MASTER OF COMPUTER APPLICATION

Syllabus w.e.f. the Academic Session 2021-2022

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY
WEST BENGAL

First Year: Semester-I

Code: MCAN-101	**Paper: Programming Concept with Python**	
Contacts Hours / Week: 4	**Total Contact Hours: 40**	**Credit: 4**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Learn, understand and comprehend the concept of programming.
- ✓ Design algorithm to solve simple programming problem.
- ✓ Understand and remember syntax and semantics of Python.
- ✓ Create application using secondary storage.
- ✓ Understand and apply library for data analysis.
- ✓ Apply Python to implement different solutions for the same problem and analyze why one solution is better than the other.
- ✓ To write program for real life problem.

UNIT	COURSE CONTENT
1	**Fundamentals of Computer** **(6L)** History of Computers, Basic Anatomy of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices. Basic Concepts of Assembly language, High level language, Compiler and Assembler. Number systems (decimal, octal and hexadecimal) with signed and unsigned numbers (using 1's and 2's complement) - their representation, conversion and arithmetic operations. Packed and unpacked BCD system, ASCII. IEEE-754 floating point representation (half- 16 bit, full- 32 bit, double- 64 bit).
2	**Programming Basics** **(2L)** Problem analysis, Flowchart, algorithms, Pseudo codes, structured programming, Example of Flowchart and Algorithm representation
3	**Variable and Expression** **(4L)** Variables as names for values; expressions (arithmetic and logical) and their evaluation (operators, associativity, precedence). Assignment operation; difference between left hand side and right hand side of assignment, Console input/output: taking input from user and printing user information.
4	**Control Statement and Iteration** **(5L)** If statement, else-if statement, multiple statements within if, multiple if statement. While Loop, For Loop, Nesting Loops, Controlling Loops using Break and Continue, Else Statement, Range Statement and Pass Statement in Loop.
5	**Collections** **(2L)** Strings, List, Tuples, Dictionary, Set, Selection sort, Bubble sort
6	**Function** **(2L)** Built in function, user defined function, function passing values, function returning values, default parameter values, Recursive function
7	**File Management** **(4L)** Operations on files (opening, modes, attributes, encoding, closing), read() & write() methods, tell() & seek() methods, renaming & deleting files and directories
8	**Errors and Exception Handling** **(2L)** Dealing with syntax errors, Exceptions, Handling exceptions with try/except, Cleaning up with finally
9	**Classes and Objects** **(5L)** Create a Class, Create Object, __Init__() Function, Methods, Self Parameter, Modification and Deletion of Object Parameter, Deletion of Object, Pass Statement, Inheritance and Polymorphism, Scope, Module, Built-In Math Function, Math Module, Module datetime and Date Objects, RegEx Module andRegEx Functions, Exception Handling.
10	**Modules& Packages** **(2L)** Importing a module, Creating module, Function aliases, packages
11	**Numpy** **(6L)** ndArray, Pandas: reading files, exploratory data analysis, data preparation and processing, , Matplolib: Scatterplot, Line plot, Bar plot, Histogram, Box plot, Pair plot

Reference Books:

- N.S. Gill, Handbook of Computer Fundamentals, Khanna Publishing House
- Dr.Jeeva Jose-Taming Python by Programming, Khanna Publishing
- Martin C. Brown – The Complete Reference Python, Mc Graw Hill
- A. Martelli, A. Ravenscroft, S. Holden, Python in a Nutshell,OREILLY.
- Jason Rees-Python Programming:Practical introduction to Python Programming for total beginners,
- Anthony Brun - Python Programming: A Step By Step Guide From Beginner To Expert (Beginner, Intermediate & Advanced)
- Mark Pilgrim-Diva into Python, Springer-Verlag Berlin and Heidelberg GmbH & Co. KG
- Summerfield Mark- Programming in Python 3,Pearson Education India

Code: MCAN-102	**Paper: Relational Database Management System**	
Contacts Hours / Week: 4	**Total Contact Hours: 40**	**Credit: 4**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Identify the need for a database over the file system.
- ✓ Understand and implement the process of data insertion, retrieval, and manipulation.
- ✓ Understand and analyze the functional dependencies among attributes of the entity set and normalization between the relations.
- ✓ Implement SQL concept for a database transaction.
- ✓ Understand and Implement the Transaction control and concurrency control management.
- ✓ Evaluate the relational tables, PL/SQL programs, triggers, database files, indexing of RDBMS.

UNITS	COURSE CONTENT
1	**Basic Concept** **(7L)** Database Management System , File based system, Advantages of DBMS over file based system, Database Approach, Logical DBMS Architecture, Three level architecture of DBMS or logical DBMS architecture, Need for three level architecture, Physical DBMS Architecture, Database Administrator (DBA) Functions & Role, Data files indices and Data Dictionary Types of Database, Relational and ER Models: Data Models , Relational Model, Domains, Tuple and Relation, Super keys, Candidate keys , Primary keys and foreign key for the Relations, Relational Constraints, Domain Constraint, Key Constraint , Integrity Constraint,- Update Operations and Dealing with Constraint Violations, Relational Operations **Entity Relationship (ER) Model:** Entities, Attributes, Relationships,More about Entities and Relationships, Conversion of E-R Diagram to Relational Database.
2	**Database Integrity And Normalization** **(8L)** Relational Database Integrity, The Keys, Referential Integrity, Entity Integrity, Redundancy and Associated Problems, Single Valued Dependencies, Normalization, Rules of Data Normalization, The First Normal Form, The Second Normal Form, The Third Normal Form, Boyce CODD Normal Form, The Fourth Normal Form, The Fifth Normal Form, Multi-valued Functional Dependency, Attribute Preservation,Losslessjoin Decomposition, Dependency Preservation.
3	**File Organization** **(4L)** Physical Database Design Issues, Storage of Database on Hard Disks, File Organization and Its Types, Heap files (Unordered files), Sequential File Organization, Indexed (Indexed Sequential) File Organization, Hashed File Organization, Types of Indexes, Index and Tree Structure, Multi-key File Organization, Need for Multiple Access Paths, Multi-list File Organization, Inverted File Organization.
4	**Structured Query Language (SQL)** **(7L)** Meaning, SQL commands, Data Definition Language, Data Manipulation Language, Data Control Language, Transaction Control Language, Queries using Order by, Where, Group by, Nested Queries. Joins, Views, Sequences, Indexes and Synonyms, Table Handling.
5	**Transaction and Concurrency Management** **(8L)** Transactions, Concurrent Transactions, Locking Protocol,Serializable Schedules, Locks Two Phase Locking (2PL), Deadlock and its Prevention, Optimistic& Pessimistic Concurrency Control. Database Recovery and Security: Database Recovery meaning, Kinds of failures, Failure controlling methods, Database errors, Backup & Recovery Techniques, Security & Integrity, Database Security Authorization.
6	**PL/SQL** **(6L)** Introduction to PL/SQL, Variables & Data types, Basic blocks, Conditional & branching statement, Handling of Cursor, Trigger, Function, Procedure, Package and Exception.

Reference Books:

- Silverchatz, Korth&Sudarshan-Data Base System Concepts, MH.
- Elmasri, Navathe- Fundamentals of Database Systems, Pearson
- C J date-An Introduction to Database, Addison-Wesley Publishing Company
- Majumder& Bhattacharyya-Data Base Management Systems, TMH
- Feuerstein-Oracle PL/SQL Programming,SPD/O'REILLY
- Leon-Data Base Management Systems, VIKAS
- Kroenke-Data Base Processing:Fundamentals, Design &Implementation,PHI
- P.S Deshpande-SQL PL/SQL for Oracle 8 & 8i, Wiley Dreamtech
- P. Bhatia, S. Bhatia, G. Singh- Concepts of Database Management System, Kalyani Publishers
- R.P. Mahapatra, Database Management Systems, Khanna Publishing House (AICTE Recommended)

Code: MCAN-103	**Paper: Computer Organization and Architecture**	
Contacts Hours / Week: 4	**Total Contact Hours: 40**	**Credit: 4**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Describe the merits and pitfalls in computer performance measurements and analyze the impact of instruction set architecture on cost-performance of computer design
- ✓ Explain Digital Logic Circuits, Data Representation, Register and Processor level Design and Instruction Set architecture
- ✓ Solve problems related to computer arithmetic and Determine which hardware blocks and control lines are used for specific instructions
- ✓ Design a pipeline for consistent execution of instructions with minimum hazards
- ✓ Explain memory organization, I/O organization and its impact on computer cost/performance.

UNITS	COURSE CONTENT
1	**INTRODUCTION** **(8L)** **Digital Logic Design:** Axioms and laws of Boolean algebra, Reduction of Boolean expressions, conversion between canonical forms, Karnaugh map (4 variable), Half Adder, full adder, 4-bitparallel parity bit generator, checker circuit, Decoder, Encoder, Multiplexer, IC RAM, ROM, Memory Organization, Sequential Circuits, State transistors, Flip-flop, RS, JK, D-Latch, Master-slave.
2	**INSTRUCTION SET ARCHITECTURE:** **(8L)** **Memory Locations and Addresses:** Byte Addressability, Big-Endian and Little-Endian Assignments, Word Alignment, Instructions and Instruction Sequencing, Addressing Modes, Assembly Language, Subroutines, Additional Instructions, dealing with 32-Bit Immediate Values.
3	**BASIC PROCESSING UNIT & PIPELINING** **(8L)** **Basic Processing Unit:** Some Fundamental Concepts, Instruction Execution, Hardware Components, Instruction Fetch and Execution Steps, Control Signals, Hardwired Control, CISC-Style Processors. **Pipelining:** Basic Concept, Pipeline Organization, Pipelining Issues, Data Dependencies, Memory Delays, Branch Delays, Pipeline Performance Evaluation.
4	**MEMORY ORGANIZATION** **(8L)** Basic Concepts, Semiconductor RAM Memories, Read-only Memories, Direct Memory Access, Memory Hierarchy, Cache Memories, Performance Considerations, Virtual Memory, Memory Management Requirements, Secondary Storage.
5	**INPUT OUTPUT & PARALLEL PROCESSING** **(8L)** **Basic Input Output:** Accessing I/O Devices, Interrupts, Input Output Organization: Bus Structure, Bus Operation, Arbitration, Interface, Interconnection Standards. Parallel Processing: Hardware Multithreading, Vector (SIMD) Processing, Shared-Memory Multiprocessors, Cache Coherence, Message-Passing Multicomputers, Parallel Programming for Multiprocessors, Performance Modeling.

Reference Books:

- Computer Organization and Embedded Systems, 6th Edition, Hamacher Carl, et. al, Tata McGraw Hill, New Delhi, 2011.
- Computer Organization and Design: The Hardware Software / Interface, 5th Edition, 1994, Patterson David A.
- Computer System Architecture, Revised 3rd Edition, Mano M. Morris,Pearson Education,

Code: MCAN-104	**Paper: Discrete Mathematics**	
Contacts Hours / Week: 4	**Total Contact Hours: 40**	**Credit: 4**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Interpret the problems that can be formulated in terms of graphs and trees.
- ✓ Explain network phenomena by using the concepts of connectivity, independent sets, cliques, matching, graph coloring etc.
- ✓ Achieve the ability to think and reason abstract mathematical definitions and ideas relating to integers through concepts of well-ordering principle, division algorithm, greatest common divisors and congruence.
- ✓ Apply counting techniques and the crucial concept of recurrence to comprehend the combinatorial aspects of algorithms.
- ✓ Analyze the logical fundamentals of basic computational concepts.
- ✓ Compare the notions of converse, contrapositive, inverse etc. in order to consolidate the comprehension of the logical subtleties involved in computational mathematics.

UNITS	COURSE CONTENT
1	**Logic and Proofs** **(3L)** Propositional logic, Propositional equivalences, Predicates and quantifiers, Nested quantifiers, Rules of inference.
2	**Principles of Mathematical Induction** **(5L)** The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.
3	**Sets and Sequence** **(8L)** Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem. Fuzzy set, Basic properties of fuzzy set.
4	**Counting and Combinatorics** **(8L)** Counting, Sum and product rule, Principle of Inclusion Exclusion. Pigeon Hole Principle, Counting by Bijections. Double Counting. Linear Recurrence relations - methods of solutions. Generating Functions. Permutations and Combination.
5	**Algebraic Structure** **(9L)** Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form
6	**Graph and Tree** **(7L)** Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.

Reference Books:

- S.B. Singh, Discrete Structures, Khanna Book Publishing, Delhi
- Kandel& Baker- Discrete Mathematics for Comp. Scientists & Mathematicians, Mott, PHI
- C.L.Liu- Discrete Mathematical Structure, C.L.Liu,TMH
- G.S.RAO- Discrete Mathematical Structure, New Age International
- DeoNarsingh - Graph Theory With Applications To Engineering And Computer Science, PHI Learning
- Arumugam, Ramachandran- Invitation to Graph Theory, Scitech Publications (India)

Code: MCAN-E105A	**Paper: Environment and Ecology**	
Contacts Hours / Week: 3	**Total Contact Hours: 30**	**Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Be able to understand the natural environment and its relationships with human activities.
- ✓ Be able to apply the fundamental knowledge of science and engineering to assess environmental and health risk.
- ✓ Be able to understand environmental laws and regulations to develop guidelines and procedures for health and safety issues
- ✓ Be able to solve scientific problem-solving to air, water, noise and land pollutions.

UNITS	COURSE CONTENT
1	**Introduction** **(4L)** Basic ideas of environment and interrelationship among man society and environment. Environmental problems and issues, Segments of environments, Natural Cycles of environments Mathematics of population growth and its associated problems, Logistic population growth
2	**Elements of Ecology** **(3L)** Open and closed system ecology, species, population, community, definition of ecosystem-components types and functions, Environmental perspectives, Montreal protocol
3	**Pollutants and Contaminants** **(3L)** Definition of primary and secondary pollutants and contaminants. Source and effects of different air pollutants suspended particulate matter, oxides of carbon, nitrogen, sulphur particulate
4	**Air Pollution** **(5L)** Structures of the atmosphere, global temperature models, Greenhouse effect, global warming; acid rain: causes, effects and control. Lapse rate and atmospheric stability; pollutants and contaminants; smog; depletion of ozone layer; standards and control measures of air pollution.
5	**Water Pollution** **(5L)** Hydrosphere; pollutants of water: origin and effects; oxygen demanding waste; thermal pollution; pesticides; salts. Biochemical effects of heavy metals; eutrophication: source, effect and control. Water quality parameters: DO, BOD, COD. Water treatment: surface water and wastewater.
6	**Land Pollution** **(5L)** Land pollution: sources and control; solid waste: classification, recovery, recycling, treatment and disposal.
7	**Noise Pollution** **(5L)** Noise: definition and classification; noise frequency, noise pressure, noise intensity, loudness of noise, noise threshold limit value; noise pollution effects and control.

Reference Books:

- Environmental Studies, M.P. Poonia & S.C. Sharma, Khanna Publishing House.
- Basic Environmental Engineering and Elementary Biology, GourKrishna Das Mahapatra, Vikas Publishing House P. Ltd.
- Environmental Chemistry, A. K. De, New Age International.
- Environmental Engineering, G.M.Masters, Tata Mc Graw Hills
- Environmental Chemistry with Green Chemistry, A. K. Das, Books and Allied P. Ltd.
- Fundamentals of Environment & Ecology, D. De, D. De, S. Chand & Company Ltd.

Code: MCAN-E105B	**Paper: Management Accounting**	
Contacts Hours / Week: 3	**Total Contact Hours: 30**	**Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Understand the basic concepts related to Business.
- ✓ Demonstrate the roles, skills and functions of different discipline of business management.
- ✓ To disseminate knowledge among the students inculcate with theoretical structures about banking system
- ✓ Record basic accounting transactions and prepare annual financial statements; and analyse, interpret and communicate the information contained in basic financial statements
- ✓ Analyse and provide recommendations to improve the operations of Organisations through the application of Cost and Management accounting techniques
- ✓ Equip students with in-depth and expert knowledge of Tally ERP with GST.

UNITS	COURSE CONTENT
1	**Introduction** **(3L)** Basics of management; Planning, scheduling, organizing, staffing, directing, controlling
2	**Management** **(3L)** Marketing Management, Financial management, Operation management, Human resource management, Management information System
3	**Strategy** **(3L)** Firm and its environment, strategies and resources, industry structure and analysis, corporate strategies and its evaluation, strategies for growth and diversification, strategic planning
4	**Business Trade and Banking** **(3L)** Business: Types of business, Sole Proprietorship, Partnership, Limited company and cooperative society – their characteristics. Banking: role of commercial banks; credit creation and its importance in industrial functioning. Role of central bank: Reserve Bank of India. International Business or Trade Environment.
5	**Financial Accounting** **(7L)** Journals, Ledgers, Trial Balance, Profit & Loss Account, Balance Sheet, Financial Reporting Financial Statement Analysis and Interpretation (Financial Ratio and Cash Flow analysis)
6	**Cost Accounting** **(7L)** Concepts and Classification of costs, Cost Sheet Break Even Analysis, Variance Analysis, Cost-volume profit (CVP) relationship, Cash Budgeting
7	**Packages** **(4L)** Financial accounting computer package (Tally ERP with GST)

Reference Books:

- Financial Accounting- A Managerial Perspective, R. Narayanswami, Prentice-Hall of India Private Limited. New Delhi
- Fundamentals of Financial Management, Horne, James C Van, Prentice-Hall of India Private Limited, New Delhi
- Modern Economic Theory, H. L. Ahuja., S. Chand. New Delhi.
- Management Accounting, Khan & Jain, TMH
- Management Accounting,M.E.ThukaramRao,New Age International

Code: MCAN-E105C	**Paper: Constitution of India**	
Contacts Hours / Week: 3	**Total Contact Hours: 30**	**Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- ✓ To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- ✓ To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNITS	COURSE CONTENT
1	**History of Making of the Indian Constitution** **(5L)** History Drafting Committee, (Composition & Working)
2	**Philosophy of the Indian Constitution** **(5L)** Preamble Salient Features
3	**Contours of Constitutional Rights & Duties** **(5L)** Fundamental Rights, Right to Equality, Right to Freedom ,Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.
4	**Organs of Governance** **(5L)** Parliament , Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions
5	**Local Administration** **(5L)** District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy
6	**Election Commission** **(5L)** Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Reference Books:

- The Constitution of India, 1950 (Bare Act), Government Publication.
- Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
- M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
- D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Code: MCAN-E105D	**Paper: Stress Management through Yoga**	
Contacts Hours / Week: 3	**Total Contact Hours: 30**	**Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ To achieve overall health of body and mind
- ✓ To overcome stress

UNITS	COURSE CONTENT
1	**Astanga** **(8L)** Definitions of Eight parts of Yoga (Ashtanga)
2	**Yam and Niyam** **(8L)** Do`s and Don't's in life. i) Ahinsa, satya, astheya, bramhacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan
3	**Asan and Pranayam** **(8L)** i) Various yog poses and their benefits for mind & body ii)Regularization of breathing techniques and its effects-Typesof pranayama
4	**Meditation Techniques** **(6L)**

Reference Books:

- Janardan Swami Yogabhyasi Mandal- Yogic Asanas for Group Tarining-Part-I, Nagpur
- Swami Vivekananda- Rajayoga or conquering the Internal Nature, AdvaitaAshrama (Publication Department), Kolkata

Code: MCAN-E105E	**Paper: Ethics in Business Profession**	
Contacts Hours / Week: 3	**Total Contact Hours: 30**	**Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Earn about morals, values & work ethics, Learn to respect others and develop civic virtue.
- ✓ Learn about the ethical responsibilities of the engineers, create awareness about the customs and religions, Install Moral and Social Values and Loyalty and to appreciate the rights of others.
- ✓ Demonstrate knowledge to become a social experimenter, Provide depth knowledge on framing of the problem and determining the facts.
- ✓ Create awareness about safety, risk & risk benefit analysis, Provide knowledge on Intellectual Property Rights.
- ✓ Develop knowledge about global issues, Create awareness on computer and environmental ethics, Analyze ethical problems in research.

UNITS	COURSE CONTENT
1	**Human Values** **(6L)** Morals, Values and Ethics-Integrity-Work Ethic-Service learning, Civic Virtue, Respect for others, Living Peacefully, Caring, Sharing, Honesty, Courage-Cooperation, Commitment, Empathy, Self Confidence Character.
2	**Professional Ethics** **(6L)** Senses of 'Professional Ethics-Variety of moral issued, Types of inquiry, Moral dilemmas, Moral autonomy, Kohlberg's theory-Gilligan's theory, Consensus and controversy, Models of professional roles, Theories about right action, Self-interest, Customs and religion.
3	**Professional As Social Experimentation** **(6L)** Profession As Social Experimentation, Framing the problem, Determining the facts, Codes of Ethics, Clarifying Concepts, Application issues, Common Ground, General Principles, Utilitarian thinking respect for persons.
4	**Safety, Responsibilities And Rights in Profession** **(6L)** Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination
5	**Global Issues** **(6L)** Globalization, Cross culture issues-Environmental Ethics, Computer Ethics –Computers as the instrument of Unethical behavior, Computers as the object of Unethical acts, Autonomous Computers, Computer codes of Ethics, Moral Leadership, Code of Conduct, Corporate Social Responsibility. Ethics and Research, Analyzing Ethical Problems in research.

Reference Books:

- Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi.
- A. R. Aryasri, DharanikotaSuyodhana "Professional Ethics and Morals" Maruthi Publications.
- Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi.
- John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi.

Code: MCAN-E105F	**Paper: Managerial Economics**	
Contacts Hours / Week: 3	**Total Contact Hours: 30**	**Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ To understand applications of managerial economics.
- ✓ To understand and interpret demand function,
- ✓ To assess the relationships between short-run and long-run costs.
- ✓ To analyze perfectly competitive markets including substitution.
- ✓ To explain uniform pricing and how it relates to price discrimination and total revenue.
- ✓ To analyze the causes and consequences of different market conditions.
- ✓ To integrate the concept of price and output decisions of firms under various market structure.

UNITS	COURSE CONTENT
1	**Introduction (2L)** Introduction to Managerial Economics, Basic problems of an economic system; Goals of managerial decision making; Resource allocation using PPC
2	**Demand Analysis (6L)** A. Demand Functions - Law of Demand, Explaining the law of demand, Violations of theLaw of Demand, Shifts in Demand; Elasticity of Demand: Price Elasticity (at a point andover and interval), Factors affecting price elasticity, Price elasticity and Change in TotalRevenue, AR, MR and Price elasticity, Range of Values of Price Elasticity; IncomeElasticity, Inferior, Superior and Normal goods, Income Elasticity and Share in TotalExpenditure; Cross-Price Elasticity, Substitutes and Complements Indifference curves, budget line and consumer equilibrium Introduction to methods of demand estimation (concepts only)
3	**Production and Cost Analysis (10L)** Production Function, Short Run and Long Run, Production with One Variable Input,Total Product, Average and Marginal Products, Law of Variable proportions,Relationship between TP, AP and MP. Short Run Costs of Production, Fixed and Variable Costs, Short Run Total, Average andMarginal Cost and Relationship between them, Short Run Cost Curves, Relationshipbetween AVC, MC, AP and MP; Long run cost curves, Relationship between LAC andSAC, Economies of Scale and Scope. Production with Two Variable Inputs, Isoquants – Characteristics, Marginal Rate of Technical Substitution, Laws of Returns to Scale, Isocost Curves, * # Finding the Optimal Combination of Inputs, Production of a given output at Minimum Cost, Production of Maximum Output with a given level of Cost, Expansion Path, Finding the Long Run Cost Schedules from the Production Function,
4	**Alternate Goals of Managerial Firms (2 L)** Profit maximization; Revenue maximization; Managerial utility maximization
5	**Managerial Decision Making under Alternative Market Structures (6 L)** . Characteristics of Perfect Competition, #Profit Maximization in Competitive Markets, Output Decision in the Short Run, Shut Down Point, Short Run Supply for the Firm and Industry; Output Decision in the Long Run, Break Even Point, Long Run Supply for the Perfectly Competitive Industry. Price and output decision under different market structure – Monopoly, Monopolistic Competition, Oligopoly – cartel, price leadership.
6	**Pricing Decisions [4 L]** Price Discrimination under Monopoly, Transfer Pricing. Market Failure Game theory &Asymmetric information

Reference Books:

- Sociology & Economics for Engineers, Khanna Publishing, Delhi,
- Damodaran, Suma – Managerial Economics – Oxford University Press
- Lipsey & Chrystal – Economics – Oxford University Press
- Peterson & Lewis – Managerial Economics – Pearson Education.
- Pindyck and Rubenfeld - Micro Economics – Pearson Education
- H.L. Ahuza- Managerial Economics, S. Chand
- D.N. Dwivedi- Managerial Economics, Prentice Hall.

Code: MCAN-190	**Paper: Soft Skill and Interpersonal Communication**	
Contacts Hours / Week: 4	**Total Contact Hours: 40**	**Credit: 2**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Effectively communicate through verbal/oral communication and improve the listening skills
- ✓ Able to be self-confident with positive vibes
- ✓ Actively participate in group discussion / meetings / interviews and prepare & deliver presentations
- ✓ Become more effective individual through goal/target setting, self-motivation and practicing creative thinking.
- ✓ Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.

UNITS	COURSE CONTENT
1	**Soft Skills& Interpersonal Communication** An Introduction – Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development. Inter personal relations; communication models, process and barriers; team communication; developing interpersonal relationships through effective communication; listening skills; essential formal writing skills; corporate communication styles –assertion, persuasion, negotiation.
2	**SWOT & Creative Thinking** Discovering the Self; Setting Goals; Beliefs, Values, Attitude, Virtue. Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels.
3	**Corporate Communication** **Public Speaking:** Skills, Methods, Strategies and Essential tips for effective public speaking. **Group Discussion:** Importance, Planning, Elements, Skills assessed; Effectively disagreeing, Initiating, Summarizing and Attaining the Objective. **Interview& Presentation Skills:** Interviewer and Interviewee– in-depth perspectives. Before, During and After the Interview. Tips for Success: Types, Content, Audience Analysis, Essential Tips – Before, During and After, Overcoming Nervousness.
4	**Non-Verbal Communication & Personality Development** Importance and Elements; Body Language. Concept, Essentials, Tipsc Meaning, Nature, Features, Stages, Models; Learning Skills; Adaptability Skills.
5	**Business Etiquette & Team Work** Concept of Teams; Building effective teams; Concept of Leadership and honing Leadership skills. Meaning, Nature, Features, Stages, Models; Learning Skills; Adaptability Skills.

Reference Books:

- Managing Soft Skills for Personality Development – edited by B.N.Ghosh,McGraw Hill India, 2012.
- Effective Communication and Soft Skills, Nitin Bhatnagar, Pearson Education India, 2011
- English and Soft Skills – S.P.Dhanavel, Orient Blackswan India, 2010.
- Effective Business Communication, Kulbhushan Kumar, Khanna Publishing House, 2021.

Code: MCAN-191	**Paper: Python Programming Lab**	
Contacts Hours / Week: 4	**Total Contact Hours: 40**	**Credit: 2**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ To write simple programs relating to different logical problems.
- ✓ To be able to interpret, understand and debug syntax errors reported by the compiler.
- ✓ Understand and implement the native data types (Python in this course)
- ✓ To implement conditional branching, iteration.
- ✓ To decompose a problem intofunctions.
- ✓ To be able to create, read from and write into simple text files.
- ✓ To understand the basic concept of OOPs
- ✓ To understand and implement Python NumpyArrray operations

UNITS	COURSE CONTENT
1	**Python Basics:** Installing Python, Setting up Path and Environment Variables, Running Python, First Python Program
2	**Python Data Types & Input/output:** Keywords, Identifiers, Python Statement, Indentation, Documentation, Variables, Multiple Assignment, Understanding Data Type, Data Type Conversion, Python Input and Output Functions, Import command.
3	**Operators and Expressions:** Operators in Python, Expressions, Precedence, Associativity of Operators, Non Associative Operators.
4	**Control Structures:** Decision making statements, Python loops, Python control statements.
5	**Python Native Data Types:** Numbers, Lists, Tuples, Sets, Dictionary, Functions & Methods of Dictionary, Strings(in detail with their methods and operations).
6	**Python Functions:** Built-in Functions, User defined functions, Anonymous functions, Pass by value, Pass by Reference, Recursion
7	**Exception Handling:** Exceptions, Built-in exceptions, Exception handling, User defined exceptions in Python.
8	**File Management in Python:** Operations on files (opening, modes, attributes, encoding, closing), read() & write() methods, tell() & seek() methods, renaming & deleting files in Python, directories in Python.
9	**Python OOPs** Python OOPs Concepts, Object Class, Constructors, Inheritance
10	**Python Numpy** Numpy data types, Operations on Numpy Array (indexing,slicing, shape/reshape, iteration, join, split, search, sort, filter)

Code: MCAN-192	**Paper: Relational Database Management System Lab**	
Contacts Hours / Week: 4	**Total Contact Hours: 40**	**Credit: 2**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Learn to use Entity Relationship Diagram (ERD) model as a blueprint to develop the corresponding relational model in a RDBMS system like Oracle DBMS.
- ✓ Apply DDL component of Structured query language (SQL) to create a relational database from scratch through implementation of various constraints in Oracle RDBMS system.
- ✓ Apply DML component of Structured query language (SQL) for storing and modification of data in Oracle RDBMS system.
- ✓ Apply DQL component of Structured query language (SQL) to construct complex queries for efficient retrieval of data from existing database as per the user requirement specifications.
- ✓ Conceptualize and apply various P/L SQL concepts like cursor, trigger in creating database programs.
- ✓ Develop a fully-fledged database backend system using SQL and P/L SQL programming to establish overall integrity of the database system.
- ✓ Implement PL/SQL function, Procedure and Package and Apply Exception.

UNITS	COURSE CONTENT
1	**Creation of a database based on given ERD Model:** SQL Data Definition Language (DDL) Create (and Alter) table structure, Apply (and Alter) constraints on columns/tables viz., primary key, foreign key, unique, not null, check. Verify/ Review the table structure (along with applied constraints) using appropriate data dictionary tables like user_constraints, user_cons_columns, etc. Create view, materialized view using one or more table. SQL Data Manipulation Language (DML) Insert into rows (once at a time/ and in bulk) from a table, Update existing rows of a table, Delete rows (a few or all rows) from a table.
2	**Data Query Language (DQL)** Basic select-from-where structure - Usage of Top, Distinct, Null keywords in query, Using String and Arithmetic Expressions, Exploring Where Clause with various Operators and logical combination of various conditions, Sorting data using Order By clause. Usage of IN, LIKE, ALL keywords. Introduction to Joins, Natural Joins, equi-join, non-equi-join, Self-Join, Inner Join, Outer (left, right) Join. Set operations: Unions, Intersect, minus set operations on table data using SQL. Using single row functions in Queries NVL function (to handle ambiguity of null data), upper, lower, to_date, to_char functions, etc. Using group/multiple row functions in Queries like Count, Sum, Min, Max, Avg, etc, using Group By and Having Clause, Using Group By with Rollup and Cube. Sub-query - Working with various nested structure of Sub Queries - use in from or where clause with more than one level of nesting, correlated sub-query- Ranking table data using correlated sub-query.
3	**PL/SQL** Stored Procedures and Functions- Basic programming constructs of PL / SQL like if, else, else-if, loop, while, for structure Populate stored procedure variables with the data fetched from table using SQL command. Working with Cursors - Creating Cursors, parameterized cursor, Locks on cursors, Exploring advantages of cursors. Introduction to triggers - Constraints Vs Triggers, Creating, Altering, Dropping triggers, use of for/ after/ instead of triggers, Using trigger to validate/ rollback a Transaction, Automatically populate integer data based primary key columns (e.g., Id.) using trigger. Handling Function, Procedure & Package – Create Function, Create Procedure and Create Package. Exception Handling.