

Q4. **Either**

(A) 5 Unit II

(B) 5 Unit II

OR

(C) 10 Unit II

Q5. **Either**

(A) 5 Unit III

(B) 5 Unit III

OR

(C) 10 Unit III

Q6. **Either**

(A) 5 Unit IV

(B) 5 Unit IV

OR

(C) 10 Unit IV