

Narula Institute of Technology

Department of Computer Applications

Course Structure

&

Syllabus

for

Master of Computer Applications (MCA)

Regulation – 20

(Under Autonomy)

NARULA INSTITUTE OF TECHNOLOGY

Affiliated to -

**Maulana Abul Kalam Azad University of
Technology (Formerly known as WBUT)**

Narula Institute of Technology

Department of Computer Applications

Program Structure							
SEMESTER	THEORY		PRACTICAL		SESSIONAL		Semester Credits [A+B+C]
	Courses	Credits [A]	Courses	Credits [B]	Courses	Credits [C]	
I	4(C) + 1(E)	19	3	6	-	-	25
II	4(C) + 1(E)	19	3	6	-	-	25
III	3(C) + 2(E)	18	1	2	1	5	25
IV	1(O)	3	-	-	2	22	25
TOTAL CREDIT →							100
* C → Compulsory Courses							
* E → Elective Courses							
* O → Open Elective Courses							

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CURRICULUM								
Semester – I								
Sl. No.	Course Code	Course Name	Contact Hours / Week				Credit	
			L	T	P	Total		
THEORY								
1	MCA20-101	Programming in Python	3	1	-	4	4	
2	MCA20-102	Relational Database Management System	3	1	-	4	4	
3	MCA20-103	Computer Organization and Architecture	3	1	-	4	4	
4	MCA20-104	Discrete Mathematics and Graph Theory	3	1	-	4	4	
5	Elective I		3	-	-	3	3	
	MCA20-E105A	Environment and Ecology						
	MCA20-E105B	Management and Accountancy						
	MCA20-E105C	Constitution of India						
	MCA20-E105D	Stress Management through Yoga						
	MCA20-E105E	Values and Ethics in Profession						
	MCA20-E105F	Managerial Economics						
PRACTICAL								
1	MCA20-190	Soft Skill and Interpersonal Development	-	-	4	4	2	
2	MCA20-191	Python Programming Lab	-	-	4	4	2	
3	MCA20-192	Relational Database Management System Lab	-	-	4	4	2	
		Total Weekly Contact Hours and Credit					31	25

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CURRICULUM								
Semester – II								
Sl. No.	Course Code	Course Name	Contact Hours / Week				Credit	
			L	T	P	Total		
THEORY								
1	MCA20-201	Data Structures	3	1	-	4	4	
2	MCA20-202	Operating Systems	3	1	-	4	4	
3	MCA20-203	Object Oriented Programming with JAVA	3	1	-	4	4	
4	MCA20-204	Data Communication & Computer Networks	3	1	-	4	4	
5	Elective II		3	-	-	3	3	
	MCA20-E205A	Numerical and Statistical Analysis						
	MCA20-E205B	Computer Graphics						
	MCA20-E205C	Probability and Statistics						
	MCA20-E205D	Introduction to Cyber Security						
	MCA20-E205E	Introduction to IoT						
	MCA20-E205F	Automata Theory & Computational Complexity						
PRACTICAL								
1	MCA20-291	Data Structure Lab	-	-	4	4	2	
2	MCA20-292	Operating System Lab (Unix)	-	-	4	4	2	
3	MCA20-293	Object Oriented Programming Lab using JAVA	-	-	4	4	2	
		Total Weekly Contact Hours and Credit					31	25

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CURRICULUM								
Semester – III								
Sl. No.	Course Code	Course Name	Contact Hours / Week				Credit	
			L	T	P	Total		
THEORY								
1	MCA20-301	Software Engineering	3	1	-	4	4	
2	MCA20-302	Artificial Intelligence	3	1	-	4	4	
3	MCA20-303	Design and Analysis of Algorithm	3	1	-	4	4	
4	Elective III		3	-	-	3	3	
	MCA20-E304A	Image Processing						
	MCA20-E304B	Web Enabled JAVA Programming						
	MCA20-E304C	Cloud Computing						
	MCA20-E304D	Web Technology						
	MCA20-E304E	Android Application Development						
	MCA20-E304F	Basic Data Science						
5	Elective IV		3	-	-	3	3	
	MCA20-E305A	Information Retrieval						
	MCA20-E305B	Data Warehousing and Data Mining						
	MCA20-E305C	Introduction to Big Data Analytics						
	MCA20-E305D	Cryptography						
	MCA20-E305E	Operation Research and Optimization Techniques						
	MCA20-E305F	Pattern Recognition						
	MCA20-E305G	Machine Learning						
PRACTICAL								
1	MCA20-E394 (A/B/C/D/E/F)	Elective III Lab	-	-	4	4	2	
SESSIONAL								
1	MCA20-381	Minor Project and Viva-voce	-	-	8	8	5	
		Total Weekly Contact Hours and Credit					30	25

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CURRICULUM								
Semester – IV								
Sl. No.	Course Code	Course Name	Contact Hours / Week				Credit	
			L	T	P	Total		
THEORY								
1	Open Elective *+		-	-	-	-	3	
	MCA20-O401A	Business Analytics						
	MCA20-O401B	Robotics						
	MCA20-O401C	Bioinformatics						
	MCA20-O401D	Information Theory & Coding						
	MCA20-O401E	Automation in VLSI Design						
	MCA20-O401F	Intelligent Control						
	MCA20-O401G	Design of Embedded Systems						
	MCA20-O401H	Machine Learning						
	MCA20-O401I	Soft Computing						
	MCA20-O401J	Information Retrieval						
	MCA20-O401K	Multimedia						
	MCA20-O401L	Distributed System						
	MCA20-O401M	Big Data Analytics						
	MCA20-O401N	Cryptography						
	MCA20-O401O	Social Networks						
	<p><i>*While opting for a domain for pursuing the Open Elective course, a student needs to ensure that the domain was not covered in previous semesters of the program.</i></p> <p><i>+ will abide by the rules of MAKAUT</i></p>							
SESSIONAL								
1	MCA20-481	Grand Viva	-	-	-	-	2	
2	MCA20-482	Major Project and Viva-voce	-	-	28	28	20	
		Total Weekly Contact Hours and Credit				28	25	

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SYLLABUS	
Semester – I	
Course Code	MCA20-101
Course Name	Programming in Python
Lecture (per week)	3
Tutorial (per week)	1
Contact Hours (per week)	4
Total Contact Hours	40
Credit	4
Course Objective: <ul style="list-style-type: none">✓ To acquire programming skills in core Python.✓ To understand why Python is a useful scripting language for developers.✓ To learn how to design and program Python applications.✓ To learn how to use lists, tuples, and dictionaries in Python programs.✓ To learn how to identify Python object types.	
Course Outcome: <p>After successful completion of this course, students will be able to:</p> <ul style="list-style-type: none">✓ 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 problems.	

MODULE NUMBER	COURSE CONTENT
1	Fundamentals of Computers (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).

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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 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 date time and Date Objects, RegEx Module and RegEx Functions, Exception Handling.

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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, , Matplotlib : 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

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SYLLABUS	
Semester – I	
Course Code	MCA20-102
Course Name	Relational Database Management System
Lecture (per week)	3
Tutorial (per week)	1
Contact Hours (per week)	4
Total Contact Hours	40
Credit	4
Course Objective: The students will learn <ul style="list-style-type: none">✓ Fundamental Concepts Of Database Management System✓ Data Models✓ Different Database Languages	
Course Outcome: <ul style="list-style-type: none">✓ 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.✓ Implement SQL concept for a database transaction.✓ Understand and analyze the functional dependencies among attributes of the entity set and normalization between the relations.✓ Evaluate the relational tables, PL/SQL programs, triggers, database files, indexing of RDBMS.✓ Understand and Implement the Transaction control and concurrency control management.✓ Understanding the concept of distributed & object-oriented database.	

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MODULE NUMBER	COURSE CONTENT
1	<p>Basic Concept (5L)</p> <p>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</p> <p>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</p> <p>Entity Relationship (ER) Model: Entities, Attributes, Relationships, More about Entities and Relationships, Defining Relationship for College Database, Conversion of E-R Diagram to Relational Database.</p>
2	<p>Database Integrity and Normalization (7L)</p> <p>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, Lossless join Decomposition, Dependency Preservation.</p>
3	<p>File Organization (4L)</p> <p>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.</p>
4	<p>Structured Query Language(SQL) (6L)</p> <p>Meaning, SQL commands, Data Definition Language, Data Manipulation Language, Data Control Language,</p> <p>Transaction Control Language, Queries using Order by, Where, Group by, Nested Queries. Joins, Views, Sequences, Indexes and Synonyms, Table Handling.</p>
5	<p>Transaction and Concurrency Management (8L)</p> <p>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.</p>

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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.
7	Distributed & Object-Oriented Databases (4L) Centralized Versus Non-Centralized Databases, Heterogeneous and Homogeneous Distributed Databases Reference Architecture of DDBMS, Distributed Database Design Query Processing, Distributed Concurrency Control: Serializability, Locking Protocols, Timestamp Protocols, Distributed Deadlock Management, Distributed Commit Protocols: Two-Phase Commit (2PC) & Three-Phase Commit (3PC). Basic Concept, Limitation of Relational Databases and Need for Object Oriented Databases.

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

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SYLLABUS	
Semester – I	
Course Code	MCA20-103
Course Name	Computer Organization and Architecture
Lecture (per week)	3
Tutorial (per week)	1
Contact Hours (per week)	4
Total Contact Hours	40
Credit	4
Course Objective: The students will learn <ul style="list-style-type: none">✓ The organization of a computer and its principal components, viz, ALU, Control, Memory and Input/output, etc.✓ The design components of a digital subsystem that required realizing various components such as ALU, Control, etc.	
Course Outcome: After successful completion of this course, students will be able to: <ul style="list-style-type: none">✓ 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.	

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MODULE NUMBER	COURSE CONTENT
1	Data and numbers [4L] Data and number representation- binary-complement representation, BCD-ASCII, conversion of numbers from one Number system to the other, (r-1)'s & r's complement representation. Weighted and Unweighted Codes – Gray Code, Excess 3 Code, Binary Arithmetic, Floating Point Numbers.
2	Boolean Algebra and Logic Gates [4L] Fundamentals of Boolean Algebra, Logic gates (AND, OR, NOT, XOR, NAND, NOR) MINTERM, MAXTERM, truth table, Boolean expression, simplification, Boolean Algebra, K-map up-to 4 variable, Canonical Forms.
3	Module 3: Combinational Circuits [6L] Adder, subtractor, BCD adder, multiplexer, De-multiplexer, encoder, decoder
4	Module 4: Sequential Circuits [8L] Flip-Flop (SR, JK, D, T, Master-slave), Application of flip-flop-- Asynchronous counter up-to 4-bit, decade counter, mod-n-counter, Synchronous counter—ring counter, Johnson's count, Up down counter, Register.
5	Module 5: Memory Organization [4L] Types of memory RAM ROM, EPROM, DRAM, SRAM, Addressing Modes, Associative memory, main memory, virtual memory, Memory Hierarchy, Cache memory, secondary memory
6	Module 6: I/O Interface [4L] I/O: I/O interface, polling, interrupts, DMA, mode of data transfer
7	Module 7: CPU Organization & Pipelining [6L] CPU organization, instruction format, addressing mode, RISC, CISC, Von- Neumann- Architecture Pipeline & vector processing, Pipeline structure, speedup, efficiency, throughput and bottlenecks. Data dependencies, branch delays. Arithmetic pipeline and Instruction pipeline.
8	Module 8: Computer Arithmetic [4L] Computer arithmetic: addition, subtraction, multiplication & division. Booth's algorithm. Dual core, C2D, I3, I5.

Reference Books:

- ✓ Computer Organization and Embedded Systems, 6th Edition, Hamacher Carl, et.al, Tata Mc Graw 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,

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SYLLABUS	
Semester – I	
Course Code	MCA20-104
Course Name	Discrete Mathematics and Graph Theory
Lecture (per week)	3
Tutorial (per week)	1
Contact Hours (per week)	4
Total Contact Hours	40
Credit	4
Course Objective: The students will learn <ul style="list-style-type: none">✓ Fundamental concepts of Basics of Discrete Mathematics, Algebraic Structures.✓ Mathematical Logic✓ Set theory and algebraic structures✓ Graph Theory and its applications	
Course Outcome: After successful completion of this course, students will be able to: <ul style="list-style-type: none">✓ 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.	

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MODULE NUMBER	COURSE CONTENT
1	Mathematical Logic [4L] Mathematical Logic: Statements and Notation, Connectives, Normal Forms, Predicate Calculus.
2	Set Theory [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.
3	Mathematical Induction [2L] The Well-Ordering Principle, Recursive definition, The Division Algorithm : Prime Numbers, GCD : Euclidian Algorithm, The fundamental theorem of Arithmetic, Mathematical Induction, Problem solving using method of Mathematical Induction
4	Counting Principle[8L] Counting: Factorial Notation, Binomial Coefficients, Permutation and Combinations, Pigeonhole Principle, Principle of Inclusion-Exclusion.
5	Algebraic Structure [6L] Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Algebraic Structures with two Binary Operations, Rings, Integral domains, Fields.
6	Graph Theory[12L] Basic concepts; Complete, Regular and Bipartite Graphs; Subgraphs and Isomorphism; Paths and connectivity; Trees and Planar graphs; Euler and Hamiltonian Graphs; Graph Algorithms. Spanning Tree, minimal Spanning Tree, Shortest path and algorithms. Graph colouring, colouring maps, colouring vertices and edges, perfect graph.

Reference Books:

- ✓ 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
- ✓ Deo Narsingh - Graph Theory With Applications To Engineering And Computer Science, PHI Learning
- ✓ Arumugam, Ramachandran- Invitation to Graph Theory, Scitech Publications(India)

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SYLLABUS	
Semester – I	
Course Code	MCA20-E105A
Course Name	Environment and Ecology
Lecture (per week)	3
Tutorial (per week)	0
Contact Hours (per week)	3
Total Contact Hours	30
Credit	3
<p>Course Objective: The students will learn</p> <ul style="list-style-type: none">✓ Environment concerns.✓ Students will learn about environment, factors affecting the environment✓ Environmental ethics and its protection✓ Save our nature✓ Presentations, documentaries and field visits	
<p>Course Outcome: After successful completion of this course, students will be able to:</p> <ul style="list-style-type: none">✓ Understand the natural environment and its relationships with human activities.✓ Apply the fundamental knowledge of science and engineering to assess environmental and health risk.✓ Understand environmental laws and regulations to develop guidelines and procedures for health and safety issues✓ Solve scientific problem-solving to air, water, noise and land pollutions.	

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MODULE NUMBER	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: <ul style="list-style-type: none">✓ Basic Environmental Engineering and Elementary Biology, Gour Krishna 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.	

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SYLLABUS

Semester – I

Course Code	MCA20-E105B
Course Name	Management and Accountancy
Lecture (per week)	3
Tutorial (per week)	0
Contact Hours (per week)	3
Total Contact Hours	30
Credit	3
<p>Course Objective: The students will learn -</p> <ul style="list-style-type: none">✓ To develop cognizance of the importance of accounting in organization and financial statements✓ To describe how people analyze the corporate financial under different conditions✓ To understand why people describe the financial statements in different manner.✓ To analyze specific characteristics of Logistics Management Accounting✓ To analyze future action for expenses and income✓ To synthesize related information and evaluate options for most logical and optimal solutions	
<p>Course Outcome: After successful completion of this course, students will be able to:</p> <ul style="list-style-type: none">✓ Understand the basic concepts related to Business.✓ Demonstrate the roles, skills and functions of different discipline of business management.✓ 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.	

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MODULE NUMBER	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: <ul style="list-style-type: none">✓ 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.Thukaram Rao, New Age International	

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SYLLABUS	
Semester – I	
Course Code	MCA20-E105C
Course Name	Constitution of India
Lecture (per week)	3
Tutorial (per week)	0
Contact Hours (per week)	3
Total Contact Hours	30
Credit	3
Course Objective: The students will learn <ul style="list-style-type: none">✓ The importance of constitution✓ The structure of executive, legislature and judiciary✓ Philosophy of fundamental rights and duties✓ Autonomous nature of constitutional bodies like Supreme Court and high court, controller and auditor general of India and election commission of India.✓ Central and state relation, financial and administrative bodies	
Course Outcome: After successful completion of this course, students will be able to: <ul style="list-style-type: none">✓ 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.	

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MODULE NUMBER	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 Zila Pachayat: 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: <ul style="list-style-type: none">✓ 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.	

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SYLLABUS	
Semester – I	
Course Code	MCA20-E105D
Course Name	Stress Management through Yoga
Lecture (per week)	3
Tutorial (per week)	0
Contact Hours (per week)	3
Total Contact Hours	30
Credit	3
Course Objective: The students will learn <ul style="list-style-type: none">✓ To identify and understand the signs and symptoms of stress.✓ Distinguish methods to control and/or reduce stress in their daily life.✓ Develop coping skills that will enable the student to control his/her level of stress.✓ Apply stress management techniques.	
Course Outcome: After successful completion of this course, students will be able to: <ul style="list-style-type: none">✓ To achieve overall health of body and mind✓ To overcome stress.	

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MODULE NUMBER	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: <ul style="list-style-type: none">• Janardan Swami Yogabhyasi Mandal- Yogic Asanas for Group Tarining-Part-I, Nagpur• Swami Vivekananda- Rajayoga or conquering the Internal Nature, Advaita Ashrama (Publication Department), Kolkata	

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SYLLABUS	
Semester – I	
Course Code	MCA20-E105E
Course Name	Values and Ethics in Profession
Lecture (per week)	3
Tutorial (per week)	0
Contact Hours (per week)	3
Total Contact Hours	30
Credit	3
<p>Course Objective: The students will learn -</p> <ul style="list-style-type: none">✓ Creating awareness among technical students about the importance of professional ethics✓ The effect of technology on the societal issues✓ How to develop technologies that do not disturb the psychological wellbeing of the society	
<p>Course Outcome: After successful completion of this course, students will be able to:</p> <ul style="list-style-type: none">✓ 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.	

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MODULE NUMBER	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: <ul style="list-style-type: none">✓ Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi.✓ A. R. Aryasri, Dharanikota Suyodhana "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.	

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SYLLABUS

Semester – I

Course Code	MCA20-E105F
Course Name	Managerial Economics
Lecture (per week)	3
Tutorial (per week)	0
Contact Hours (per week)	3
Total Contact Hours	30
Credit	3

Course Objective:

The students will learn

- ✓ To get familiarized with the basic concept of microeconomics.
- ✓ To understand the demand and supply analysis in business applications
- ✓ To get familiarized with the production and cost structure under different stages of production.
- ✓ The pricing and output decisions under various market structures.
- ✓ To understand and apply the various decision tools to understand the market structure.

Course Outcome:

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

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

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MODULE NUMBER	COURSE CONTENT
1	<p>Introduction (2L)</p> <p>Introduction to Managerial Economics, Basic problems of an economic system; Goals of managerial decision making; Resource allocation using PPC</p>
2	<p>Demand Analysis (6L)</p> <p>A. Demand Functions - Law of Demand, Explaining the law of demand, Violations of the Law of Demand, Shifts in Demand; Elasticity of Demand: Price Elasticity (at a point and over and interval), Factors affecting price elasticity, Price elasticity and Change in Total Revenue, AR, MR and Price elasticity, Range of Values of Price Elasticity; Income Elasticity, Inferior, Superior and Normal goods, Income Elasticity and Share in Total Expenditure; Cross- Price Elasticity, Substitutes and Complements</p> <p>Indifference curves, budget line and consumer equilibrium Introduction to methods of demand estimation (concepts only)</p>
3	<p>Production and Cost Analysis (10L)</p> <p>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.</p> <p>Short Run Costs of Production, Fixed and Variable Costs, Short Run Total, Average and Marginal Cost and Relationship between them, Short Run Cost Curves, Relationship between AVC, MC, AP and MP; Long run cost curves, Relationship between LAC and SAC, Economies of Scale and Scope.</p> <p>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</p> <p>Cost Schedules from the Production Function,</p>
4	<p>Alternate Goals of Managerial Firms (2 L)</p> <p>Profit maximization; Revenue maximization; Managerial utility maximization</p>
5	<p>Managerial Decision Making under Alternative Market Structures (6 L)</p> <p>. 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.</p> <p>Price and output decision under different market structure – Monopoly, Monopolistic Competition, Oligopoly – cartel, price leadership.</p>

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6	Pricing Decisions [4 L] Price Discrimination under Monopoly, Transfer Pricing. Market Failure Game theory & Asymmetric information
Reference Books: <ul style="list-style-type: none">✓ Damodaran, Suma – Managerial Economics – Oxford University Press✓ Lipsey & Chrystal – Economics – Oxford University Press✓ Peterson & Lewis – Managerial Economics – Pearson Education.✓ Pindyck and Rubinfeld - Micro Economics – Pearson Education✓ H.L. Ahuja- Managerial Economics, S. Chand✓ D.N. Dwivedi- Managerial Economics, Prentice Hall.	

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SYLLABUS	
Semester – I	
Course Code	MCA20-190
Course Name	Soft Skill and Interpersonal Development
Lecture (per week)	0
Practical (per week)	0
Contact Hours (per week)	4
Total Contact Hours	40
Credit	2
Course Objective: The students will learn <ul style="list-style-type: none">✓ Understand the communication concepts.✓ Practically apply various components of business communication✓ Identify and analyze essentials of communication✓ Understand the concept of effective communication in a corporate world	
Course Outcome: After successful completion of this course, students will be able to: <ul style="list-style-type: none">✓ 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. through the knowledge of team work,✓ Function effectively in multi-disciplinary and heterogeneous teams personal relationships, conflict management and leadership quality.✓ Inter- personal relationships, conflict management and leadership quality	

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MODULE NUMBER	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, Tips 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: <ul style="list-style-type: none">✓ 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.	

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SYLLABUS

Semester – I

Course Code	MCA20-191
Course Name	Python Programming Lab
Lecture (per week)	0
Practical (per week)	0
Contact Hours (per week)	4
Total Contact Hours	40
Credit	2
Course Objective: The students will learn	
<ul style="list-style-type: none">✓ Interpret the use of procedural statements like assignments, conditional statements, loops and function calls.✓ Infer the supported data structures like lists, dictionaries and tuples in Python.✓ Illustrate the application of matrices and regular expressions in building the Python programs.✓ Discover the use of external modules in creating excel files and navigating the file systems.✓ Describe the need for Object-oriented programming concepts in Python	
Course Outcome: After successful completion of this course, students will be able to:	
<ul style="list-style-type: none">✓ Write simple programs relating to different logical problems.✓ Be able to interpret, understand and debug syntax errors reported by the compiler.✓ Understand and implement the native data types (Python in this course)✓ Implement conditional branching, iteration.✓ Decompose a problem into functions.✓ Be able to create, read from and write into simple text files.✓ Understand the basic concept of OOPs✓ Understand and implement Python Numpy Array operations	

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MODULE NUMBER	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)

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SYLLABUS

Semester – I

Course Code	MCA20-192
Course Name	Relational Database Management System Lab
Lecture (per week)	0
Practical (per week)	0
Contact Hours (per week)	4
Total Contact Hours	40
Credit	2

Course Objective:

The students will learn

- ✓ To describe the fundamental elements of relational database management systems
- ✓ To explain the basic concepts of relational data model, ER model, relational database design
- ✓ Relational algebra and SQL
- ✓ To design ER-models to represent simple database application scenarios
- ✓ To convert the ER-model to relational tables, populate relational database
- ✓ Formulate SQL queries on data, Database normalization
- ✓ Basic database storage structures and access techniques: file and page organizations, indexing methods

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.

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MODULE NUMBER	COURSE CONTENT
1	<p>Creation of a database based on given ERD Model:</p> <p>SQL Data Definition Language (DDL)</p> <p>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.</p> <p>SQL Data Manipulation Language (DML)</p> <p>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.</p>
2	<p>Data Query Language (DQL)</p> <p>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.</p> <p>Introduction to Joins, Natural Joins, equi-join, non-equi-join, Self-Join, Inner Join, Outer (left, right) Join. Set operations:</p> <p>Unions, Intersect, minus set operations on table data using SQL. Using single row functions in Queries</p> <p>NVL function (to handle ambiguity of null data), upper, lower, to_date, to_char functions, etc.</p> <p>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.</p> <p>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.</p>
3	<p>PL/SQL</p> <p>Stored Procedures and Functions- Basic programming constructs of PL / SQL like if, else, else-if, loop, while, for structure</p> <p>Populate stored procedure variables with the data fetched from table using SQL command.</p> <p>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.</p> <p>Handling Function, Procedure & Package – Create Function, Create Procedure and Create Package. Exception Handling.</p>