AC 25.04.24 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 2024-2025

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- 2024-25

Name of the Department: Mathematics

Semester	Course Code	Course Title	Vertical	Credit
I	K24USMATMJ111	Calculus –I and Algebra -I	Major	2
	K24USMATMJP11	Practical : Calculus –I and Algebra -I	Major practical	2
	K24USMATOE131	Mathematical and Statistical Techniques -I	OE	2
	K24USMATVC141	Microsoft word and Power point	VSC practical	2
	K24USMATSC151	Quantitative Aptitude and Logical reasoning -I	SEC practical	2
II	K24USMATMJ211	Calculus – II and Discrete Mathematics	Major	2
	K24USMATMJP21	Practical : Calculus – II and Discrete Mathematics	Major practical	2
	K24USMATOE231	Mathematical and Statistical Techniques -II	OE	2
	K24USMATVC241	Advanced Excel	VSC practical	2
	K24USMATSC251	Quantitative Aptitude and Logical reasoning -II	SEC practical	2

Course Code	MAJOR SEM – I	Credits	Lectures /Week
K24USMATMJ111	Paper I : Calculus –I and Algebra -I	2	2

Course Outcomes:

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

- Define bounded sets, Infimum and supremum, sequences, Divisibility of integers, congruences, functions, relations.
- Explain real numbers and its various properties, sequences and its convergence, properties of divisibility , congruence modulo n .
- Apply various properties of real numbers, standard theorems of sequences and subsequences, properties of divisibility, congruences by employing suitable algorithms and theorems to solve related problems .
- Examine boundedness of a sequence, convergence of sequences, congruence, residue classes in integers.

Unit	Topics	No of Lectures
I	**a)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. **b)Sequences in R** i) Definition of sequence and examples, Convergence of sequences, and its properties. 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,Cauchy sequences, Every convergent sequences is a	15

	Cauchy sequence and converse.	
II	**a)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 and properties , Expression of g.c.d. in the form of 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. **b)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 and its properties Definition of partition, every partition gives an equivalence relation and vice versa. ii) Congruence is an equivalence relation on Z, Residue classes and partition of Z, Addition and 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.	**15**

Textbooks:

- R. G. Bartle- D. R. Sherbert, Introduction to Real Analysis, John Wiley & Sons, 1994.
- K. G. Binmore, Mathematical Analysis, Cambridge University Press, 1982.
- R. R. Goldberg, Methods of Real Analysis, Oxford and IBH, 1964.
- Sudhir Ghorpade and Balmohan Limaye, A course in Calculus and Real Analysis, Springer International Ltd, 2000.
- 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:

- 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
- 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
K24USMATMJP11	Practical (Calculus –I and Algebra –I)	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 theory questions on unit I
8	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 $\in$ Z,
9	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
10	Congruence, linear congruence equations.
11	Binary Operation, Equivalence Relations, Partition and Equivalence classes
12	Congruence , Residue classes**,** partition of Z, Addition modulo n, Multiplication modulo n,
13	Bijective and Invertible functions, Compositions of functions.
14	Miscellaneous theory questions on unit II

Course Code	Open Elective	Credits	Lectures/ Week
K24USMATOE131	Mathematical and Statistical Techniques -I	2	2

Course Outcomes:

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

- Define shares, mutual funds, measures of central tendencies and measures of dispersion.
- Explain the concepts of shares, mutual funds, measures of central tendencies and measures of dispersion.
- Use the concepts of shares, mutual funds, measures of central tendencies and measures of dispersion.
- Examine the ideas of shares, mutual funds, measures of central tendencies and measures of dispersion to solve related problems.

Unit	**Topics**	No of Lectures
I	Shares and Mutual Funds Shares: Concept of share, face value, market value, dividend, equity shares, preferential shares, bonus shares. Simple examples. Mutual Funds: Simple problems on calculation of Net income after considering entry load, dividend, change in Net Asset Value (N.A.V.) and exit load. Averaging of price under the Systematic Investment Plan (S.I.P.)	15
II	Summarization Measures Measures of Central Tendencies: Definition of Average, Types of Averages: Arithmetic Mean, Median, and Mode for grouped as well as ungrouped data. Quartiles, Deciles and Percentiles. Using Ogive locate median and Quartiles. Using Histogram locate mode. Combined and Weighted mean. Measures of Dispersions: Concept and idea of dispersion. Various measures Range, Quartile Deviation, Mean Deviation, Standard Deviation, Variance, Combined Variance.	15

Books and references:

- Mathematics for Economics and Finance Methods and Modelling by Martin Anthony and Norman Biggs, Cambridge University Press, Cambridge low- priced edition, 2000, Chapters 1, 2, 4, 6 to 9 & 10.
- Applied Calculus: By Stephen Waner and Steven Constenoble, Brooks/Cole Thomson Learning, second edition, Chapter 1 to 5.
- Business Mathematics By D. C. Sancheti and V. K. Kapoor, Sultan Chand & Sons, 2006, Chapter 1, 5, 7, 9 &10.

- Mathematics for Business Economics: By J. D. Gupta, P. K. Gupta and Man Mohan, Tata Mc- Graw Hill Publishing Co. Ltd., 1987, Chapters 9 to 11 & 16.
- Quantitative Methods- Part- I By S. Saha and S. Mukerji, New Central Book Agency, 1996, Chapters 7 & 12.

Additional References:

- Mathematical Basis of Life Insurance By S.P. Dixit, C.S. Modi and R.V. Joshi, Insurance Institute of India, Chapters 2: units 2.6, 2.9, 2.20 & 2.21.
- Indian Mutual Funds Handbook : By Sundar Shankaran, Vision Books, 2006, Sections 1.7,1.8.1, 6.5 & Annexures 1.1to 1.3.
- STATISTICS by Schaum Series.
- Business Mathematics & Statistics : B Aggarwal, Ane Book Pvt. Limited.
- Business Mathematics : D C Sancheti & V K Kapoor, Sultan Chand & Sons

Course Code	VSC - Microsoft word and Power point	Credits	Lectures /Week
K24USMATVC141	Practical	2	4

Course Outcomes:

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

- Describe the names and functions of the word and power point interface components.
- Apply edit, save, print documents format document using word and power point.
- Analyse formatting techniques and presentation styles.
- Construct document and slide presentations that include text, graphics, animation, and transitions.

Sr. no.	**Practical's Details:**
1	**Microsoft word** :Text Basics
2	Text Formatting and saving file
3	Working with Objects
4	Header & Footers
5	Bullets and Numbering
6	Working with Tables
7	Proofing the document
8	Sharing and Maintaining Document
9	Revision practical on Microsoft word.
10	**Power point** :Setting Up PowerPoint Environment
11	Formatting Text
12	Creating slides and applying themes
13	Working with bullets and numbering
14	Working with Objects
15	Inserting Hyperlinks and Action Buttons , Edit Hyperlinks and Action Button
16	Using SmartArt and Tables
17	Animation and Slide Transition
18	Slide show option, Creating custom slide show
19	Proofing and Printing
20	Revision practical on Power point.

Reference books:

- Microsoft Office 365: In Practice, 2021 Edition**,** By Randy Nordell, Kathleen Stewart, Annette

Easton, Pat Graves Mc Grow Hill Publication
- Microsoft word in easy steps by Scott Basham
- Microsoft power point guide to success by Kelvin Pitch
- Microsoft power point best practices , tips and techniques by Chantal Bosse

Additional References:
- Learning Ms. Word and Ms Excel by Rohit Khurana
- Microsoft power point basics by Angela Rose
- Microsoft power point tips, tricks and shortcuts by Amelia Griggs

Course Code	SEC SEM – I	Credits	Lectures/ Week
K24USMATSC151	**Quantitative Aptitude and Logical reasoning -I**	**2**	**4**

Course Outcomes:

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

- Define different types of numbers , factors and multiples of numbers , LCM and GCD of numbers, BODMAS rule, tabulation, logical reasoning .
- Describe number system , BODMAS rule, factors and multiples of numbers , LCM and GCD of numbers the numbers , various properties of divisibility, data Interpretation and logical reasoning .
- Solve problems of divisibility,square and square roots, cube and cube roots,division and euclidean algorithms , HCF and LCM of numbers , Simplifications using BODMAS , data Interpretation and logical reasoning problems.
- Illustrate techniques involved in solving mathematical problems and thereby reducing the time taken for performing related calculation .

Sr. no.	**Practical Detail:**
1	**Number System** : Number line and classification of numbers, Face value and Place value of a digit in a number
2	squares and square roots , cube and cube roots
3	prime numbers, test for an number to be a prime, Tests of divisibility
4	Factorial of a number ,Modulus of a number , Greatest integral value, multiplication by short cut methods
5	Division and Euclidean algorithms.
6	More problem solving on practical 1,2,3,4,5.
7	**Simplifications using BODMAS**: simple problems
8	Modulus of a real number, problems by using formulae like $(a+b)^2, (a-b)^2, a^2-b^2, (a+b)^3, (a^3-b^3), (a+b+c)^2$ *etc*
9	More problems on practical 7 and 8.
10	**HCF and LCM of numbers**: Factors and Multiples
11	HCF of two or more than two numbers by factorization method and by division method
12	LCM by factorization and by short method,product of two numbers in terms of HCF and LCM
13	Coprime numbers, HCF and LCM of fractions, Decimal fractions and comparison of fraction.
14	**More problems on practical 10,11,12,13.**
15	**Data Interpretation**: Tabulation and bar graphs related problems.

16	More problems on practical 15
17	**Logical Reasoning:** Important concepts in Logical Reasoning simple problems
18	Logical reasoning based on arrangements, Logical reasoning based on ranking
19	Quantitative reasoning, Puzzle test, Syllogisms.
20	**Problems based on problem solving on practical 17,18,19.**

Reference books:

- Quantitative Aptitude for competitive examinations by Dr. R.S.Aggarwal S.Chand Publication
- Quantitative Aptitude for the CAT by Arun Sharma , TATA McGRAW-HILL's Series.

Additional References:

- Quantitative Aptitude for competitive examinations by Abhijit Gupta TATA McGRAW-HILL Publishing company limited, New Delhi.
- Quantitative Aptitude by P.R. Vittal pearson education Publication.

Course Code	MAJOR SEM – II	Credits	Lectures /Week
K24USMATMJ211	Paper I : - Calculus – II and Discrete Mathematics	2	2

Course Outcomes:

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

- Define limit, continuity , convergence and divergence series, Finite and infinite sets,. Pigeonhole principle, Permutation, Principal of inclusion and exclusion principle , derangements and eulers phi function.
- Explain limit, continuity , convergence and divergence series, Finite and infinite sets,. Pigeonhole principle, Permutation, Principal of inclusion and exclusion principle , derangements and eulers phi function.
- Apply various properties of limits, continuity, convergence and divergence series, Finite and infinite sets,. Pigeonhole principle, Permutation, Principal of inclusion and exclusion principle , derangements and Euler's -phi- function to solve related problems.
- Examine limit , continuity , convergence and divergence series ,countable and uncountable sets, various counting principals and solve related problems.

Unit	Topics	No of Lectures
I	**a)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 $\lim_{x\to a^-}$ f(x) , right-hand-limit $\lim_{x\to a^+}$ f(x) , non-existence of limits, $\lim_{x\to -\infty}$ f(x) , $\lim_{x\to \infty}$ f(x) , $\lim_{x\to a}$ f(x) , = ± ∞. ii) Continuous functions: Continuity of a real valued function at a point, on a set and at end points of domain using $\varepsilon-\delta$ definition, examples, f is continuous at a if and only if $\lim_{x\to a}$ f(x) exists and equals to f(a), Sequential continuity, Algebra of continuous functions, discontinuous functions, examples of removable and essential discontinuity.	15

	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 bounds. **b)Infinite Series** i). Infinite series in $\mathbb{R}$. Definition of convergence and divergence series. Basic examples including geometric series. Elementary results such as if $\sum_{n=1}^{\infty} a_n$ is convergent, then $a_n \to 0$ as $n \to \infty$ but converse is not true. Cauchy Criterion. Algebra of convergent series. ii). Tests for convergence: Comparison Test, Limit Comparison Test, Ratio Test (without proof), Root Test (without proof), Abel Test (without proof) and Dirichlet Test (without proof). Examples. The decimal expansion of real numbers. Convergence of $\sum_{n=1}^{\infty} \frac{1}{n^p}$ (p > 1). Divergence of harmonic series $\sum_{n=1}^{\infty} \frac{1}{n}$. iii)Alternating series. Leibnitz's Test. Examples. Absolute convergence, absolute convergence implies convergence but not conversely. Conditional Convergence.	
II	**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. **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 $x_1+x_2+x_3+\cdots.+x_k=$ n. iv) Principal of inclusion and exclusion, its applications, derangements, explicit formula for dn, deriving formula for Euler's function φ(n).	**15**

Textbooks:

- R. G. Bartle- D. R. Sherbert, Introduction to Real Analysis, John Wiley & Sons, 1994.
- 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.
- 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:

- 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
- 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
K24USMATMJP21	Practical	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 various properties of limits, continuity, convergence and divergence series, Finite and infinite sets,. Pigeonhole principle, Permutation, Principal of inclusion and exclusion principle , derangements and Euler's -phi- function to solve related problems.
- Examine limit , continuity , convergence and divergence series ,countable and uncountable sets, various counting principals and solve related problems.
- Relate and apply concepts of mathematics in related disciplines.

Sr.no.	Practical detail
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 theory questions on unit I
8	Finite and infinite sets, countable and uncountable sets
9	Counting principles, Two way counting.
10	Pigeon hole principle.
11	Multinomial theorem, identities, permutation and combination of multi-set.
12	Non-negative integer solutions of equation $x1 + x2 + \cdots + xk = n$.
13	Inclusion-Exclusion principle. Euler phi function.
14	Miscellaneous theory questions on unit II

Course Code	**Open Elective SEM – II**	**Credits**	**Lectures /Week**
K24USMATOE231	Mathematical and Statistical Techniques -II	**2**	**2**

Course Outcomes:

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

- Define permutation, combination, linear programming problem and various terms from elementary probability theory.
- Describe permutation, combination, linear programming problem and various terms from elementary probability theory.
- Use permutation, combination, linear programming problem and elementary probability theory to solve related problems.
- Analyse permutation, combination, linear programming problem and elementary probability theory.

Unit	**Topics**	No of Lectures
I	Permutation, Combination and Linear Programming Problems Permutation and Combination: Factorial Notation, Fundamental principle of counting, Permutation as arrangement, Simple examples, combination as selection, Simple examples, Relation between C(n,r) and P(n,r) Examples on commercial application of permutation and combination. Linear Programming Problem: Sketching of graphs of (i) linear equation Ax + By + C = 0 (ii) linear inequalities. Mathematical Formulation of Linear Programming Problems upto 3 variables. Solution of Linear Programming Problems using graphical method up to two variables.	15
II	Elementary Probability Theory Probability Theory: Concept of random experiment/trial and possible outcomes; Sample Space and Discrete Sample Space; Events their types, Algebra of Events, Mutually Exclusive and Exhaustive Events, Complimentary events. Classical definition of Probability, Addition theorem (without proof), conditional probability. Independence of Events: $P(A \cap B) = P(A) P(B)$. Simple examples. Random Variable: Probability distribution of a discrete random variable; Expectation and Variance of random variable, simple examples on probability distributions.	15

Books and references:

- Mathematics for Economics and Finance Methods and Modelling by Martin Anthony and Norman Biggs, Cambridge University Press, Cambridge low-priced edition, 2000, Chapters 1, 2, 4, 6 to 9 & 10.
- Applied Calculus: By Stephen Waner and Steven Constenoble, Brooks/Cole Thomson Learning, second edition, Chapter 1 to 5.
- Business Mathematics By D. C. Sancheti and V. K. Kapoor, Sultan Chand & Sons, 2006, Chapter 1, 5, 7, 9 &10.
- Mathematics for Business Economics: By J. D. Gupta, P. K. Gupta and Man Mohan, Tata Mc- Graw Hill Publishing Co. Ltd., 1987, Chapters 9 to 11 & 16.
- Quantitative Methods-Part-I By S. Saha and S. Mukerji, New Central Book Agency, 1996, Chapters 7 & 12.

Additional References:

- Mathematical Basis of Life Insurance By S.P. Dixit, C.S. Modi and R.V. Joshi, Insurance Institute of India, Chapters 2: units 2.6, 2.9, 2.20 & 2.21.
- Indian Mutual Funds Handbook : By Sundar Shankaran, Vision Books, 2006, Sections 1.7,1.8.1, 6.5 & Annexures 1.1to 1.3.
- STATISTICS by Schaum Series.
- Business Mathematics & Statistics : B Aggarwal, Ane Book Pvt. Limited.
  Business Mathematics : D C Sancheti & V K Kapoor, Sultan Chand & Sons

Course Code	VOCATIONAL SKILL COURSE SEM – II	Credits	Lectures/ Week
K24USMATVC241	Advanced Excel	2	4

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 etc.
- Choose advanced functions and productivity tools in developing worksheets.
- Construct formulas , including the use of built in functions.

Sr. no.	**Practical Detail:**
1	**Spreadsheet :** (Creating and Navigating worksheets and adding information to worksheets) Types of data, entering different types of data such as texts, numbers, dates, functions
2	Quick way to add data Auto complete, Autocorrect, Auto fill, Auto fit. Undo and Redo
3	Moving data, contiguous and non-contiguous selections, Selecting with keyboard. Cut-Copy, Paste. Adding and moving columns or rows. Inserting columns and rows. Find and replace values. Spell check
4	Formatting cells, Numbers, Date, Times, Font, Colors, Borders, Fills.
5	Multiple Spreadsheets: Adding, removing, hiding and renaming worksheets
6	Add headers/Footers to a Workbook. Page breaks, preview.
7	Creating formulas, inserting functions, cell references, Absolute, Relative (within a worksheet, other worksheets and other workbooks).
8	**Functions:** Financial functions: FV, PV, PMT, PPMT, IPMT, NPER, RATE, NPV, IRR
9	Mathematical and statistical functions. ROUND, ROUNDDOWN, ROUNDUP, CEILING, FLOOR, INT, MAX, MIN, MOD, SQRT, ABS, AVERAGE.
10	**Data Analysis:** Sorting, Subtotal**.**
11	Pivot Tables- Building Pivot Tables, Pivot Table regions, Rearranging Pivot Table.
12	**Advanced Spreadsheet :**Multiple Spreadsheets Creating and using templates
13	Creating and Linking Multiple Spreadsheets, Using formulas and logical operators.

14	Creating and using named ranges. Creating formulas that use reference to cells in different worksheets.
15	**Functions:** Database Functions LOOKUP, VLOOKUP, HLOOKUP
16	Conditional Logic functions IF, COUNTIF, SUMIF, AVERAGEIF, NESTED IF.
17	String functions LEFT, RIGHT, MID, LEN, UPPER, LOWER, PROPER, TRIM.
18	Date functions TODAY, NOW, DATE, TIME, DAY, MONTH, YEAR, WEEKDAY, DAYS360.Statistical Functions COUNTA, COUNTBLANK, CORREL, LARGE, SMALL.
19	**Data Analysis :** Filter with customized condition.
20	The Graphical representation of data Column, Line, Pie and Bar charts.

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	SEC SEM – II	Credits	Lectures/ Week
K24USMATSC251	Quantitative Aptitude and Logical reasoning -II	2	4

Course Outcomes:

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

- Define decimal fraction, common fraction ,Average, Surds and Indices , Logarithms, Percentage, weighted average of different groups, Data Interpretation and Logical Reasoning .
- Describe decimal fraction, common fraction ,Average, Surds and Indices , Logarithms, Percentage, weighted average of different groups, Data Interpretation and Logical Reasoning
- Solve problems of decimal fraction , common fraction , Average, Surds and Indices , Logarithms, Percentage, weighted average of different groups, Data Interpretation using pie chart and line graphs ,venn diagrams , sequence and series etc.
- Illustrate various techniques involved in solving mathematical problems and thereby reducing the time taken for performing related calculation .

Sr. no.	**Practical Details:**
1	Decimal Fraction **:**Decimal fractions, Conversion of decimal fraction into common fractions.
2	Operations on decimal fraction(Addition , subtraction of decimal fraction, multiplication of decimal fraction by a power of 10)
3	comparison of fractions, recurring decimal ,pure recurring decimal, converting mixed decimal into common fraction.
4	More problems on Practical 1,2,3.
5	**Average**: Introduction , definition of average, weighted average,
6	average of different groups , addition and removal of terms and change in average,
7	replacement of some of the items ,some problem specific formulae, problems on ages.
8	More problems on Practical 5,6,7.
9	**Surds and Indices:** Law of indices, surds and law of surds.
10	**Logarithms:** Logarithm, properties of logarithms,
11	common logarithms, characteristics and mantissa.
12	**Percentage:** Concept of percentage, results on population and results on depreciation.
13	More problems on Practical 12

14	**Data Interpretation** : Pie charts and Line graphs related problems.
15	More problems on Practical 14
16	**Logical Reasoning:** Set theory
17	Venn Diagrams and Network Diagrams.
18	Binary logic, Blood relations.
19	Sequence and series.
20	More problems on Practical 16,17,18,19.

Reference books:

- Quantitative Aptitude for competitive examinations by Dr. R.S.Aggarwal S.Chand Publication
- Quantitative Aptitude for the CAT by Arun Sharma , TATA McGRAW-HILL's Series.

Additional References:

- Quantitative Aptitude for competitive examinations by Abhijit Gupta TATA McGRAW-HILL Publishing company limited, New Delhi.
- Quantitative Aptitude by P.R. Vittal pearson education Publication.

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/– 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 necessary for appearing at the time of Practical Exam

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

IV. PASSING STANDARD NEP First Year :

- The learners /students shall obtain minimum of 40% marks in the Internal Assessment and External Assessment (Semester End Examination) COMBINED, to pass the course in a particular semester. A learner / student will be said to have passed the course if He/She passes the Internal Assessment + Semester End Examination COMBINED.

- To pass the examination attendance is compulsory in both internal and external (theory plus practical) examination.

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