AC 01.09.23 ITEM NO: 23.1

Deccan Education Society's

Kirti M. Doongursee College of Arts, Science and Commerce (AUTONOMOUS)

Affiliated to

UNIVERSITY OF MUMBAI

Syllabus for
Program: Bachelor of Arts
Course: F.Y.B.SC. (Semester I&II)
Subject: Mathematics

Choice Based Credit System (CBCS)
with effect from
Academic Year 2023-2024

PROGRAM OUTCOMES

PO	Description
A student completing Bachelor's Degree in **Arts/Commerce/Science** Program will be able to	
PO1	**Disciplinary Knowledge:** Demonstrate comprehensive knowledge of the disciplines that form a part of a graduate Programme. Execute strong theoretical and practical understanding generated from the specific graduate Programme in the area of work.
PO2	**Critical Thinking and Problem solving:** Exhibit the skills of analysis, inference, interpretation and problem-solving by observing the situation closely and design the solutions.
PO3	**Social competence:** Display the understanding, behavioral skills needed for successful social adaptation, work in groups, exhibits thoughts and ideas effectively in writing and orally.
PO4	**Research-related skills and Scientific temper:** Develop the working knowledge and applications of instrumentation and laboratory techniques. Able to apply skills to design and conduct independent experiments, interpret, establish hypothesis and inquisitiveness towards research.
PO5	**Trans-disciplinary knowledge:** Integrate different disciplines to uplift the domains of cognitive abilities and transcend beyond discipline-specific approaches to address a common problem.
PO6	**Personal and professional competence:** Performing dependently and collaboratively as a part of team to meet defined objectives and carry out work across interdisciplinary fields. Execute interpersonal relationships, self-motivation and adaptability skills and commit to professional ethics.
PO7	**Effective Citizenship and Ethics:** Demonstrate empathetic social concern and equity centered national development, and ability to act with an informed awareness of moral and ethical issues and commit to professional ethics and responsibility.
PO8	**Environment and Sustainability:** Understand the impact of the scientific solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

Deccan Education Society's

Kirti M. Doongursee College (autonomous)

Proposed Curriculum as per NEP 2020 Year of implementation- 2023-24

Name of the Department: Mathematics

Semester	Course Code	Course Title	Vertical	Credit
I	K23USMATMJ111	Calculus -I	Major	2
	K23USMATMJ112	Algebra -I	Major	2
	K23USMATMJP11	Practical I	Major	2
	K23USMATVC141	Advanced Excel	VSC	2
II	K23USMATMJ211	Calculus – II	Major	2
	K23USMATMJ212	Discrete Mathematics	Major	2
	K23USMATMJP21	Practical II	Major	2
	K23USMATMR221	First Order Differential Equations	Minor	2
	K23USMATVC241	SQL and Extension	VSC	2

Course Code	MAJOR SEM – I	Credits	Lectures /Week
K23USMATMJ111	Paper I : Calculus -I	2	2

Course Outcomes:

After successful completion of this course, students would be able to

- Define bounded sets, Infimum and supremum, sequences.
- Explain real numbers and its various properties, sequences and its convergence.
- Apply various properties of real numbers, standard theorems of sequences and subsequences
- Examine boundedness of a sequence, convergence of sequences.

Unit	Topics	No of Lectures
I	**Real Number System** i) Real number system R and order properties of R, absolute value $\|\|$ and its peoperties. ii) AM-GM inequality, Cauchy-Schwarz inequality, Intervals and neighbourhoods , Interior points, Limit point, Hausdorff property. iii) Bounded sets, Statements of l.u.b. axiom and its consequences, Supremum and infimum, Maximum and minimum, Archimedean property and its applications, Density of rationals.	15
II	**Sequences in R** i) Definition of sequence and examples, Convergence of sequences, every convergent sequences is bounded. Limit of a convergent sequence and uniqueness of limit, Divergent sequences. ii) Convergence of standard sequences like $\left(\frac{1}{1+na}\right) \forall\, a > 0$, $(b^n) \forall b\,, 0 < b < 1$, $\left(c^{\frac{1}{n}}\right) \forall\, c > 0$ and $\left(n^{\frac{1}{n}}\right)$. iii) Algebra of convergent sequences, Sandwich theorem, Monotone convergence theorem and consequences of $\left(\left(1+\frac{1}{n}\right)^n\right)$. iv) Definition of subsequence, Subsequence of a convergent sequence is convergent and converges to the same limit, Definition of a Cauchy sequences, Every convergent sequences is a Cauchy sequence and converse.	15

Textbooks:

- R. R. Goldberg, Methods of Real Analysis, Oxford and IBH, 1964.
- K. G. Binmore, Mathematical Analysis, Cambridge University Press, 1982.

- R. G. Bartle- D. R. Sherbert, Introduction to Real Analysis, John Wiley & Sons, 1994.
- Sudhir Ghorpade and Balmohan Limaye, A course in Calculus and Real Analysis, Springer International Ltd, 2000.

Additional References:

- T. M. Apostol, Calculus Volume I, Wiley & Sons (Asia) Pte, Ltd.
- Richard Courant-Fritz John, A Introduction to Calculus and Analysis, Volume I, Springer.
- Ajit kumar and S. Kumaresan, A Basic Course in Real Analysis, CRC Press, 2014.
- James Stewart, Calculus, Third Edition, Brooks/ cole Publishing Company, 1994.
- A Treatise on Differential Equations, MacMillan and Co.,1956

Course Code	MAJOR SEM – I	Credits	Lectures /Week
K23USMATMJ112	**Paper II : Algebra -I**	**2**	**2**

Course Outcomes:

After successful completion of this course, students would be able to

- Describe properties of integers, divisibility, congruences, functions, relations
- Classify various properties of divisibility , congruence modulo n
- Solve problems of divisibility, congruences by employing suitable algorithms and theorems .
- Examine congruence, residue classes in integers .

Unit	Topics	No of Lectures
I	**Integers & Divisibility** i) Statements of well-ordering property of non-negative integers, Divisibility in integers, division algorithm, greatest common divisor (g.c.d.) and least common multiple (l.c.m.) of two non zero integers, basic properties of g.c.d. such as existence and uniqueness of g.c.d. of two non zero integers a & b and that the g.c.d. can be expressed as ma + nb for some m, n ∈ Z, Euclidean algorithm. ii) Primes, Euclid's lemma, Fundamental Theorem of arithmetic, The set of primes is infinite, there are arbitrarily large gaps between primes, there exists infinitely many primes of the form 4n − 1 or of the form 6n − 1. iii) Congruence, definition and elementary properties, Results about linear congruence equations. Examples.	**15**
II	**Functions, Relations and Binary Operations** (Prerequisites: Definition of relation and function, domain, co-domain and range of a function, composite functions, injective, surjective, bijective functions, examples) i) Binary operation, properties, examples. Equivalence relation, Equivalence classes, properties such as two equivalences classes are either identical or disjoint, Definition of partition, every partition gives an equivalence relation and vice versa.	**15**

	ii) Congruence is an equivalence relation on Z, Residue classes and partition of Z, Addition modulo n, Multiplication modulo n, examples. Direct image f(A) and inverse image f^{-1}(B) for a function f, Composite of injective, surjective, bijective functions when defined, invertible functions, bijective functions are invertible and conversely, examples of functions including constant, identity, projection, inclusion, Binary operation as a function.	

Textbooks:

- David M. Burton, Elementary Number Theory, Seventh Edition, McGraw Hill Education (India) Private Ltd.
- Norman L. Biggs, Discrete Mathematics, Revised Edition, Clarendon Press, Oxford 1989

Additional References:

- I. Niven and S. Zuckerman, Introduction to the theory of numbers, Third Edition, Wiley Eastern, New Delhi, 1972.
- G. Birkoff and S. Maclane, A Survey of Modern Algebra, Third Edition, Mac Millan, New York, 1965.
- N. S. Gopalkrishnan, University Algebra, Ne Age International Ltd, Reprint 2013.

Course Code	MAJOR SEM – I – Practical	Credits	Lectures /Week
K23USMATMJP11	Practical (Paper I + Paper II)	2	4

Course Outcomes:

After successful completion of this course, students would be able to

- Apply various properties of real numbers, standard theorems of sequences and subsequences
- Solve problems of divisibility, congruences by employing suitable algorithms and theorems .
- Analyze and solve the problems based on the syllabus.
- Relate mathematics and its applications in pure and applied sciences.

Paper I	
1	Algebraic and Order Properties of Real Numbers and Inequalities
2	**AM-GM inequality, Cauchy-Schwarz inequality, Interior point , Limit point.**
3	**Hausdorff Property and LUB Axiom of R, Archimedian Property**
4	Convergence and divergence of sequences, bounded sequences, Divergent sequence.
5	Algebra of Convergent sequences, Sandwich Theorem.
6	Cauchy sequences, monotonic sequences, non-monotonic sequences.
7	Miscellaneous Theoretical Questions based on full paper.
Paper II	
1	Division Algorithm, Euclidean algorithm in Z, Examples on expressing the gcd. of two non zero integers a&b as ma + nb for some m, n ∈ Z,
2	Primes and the Fundamental theorem of Arithmetic, Euclid's lemma, there exists infinitely many primes of the form 4n − 1 or of the form 6n − 1
3	Congruence, linear congruence equations.
4	Binary Operation, Equivalence Relations, Partition and Equivalence classes
5	**Congruence , Residue classes,** partition of Z, Addition modulo n, Multiplication modulo n,
6	Bijective and Invertible functions, Compositions of functions.
7	Miscellaneous Theoretical Questions based on full paper.

Course Code	VOCATIONAL SKILL COURSE SEM – I	Credits	Lectures /Week
K23USMATVC141	Paper I : - Advanced Excel	2	2

Course Outcomes:

After successful completion of this course, students would be able to

- List large amount of data and apply various functions on it.
- Manipulates data list using outline, auto filter, pivot tables , scenario manager, goal seek,etc.
- Choose advanced functions and productivity tools in developing worksheets.
- Construct formulas , including the use of built in functions.

Unit	Topics	No of Lectures
I	**Spreadsheet** **a) Creating and Navigating worksheets and adding information to worksheets** i) Types of data, entering different types of data such as texts, numbers, dates, functions. ii) Quick way to add data Auto complete, Autocorrect, Auto fill, Auto fit. Undo and Redo. iii) Moving data, contiguous and non contiguous selections, Selecting with keyboard. Cut-Copy, Paste. Adding and moving columns or rows. Inserting columns and rows. iv) Find and replace values. Spell check. v) Formatting cells, Numbers, Date, Times, Font, Colors, Borders, Fills. **b) Multiple Spreadsheets** i) Adding, removing, hiding and renaming worksheets. ii) Add headers/Footers to a Workbook. Page breaks, preview. iii) Creating formulas, inserting functions, cell references, Absolute, Relative (within a worksheet, other worksheets and other workbooks). **c) Functions** i) Financial functions: FV, PV, PMT, PPMT, IPMT, NPER, RATE, NPV, IRR ii) Mathematical and statistical functions. ROUND, ROUNDDOWN, ROUNDUP, CEILING, FLOOR, INT, MAX, MIN, MOD, SQRT,	15

	ABS, AVERAGE. **d) Data Analysis** i) Sorting, Subtotal. ii) Pivot Tables- Building Pivot Tables, Pivot Table regions, Rearranging Pivot Table.	
II	**Advanced Spreadsheet** **a) Multiple Spreadsheets** i) Creating and using templates. ii) Creating and Linking Multiple Spreadsheets. iii) Using formulas and logical operators. iv) Creating and using named ranges. v) Creating formulas that use reference to cells in different worksheets. **b) Functions** i) Database Functions LOOKUP, VLOOKUP, HLOOKUP ii) Conditional Logic functions IF, COUNTIF, SUMIF, AVERAGEIF, NESTED IF. iii) String functions LEFT, RIGHT, MID, LEN, UPPER, LOWER, PROPER, TRIM. iv) Date functions TODAY, NOW, DATE, TIME, DAY, MONTH, YEAR, WEEKDAY, DAYS360. v) Statistical Functions COUNTA, COUNTBLANK, CORREL, LARGE, SMALL. **c) Data Analysis** i) Filter with customized condition. ii) The Graphical representation of data Column, Line, Pie and Bar charts. iii) Using Scenarios, creating and managing a scenario. iv) Using Goal Seek. v) Using Solver. vi) Understanding Macros, Creating, Recording and Running Simple Macros. Editing a Macro(Concept only).	**15**

Textbooks:

- Computer system and applications by Dr. Faiyaz Gadiwala, Mukesh N. Tekwani, Sheth publishers PVT LTD.
- Computer system and applications by Dr. Verus D'Sa, Manan Prakashan.

Additional References:

- Micosoft Office Excel by Torben Lage Frandsen.
- Excel Fundamentals by St. George's University of London.

Course Code	MAJOR SEM – II	Credits	Lectures /Week
K23USMATMJ211	**Paper I : - Calculus – II**	**2**	**2**

Course Outcomes:

After successful completion of this course, students would be able to

- Define limit, continuity , differentiability and extreme values of a function and their properties.
- Explain limits, continuity and differentiability of function .Identify discontinuous functions and solve related examples.
- Apply various properties of limits, continuity, differentiability of a function and implicit differentiation of functions to solve related problems.
- Examine limit , continuity and differentiability of various functions

Unit	Topics	No of Lectures
I	**Limits and Continuity** {Brief review: Domain and range of a function, injective function, surjective function, bijective function, composite of two functions (when defined), Inverse of a bijective function. Graphs of some standard functions such as $\|x\|$, e^x, $log\ x$, ax^2+bx+c, $\frac{1}{x}$, $x^n\ n \geq 3$,sin x, cos x, tan x, $\sin\left(\frac{1}{x}\right)$, $x^2\sin\left(\frac{1}{x}\right)$ over suitable intervals of R. No direct questions to be added. } i) ε − δ definition of Limit of a function, uniqueness of limit if it exists, algebra of limits, limits of composite function, sandwich theorem, left-hand-limit $f(x)$, right-hand-limit $f(x)$, non-existence of limits, $f(x)$, $f(x)$, $f(x)$, $= \pm\infty$. ii) Continuous functions: Continuity of a real valued function at a point and on a set using $\varepsilon-\delta$ definition, examples, Continuity of a real valued function at end points of domain using $\varepsilon-\delta$ definition, f is continuous at a if and only if $f(x)$ exists and equals to f(a), Sequential continuity, Algebra of continuous functions, discontinuous functions, examples of removable and essential discontinuity. iii) Intermediate Value theorem and its applications, Bolzano-Weierstrass theorem (statement only): A continuous function on a closed and bounded interval is bounded and attains its	**15**

	bounds.	
II	**Differentiability of functions and Mean Value Theorems** i) Differentiation of real valued function of one variable: Definition of differentiability of a function at a point of an open interval, examples of differentiable and non differentiable functions, differentiable functions are continuous but not conversely, algebra of differentiable functions.' ii) Chain rule, Higher order derivatives, Leibniz rule, Derivative of inverse functions, Implicit differentiation (only examples) iii) Rolle's Theorem, Lagrange's and Cauchy's Mean Value Theorems, applications and examples, Monotone increasing and decreasing functions, examples.	**15**

Textbooks:

- R. R. Goldberg, Methods of Real Analysis, Oxford and IBH, 1964.
- James Stewart, Calculus, Third Edition, Brooks/ Cole Publishing company, 1994.
- T. M. Apostol, Calculus, Vol I, Wiley And Sons (Asia) Pte. Ltd
- Sudhir Ghorpade and Balmohan Limaye, A course in Calculus and Real Analysis, Springer International Ltd, 2000.

Additional References:

- Richard Courant and Fritz John, A Introduction to Calculus and Analysis, Volume-I, Springer.
- Ajit Kumar and S. Kumaresan, A Basic course in Real Analysis, CRC Press, 2014.
- K. G. Binmore, Mathematical Analysis, Cambridge University Press, 1982.
- G. B. Thomas, Calculus, 12th Edition 2009

Course Code	MAJOR SEM – II	Credits	Lectures /Week
K23USMATMJ212	**Paper II : - Discrete Mathematics**	**2**	**2**

Course Outcomes:

After successful completion of this course, students would be able to

- Recall and define basic concepts of counting principles .
- Explain various counting principles , Binomial Identities to solve different problems ..
- Apply pigeonhole principle ,Inclusion-Exclusion Principle to solve combinatorial problems
- Examine countable and uncountable sets, various counting principals and solve related problems.

Unit	Topics	No of Lectures
I	**Preliminary Counting** i) Finite and infinite sets, countable and uncountable sets examples such as N, Z, N × N, Q,(0, 1), R. ii) Addition and multiplication Principle, counting sets of pairs, two ways counting. iii) Pigeonhole principle simple and strong form and examples, its applications to geometry.	**15**
II	**Advanced Counting** i) Permutation and combination of sets and multi-sets, circular permutations, emphasis on solving problems. ii) Binomial and Multinomial Theorem, Pascal identity, examples of standard identities such as the following with emphasis on combinatorial proofs iii) Non-negative integer solutions of equation $x1 + x2 + \cdots + xk = n$. iv) Principal of inclusion and exclusion, its applications, derangements, explicit formula for dn, deriving formula for Euler's function $\varphi(n)$.	**15**

Textbooks:

- Norman Biggs, Discrete Mathematics, Oxford University Press.
- V. Krishnamurthy, Combinatorics-Theory and Applications, Affiliated East West Press.
- Discrete Mathematics and its Applications, Tata McGraw Hills.
- Sharad Sane, Combinatorial Techniques, Springer

Additional References:

- Schaum's outline series, Discrete mathematics,
- Allen Tucker, Applied Combinatorics, John Wiley and Sons.
- Richard Brualdi, Introductory Combinatorics, John Wiley and sons.

Course Code	**SEM II - Mathematics**	**Credits**	**Lectures/ Week**
K23USMATMJP21	**Practical (Paper I + Paper II)**	**2**	**4**

Course Outcomes:

After successful completion of this course, students would be able to

- Apply various properties of limits, continuity, differentiability of a function and implicit differentiation of functions to solve related problems.
- Apply pigeonhole principle ,Inclusion-Exclusion Principle to solve combinatorial problems.
- Equip skills to Analyze problems , evaluate and draw the reasonable conclusions thereof.
- Relate and apply concepts of mathematics in related disciplines.

Paper I	
1	Limit of a function and Sandwich theorem, Continuous and discontinuous function.
2	Algebra of limits and continuous functions, Intermediate Value theorem, Bolzano Weierstrass theorem.
3	Properties of differentiable functions, derivatives of inverse functions and implicit functions.
4	Chain Rule, Higher order derivatives
5	Leibnitz Rule, Derivative of inverse functions, Implicit differentiation.
6	Mean value theorems and its applications
7	Miscellaneous Theoretical Questions based on full paper.
Paper II	
1	Finite and infinite sets, countable and uncountable sets
2	Counting principles, Two way counting.
3	Pigeon hole principle.
4	Multinomial theorem, identities, permutation and combination of multi-set.
5	Non-negative integer solutions of equation $x1 + x2 + \cdots + xk = n$.
6	Inclusion-Exclusion principle. Euler phi function.
7	Miscellaneous Theoretical Questions based on full paper

Course Code	MINOR SEM – II	Credits	Lectures /Week
K23USMATMR221	**Paper I : - First Order Differential Equations**	**2**	**2**

Course Outcomes:

After successful completion of this course, students would be able to

- Define differential equations their order, degree, Exact and non-exact differential equations with Integrating factors.
- Identify various types of differential equations.
- Solve exact differential equations.
- Examine first order differential equations to model problems of physics, engineering and population studies**.**

Unit	Topics	No of Lectures
I	**First order First degree Differential equations** Definition of a differential equation, Order, degree, Ordinary differential equation and Partial differential equation, Linear and non-linear ODE. Solution of homogeneous and non-homogeneous differential equations of first order and first degree. Notion of partial derivatives. i) Exact Equations: General solution of Exact equations of first order and first degree. Necessary and sufficient condition for $Mx + Ny = 0$ to be exact. Non-exact equations: Rules for finding integrating factors (without proof) for non-exact equations, such as 1) $\frac{1}{Mx+Ny}$ is and I.F if $Mx + Ny \neq 0$ and $Mx + Ny = 0$ is homogeneous. 2) $\frac{1}{Mx-Ny}$ is and I.F if $Mx - Ny \neq 0$ and $Mx + Ny = 0$ is of the form $f_1(x,y)y\,dx + f_2(x,y)x\,dy = 0$. $e^{\int f(x)dx}$ $\left(resp\ e^{\int g(y)dy}\right)$ is an I.F. if N≠ 0 (resp M ≠ 0) and $\frac{1}{N}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)\left(resp\ \frac{1}{M}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)\right)$ is a function of x (resp y) alone, say f(x) (resp g(y)).	**15**
II	**Applications of First order Linear Differential Equations** Linear and reducible linear equations of first order, finding solutions of first order differential equations of the type for applications to orthogonal trajectories, population growth, and finding the current at a given time.	**15**

Textbooks:

- G. F. Simmons, Differential Equations with Applications and Historical Notes, McGraw Hill, 1972.
- E. A. Coddington , An Introduction to Ordinary Differential Equations.Prentice Hall, 1961.

Additional References:

- D. A. Murray, Introductory Course in Differential Equations, Longmans, Green and Co., 1897.
- A. R. Forsyth, A Treatise on Differential Equations, MacMillan and Co.,1956

Course Code	VOCATIONAL SKILL COURSE SEM – II	Credits	Lectures /Week
K23USMATVC241	Paper I : - SQL and Extension	2	2

Course Outcomes:

After successful completion of this course, students would be able to

- Describe database, entity relational model, conditional statements and iteration method using loops.
- Discuss various functions and clauses in SQL.
- Write complex SQL queries to retrieve information from database to support decision making.
- Apply DDL and DML commands in SQL to insert, update, delete, create, modify and drop objects within a relational database.

Unit	Topics	No of Lectures
I	**RELATIONAL DATA BASE MANAGEMENT SYSTEM** **1. Introduction to Data base Concepts:** Database, Overview of data base management system. Data base Languages- Data Definition Languages (DDL) and Data Manipulation Languages (DML). **2. Entity Relation Model:** Entity, artibutes, keys, relations, Designing ER diagram, integrity Constraints over relations, conversion of ER to relations with and without constrains. **3. SQL Commands and functions** a) Creating and altering tables: CREATE statement with constraints like KEY, CHECK, DEFAULT, ALTER and DROP statement. b) Handling data using SQL: selecting data using SELECT statement, FROM clause, WHERE clause, HAVING clause, ORDERBY, GROUP BY, DISTINCT and ALL predicates, Adding data with INSERT statement, changing data with UPDATE statement, removing data with DELETE statement. c) Functions: Aggregate functions- AVG, SUM, MIN, MAX and COUNT, Date functions- ADD_MONTHS(), CURRENT_DATE(), LAST_DAY(), MONTHS_BETWEEN(), NEXT_DAY(). String functions- LOWER(), UPPER(), LTRIN(), RTRIM(), TRIN(), INSERT(), RIGHT(), LEFT(), LENGTH(), SUBSTR(). Numeric functions: ABS(), EXP(), LOG(), SQRT(), POWER(), SIGN(),	15

	ROUND(number). d) Joining tables: Inner, outer and cross joins, union.	
II	**INTRODUCTION TO PL/SQL** **1. Fundamentals of PL/SQL:** Defining variables and constants, PL/SQL expressions and comparisons: Logical Operators, Boolean Expressions, CASE Expressions Handling, Null Values in Comparisons and Conditional Statements, **2. PL/SQL Data Types:** Number Types, Character Types, Boolean Type. Date time and Interval types. **3. Overview of PL/SQL Control Structures:** Conditional Control: IF and CASE Statements, IF-THEN Statement, IF-THEN-ELSE Statement, IF-THEN-ELSIF Statement, CASE Statement, **4. Iterative Control:** LOOP and EXIT Statements, WHILE-LOOP, FOR-LOOP, **Sequential** Control: GOTO and NULL Statements.	**15**

Textbooks:

- Data base management system, RamKrishnam, Gehrke, McGraw-Hill
- Ivan Bayross, "SQL, PL/SQL – The Programming languages of Oracle" B.P.B. Publications, 3rd Revised Edition.
- George Koch and Kevin Loney, ORACLE "The complete Reference", Tata McGraw Hill, New Delhi.

Additional References:

- Elsmasri and Navathe, "Fundamentals of Database Systems" Pearson Education.
- Peter Roband Coronel, "Database System, Design, Implementation and Management", Thomson Learning.
- C.J. Date, Longman, "Introduction database system", Pearson Education.
- **Jeffrey D. Ullman, Jennifer Widsom, "A First Course in Database Systems", Pearson Education. 8.Martin Gruber, "Understanding SQL", B.P.B. Publications.**

Evaluation Scheme for First Year (UG) under NEP (2 credits)

I. Internal Evaluation for Theory Courses – 20 Marks

1) Continuous Internal Assessment (CIA) Assignment - Tutorial/ Case Study/ Project / Presentations/ Group Discussion / Ind. Visit. – 10 marks

2) Continuous Internal Assessment (CIA) ONLINE Unit Test – 10 marks

II. External Examination for Theory Courses – 30 Marks

Duration: 1 Hours

Theory question paper pattern: All questions are compulsory.

Question	Based on	Marks
Q.1	Unit I	15
Q.2	Unit II	15

- All questions shall be compulsory with internal choice within the questions.
- Each Question may be sub-divided into sub questions as a, b, c, d, etc. & the allocation of Marks depends on the weightage of the topic.

III. Practical Examination

- Each core subject carries 50 Marks.
- Duration: 2 Hours for each practical course.
- Minimum 80% practical from each core subjects are required to be completed.
- Certified Journal is compulsory for appearing at the time of Practical Exam

NOTE: To pass the examination, attendance is compulsory in both Internal & External (Theory + Practical) Examinations.