

Rayat Shikshan Sanstha's
Karmaveer Bhaurao Patil College Vashi, Navi Mumbai
Autonomous College
[University of Mumbai]
Syllabus for Approval

Sr. No.	Heading	Particulars
1	Title of Course	F.Y.B.Sc. Mathematics
2	Eligibility for Admission	12th Science and the equivalent [of recognized Boards]
3	Passing Marks	40%
4	Ordinances/Regulations (if any)	
5	No. of Years/Semesters	One year/Two semester
6	Level	U.G.
7	Pattern	Semester
8	Status	New
9	To be implemented from Academic year	2023-2024

Date: _____

Signature: _____

Name of BOS Chairman: _____

AC-April2023

Item No-6.11



**Rayat Shikshan Sanstha's
KARMAVEER BHURAO PATIL COLLEGE, VASHI.
NAVI MUMBAI**

Sector-15- A, Vashi, Navi Mumbai - 400 703

(AUTONOMOUS COLLEGE)

Syllabus for Mathematics

Program: B.Sc.

Course: F.Y.B.Sc. Mathematics

**(w.e.f. Academic Year 2023-24)
(NEP-2020)**

**Rayat Shikshan Sanstha's
KARMAVEER BHAURAO PATIL COLLEGE, VASHI.
NAVI MUMBAI (Autonomous)
Department of Mathematics
B. Sc. Mathematics**

Program Outcomes (POs)

Learners are able to–

PO-1	Disciplinary Knowledge	Understand the basic concepts, fundamental principles, theoretical formulations, and experimental findings, and the scientific theories related to Physics, Chemistry, Mathematics, Microbiology, Computer Science, Biotechnology, Information Technology and its other fields related to the program.
PO-2	Communication Skills	Develop various communication skills such as reading, listening, and speaking skills to express ideas and views clearly and effectively.
PO-3	Critical Thinking	Propose novel ideas in explaining the scientific data, facts and figures related to science and technology.
PO-4	Analytical Reasoning and Problem Solving	Hypothesize, analyze, formulate and interpret the data systematically and solve theoretical and numerical problems in the diverse areas of science and technology.
PO-5	Sense of Inquiry	Curiously ask relevant questions for a better understanding of fundamental concepts and principles, scientific theories and applications related to the study.
PO-6	Use of Modern Tools	Operate modern tools, equipments, instruments and laboratory techniques to perform the experiments and write the programs in different languages (software).
PO-7	Research Skills	Understand to design, collect, analyze, interpret and evaluate information/data that is relevant to science and technology.
PO-8	Application of Knowledge	Develop scientific outlook and apply the knowledge with respect to subject.
PO-9	Ethical Awareness	Imbibe ethical, moral and social values and exercise it in day to day life.
PO-10	Teamwork	Work collectively and participate to take initiative for various field-based situations related to science, technology and society at large.
PO-11	Environment and Sustainability	Create social awareness about environment and develop sustainability for betterment of future.
PO-12	Lifelong Learning	Ability of self-driven to explore, learn and gain knowledge and new skills to improve the quality of life and sense of self-worth by paying attention to the ideas and goals throughout the life.

Program Specific Outcomes(PSO)

PSO-1	Recalling the concepts of mathematics and applying them to the various courses like algebra, analysis, Differential equations, statistics, etc to form mathematical models.
PSO-2	To apply knowledge of Mathematics for pursuing higher studies at reputed national and international institutes including higher research.
PSO-3	Apply Mathematics to interdisciplinary ways like statistician, mathematical finance, industry expertise and interpret quantitative ideas.

Rayat Shikshan Sanstha's
KARMAVEER BHAURAO PATIL COLLEGE, VASHI.
NAVI MUMBAI (Autonomous)
(w.e.f. academic year 2021-22)

Semester-I

CourseCode	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit Scheme			
		Lecture	Practical	Tutorial	CIE	Sem End-Exam	Term work	Practical	Oral	Total	Lecture	Practical	Tutorial	Total
MAT101	Major: Algebra & Calculus-I	03	01	-	30	45	-	25	-	100	03	01	-	04
MAT102	Generic Elective/Open Elective: Basics of Mathematics and Statistics	03	-	01	40	60	-	-	-	100	03	-	01	04
MAT103	VSC- Differential Equation Applications	02	-	-	20	30	-	-	-	50	02	-	-	02
MAT104	SEC: Introduction to Excel	-	02	-	-	-	-	50	-	50	-	02	-	02
Total										300	08	03	01	12
Total Credit											08	03	01	12

Semester-II

CourseCode	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit Scheme			
		Lecture	Practical	Tutorial	CIE	SEE	Termwork	Practical	Oral	Total	Lecture	Practical	Tutorial	Total
MAT151	Major: Algebra & Calculus – II	03	01	-	30	45	-	25	-	100	03	01	-	04
MAT152	Generic Elective/Open Elective: Business Mathematics	03	-	01	40	60	-	-	-	100	03	-	01	04
MAT153	VSC- Integration with Applications	02	-	-	25	25	-	-	-	50	02	-	-	02
MAT154	SEC: Advanced Excel	-	02	-	-	-	-	50	-	50	-	02	-	02
Total										300	08	03	01	12
Total Credit											08	03	01	12

SEMESTER-I

MAT101 Algebra & Calculus – I

Course Outcomes: Upon successful completion of this course, students will be able to:

- **CO1: Know and recall the core knowledge of the syllabus.** (To measure this outcome, questions may be of the type- objective, define, identify, state, match, list, name, etc.)
- **CO2: Understand the concept.** (To measure this outcome, questions may be of the type- explain, describe, illustrate, evaluate, give examples, compute, etc.)
- **CO3: Analyze the problem and apply the appropriate concept.** (To measure this outcome, questions will be based on applications of core concepts)
- **CO4: Give reasoning.** (To measure this outcome, questions may be of the type- true/false with justification, theoretical fill in the blanks, theoretical problems, prove implications or corollaries of theorems, etc.)
- **CO5: Apply core concepts to new situations.** (To measure this outcome, some questions will be based on self-study topics and also comprehension of unseen Problems.)

Unit I: Real Number System (15 Lectures)

Real number system and order properties of \mathbb{R} , Absolute value properties, AM-GM inequality, Triangle inequality, Intervals, and neighborhood, Hausdorff property, Bounded sets, Upper and Lower Bounds, LUB Property and Its Applications. Continuum property, l.u.b. and g.l.b axiom statement and its consequences, Density of rational and irrational, Nested interval theorem, Archimedean property and its applications.

Unit II: Integers and polynomials (15 Lectures)

Statement of well-ordering property of non-negative integers, induction principle as a consequence of well-ordering property, Binomial theorem for non-negative exponents, Pascal Triangle. Divisibility in integers, division algorithm, greatest common divisor (g.c.d.) and least common multiple (l.c.m.) of two integers, basic properties of g.c.d. such as existence and uniqueness of g.c.d. of integers. Definition of polynomial, Algebra of polynomials, degree of polynomial, basic properties, Division algorithm in polynomials and g.l.b. of two polynomials and its basic properties, Euclidean algorithm applications.

Unit III: Functions and Sequences (15 Lectures)

Definition of function, domain, co-domain and range of a function, images and inverse images of sets under function composite functions, the graph of the function, Types of functions & their properties, Bijective functions are invertible and conversely, Examples of functions, Binary operation as a function. Definition of a sequence and examples, Convergence of sequence, (every convergent sequence is bounded), uniqueness of limit if exists, Algebra of convergent sequences, Sandwich theorem, Cauchy sequence, Bolzano Weierstrass theorem, Monotone sequences, Monotone convergence theorem, subsequences, every convergent sequence is a Cauchy sequence and converse.

Reference Books:

1. Ajit Kumar-S. Kumaresan, A Basic Course in Real Analysis, CRC Press, 2014
2. R.G. Bartle- D.R. Sherbert, Introduction to Real Analysis S. John Wiley & Sons, 1994.
3. David M. Burton, Elementary Number Theory, Seventh Edition, McGraw Hill Education (India) Private Ltd.
4. Norman L. Biggs, Discrete Mathematics, Revised Edition, Clarendon Press, Oxford 1989.

Additional Reference Books:

1. T. M. Apostol, Calculus Volume I, Wiley & Sons (Asia) Pvt. Ltd.
2. A Course in Calculus And Real Analysis, Ghorpade-Limaye, Springer, 2006.
3. Richard Courant-Fritz John, A Introduction to Calculus and Analysis, Volume I, Springer.
4. R. R. Goldberg, Methods of Real Analysis, Oxford and IBH, 1964.

5. Calculus - Early Transcendentals, James Stewart.
6. Foundation Course in Mathematics by Ajit Kumar, S. Kumaresan and Bhaba Sarma Narosa Publication 2017.
7. Robert R. Stoll: Set theory and logic, Freeman & Co.

MAT101 Algebra & Calculus – I

Course Outcomes: Upon successful completion of this course, students will be able to:

- **CO1: Know and recall the core knowledge of the syllabus.** (To measure this outcome, questions may be of the type- objective, define, identify, state, match, list, name etc.)
- **CO2: Understand the concept.** (To measure this outcome, questions may be of the type-explain, describe, illustrate, evaluate, give examples, compute, etc.)
- **CO3: Analyze the problem and apply the appropriate concept.** (To measure this outcome, questions will be based on applications of core concepts)
- **CO4: Give reasoning.** (To measure this outcome, questions may be of the type-multiple correct options with justification, theoretical fill-in-the-blanks, theoretical problems, prove implications or corollaries of theorems, etc.)
- **CO5: Apply core concepts to new situations.** (To measure this outcome, some questions will be based on self-study topics and also comprehension of unseen passages.)

ICT Tools Used: Videos, PPT, Pen-Tablet, Scilab for graph plotting

Students Centric Methods: Problem Solving and Participative
(Experimental, Participative, Problem Solving)

Links: SWAYAM / MOOCS:

1)<https://nptel.ac.in/courses/111/106/111106146/>

2)<https://nptel.ac.in/courses/111/104/111104144/>

3)<https://nptel.ac.in/courses/111/105/111105112/>

4)<https://nptel.ac.in/courses/111/104/111104085/>

The CO-PO Mapping Matrix

CO\PO	PO1	PO2	PO3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	3	-	2		-	-	-	-	-	-	-	1
CO2	3	2	-	1	-	-	-	-	-	-	-	1
CO3	2	-	-	-	-	-	-	-	-	-	-	1
CO4	2	-	1	-	-	-	-	-	-	-	-	1
CO5	2	2	-	1	-	-	-	-	-	-	-	1

UGMTDSCP01 Practical based on all units (30 hrs.)

Four practical based on each unit

**SEM-I Generic Elective (Open Elective):
MAT102 Basics of Mathematics and Statistics**

Course Outcomes: Upon successful completion of this course, students will be able to:

- **CO1: Know and recall the core knowledge of the syllabus.** (To measure this outcome, questions may be of the type- objective, define, identify, state, match, list, name etc.)
- **CO2: Understand the concept.** (To measure this outcome, questions may be of the type- explain, describe, illustrate, evaluate, give examples, compute etc.)
- **CO3: Analyze the problem and apply the appropriate concept.** (To measure this outcome, questions will be based on applications of core concepts)
- **CO4: Give reasoning.** (To measure this outcome, questions may be of the type- true/false with justification, theoretical fill in the blanks, theoretical problems, prove implications or corollaries of theorems, etc.)
- **CO5: Apply core concepts to new situations.** (To measure this outcome, some questions will be based on self-study topics and also comprehension of unseen Problems.)

Unit-: I Functions, Derivatives, and Their Applications (12 Lectures)

- a. **Concept of real functions:** constant function, linear function, x^n , e^x , a^x , $\log x$. Demand, Supply, Total Revenue, Average Revenue, Total cost, Average cost and Profit function. Equilibrium Point, Break-even Point.
- b. **Derivative of functions:**
 - i. Derivative as rate measure, Derivative of x^n , e^x , a^x , $\log x$.
 - ii. Rules of derivatives: Scalar multiplication, sum, difference, product, quotient (Statements only), Simple problems. Second-order derivatives.

Applications: Marginal Cost, Marginal Revenue, Elasticity of Demand. Maxima and Minima for functions in Economics and Commerce.

Unit-II Interest and Annuity: (12 Lectures)

- a. **Interest:** Simple Interest, Compound Interest (Nominal & Effective Rate of Interest), Calculations involving up to 4 time periods.
- b. **Annuity:** Annuity Immediate and its Present value, Future Value, Equated Monthly Installments (EMI) using reducing balance method & amortization of loans, Stated Annual Rate & Affective Annual Rate Perpetuity and its present value, Simple problems involving up to 4 time periods.

Unit-III Linear Programming Problem (09 Lectures)

Sketching of graphs of (i) linear equation $Ax + By + C = 0$, (ii) linear inequalities, Mathematical Formulation of Linear Programming Problems up to 3 variables, Solution of Linear Programming Problems using graphical method up to two variables.

Unit-IV Measures of Central Tendency and Dispersion (12 Lectures)

Frequency distribution: Raw data, attributes and variables, Classification of data, frequency distribution, cumulative frequency distribution, Histogram and give curves. Requisites of ideal measures of central tendency, Arithmetic Mean, Median and Mode for ungrouped and grouped data. Combined mean, Merits and demerits of measures of central tendency, Geometric mean: definition, merits and demerits, Harmonic mean: definition, merits and demerits, Choice of A.M., G.M. and H.M. Concept of dispersion, Measures of dispersion: Range, Variance, Standard deviation (SD) for grouped and ungrouped data, combined SD, Measures of relative dispersion: Coefficient of range, coefficient of variation. Examples and problems.

Tutorials: 1Tutorial/batch/week. Batch size Max.30 students/batch.

SEM-I VSE
MAT103 Differential Equation and Applications

Unit 1: First Order and First-Degree Differential Equation (15 Lectures)

Formation of Differential Equations, Solution of Differential Equations: Variable Separable form (Reduce to variable separable form), homogeneous and nonhomogeneous, first-order exact differential equations, non-exact differential with Integrating factors, rules to find an integrating factor. First-order and first-degree linear differential Equation, reduced to linear differential equation (Bernoulli's Equation), First order higher degree equations solvable for x, y, p.

Unit 2: Applications of First order first-degree linear differential equation (15 Lectures)

Orthogonal Trajectory, Population growth, radioactive decay, Newton's law of cooling, Rectilinear Motion (velocity and acceleration), Electric circuits (Kirchhoff's law)(L-C and R-C in series), Fourier's Law of Heat Conduction, Simple Harmonic Motion(SHM).

Books Recommended

1. Shepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984.
2. Ordinary Differential Equations: Principles and Applications James Robinson, 1st Ed. Cambridge University Press.
4. Schaum's Outline of Differential Equations by by Richard Bronson, Gabriel Costa, 4th Ed. Schaum's Outlines.
5. Ordinary Differential Equations, Amit Kumar Biswas, Sayan Saha, 1st Ed. Techno World.

SEM-I SEC
MAT104 Introduction to Excel

Course Outcomes:

1. Students will have learned to open the Excel spreadsheet and be able to enter the data in worksheet.
2. They will be able to represent data in charts, diagrams, graphs, etc.
3. They can perform various mathematical calculations and can learn the use of Excel as a calculator.
4. They can perform various statistical calculations.

Unit 1: Introduction to MS-Excel (15 Lectures)

Ribbon tabs, Ribbon bar, Understanding the worksheet, (Rows and Columns, Sheets, Work-books), Format a worksheet, Format numbers in a worksheet, Active Cell, Columns, Rows, Fill Handle, Address Bar, Formula Bar, Title Bar, File Menu, Quick Access Toolbar, Ribbon Tab, Worksheet Tab, Status Bar. Using Help (F1), Key Board Shortcut, Print a worksheet, Using Print Preview & Other Utilities
Microsoft Excel Basic Functions: SUM, COUNT, AVERAGE, TIME, DATE, LEFT, RIGHT, VOOKUP, IF, NOW, etc.

Unit2 Visualization of Data: (15 Lectures)

Diagrammatic representation of statistical data Simple and subdivided bar diagrams, multiple bar diagrams, percentage bar diagrams, and pie diagrams. Presentation of Data, Graphical representation of statistical data: Histogram, frequency curve, and ogive curves. Determination of mode and median graphically. Statistical Computations (4) Computation of summary statistics, mean, mode, median, partition values, variance, standard deviation, absolute deviation, maximum, minimum.

References:

1. Michael Alexander and John Walkenbach (2013), Microsoft Excel Dashboards and Reports, 2nd Edition, Wiley.
2. Greg Harvey (2019). Microsoft Excel 2019 All-in-one for Dummies, Wiley.
3. John Walkenbach (2018), Excel 2016 Bible, Wiley.
4. Schmuller, Joseph (2020), Statistical Analysis with Excel, 4th Edition, Wiley.

SEMESTER -II

MAT151 Algebra and Calculus-II (4 Credits)

Unit I: System of Linear Equations and Matrices (15 Lectures)

Parametric equation of lines and planes, System of homogeneous and non-homogeneous linear equations, the solution of a system of m homogeneous linear equations in n unknowns by elimination and their geometrical interpretation, Matrices with real entries, addition, scalar multiplication and multiplication of matrices, Transpose of a matrix, Type of matrices, Invertible matrices, identities System of linear equations in matrix form, elementary row operations, row echelon matrix, reduced row echelon form, rank of a matrix, Gaussian elimination method, to deduce that the system of m "homogeneous linear equations in n unknowns has a non-trivial solution if $m < n$. Procedure to test the consistency of a system of linear equations using rank.

Unit I: Prime Numbers and Polynomials (15 Lectures)

Primes, Euclid's lemma, Fundamental theorem of arithmetic, the set of primes are infinite. Definition and elementary properties of congruence, Euler's phi function, Statements of Euler's theorem, Fermat's little theorem, Wilson theorem, and applications.

Roots of a polynomial, relation between roots and coefficients, multiplicity of a root, Remainder theorem, Factor theorem, a polynomial of degree n has at most n roots. Complex roots of a polynomial occur in conjugate pairs, Statement of Fundamental Theorem of Algebra.

Unit-III Limit and Continuous Functions (15 Lectures)

Limit of a function evaluation of limit of simple functions using $\epsilon - \delta$ definition, uniqueness of limit if it exists, Algebra of limits Limit of composite function, Sandwich theorem, Left hand, right-hand limits non-existence of limits, limit as $t \rightarrow \pm\infty$

Continuity of a real-valued function on a set, $\epsilon - \delta$ definition, examples, Continuity of a real-valued function at end points of a domain, Sequential continuity, Algebra of continuous functions, Discontinuous functions, examples of removable and essential discontinuity. Properties of Continuous Functions Intermediate value theorem and its applications, Bolzano-Weierstrass theorem.

Text Book

- 1) Ajit Kumar-S. Kumaresan, A Basic Course in Real Analysis, CRC Press, 2014
- 2) R.G. Bartle- D.R. Sherbert, Introduction to Real Analysis S. John Wiley & Sons, 1994.
- 3) David M. Burton, Elementary Number Theory, Seventh Edition, McGraw Hill Education (India) Private Ltd.
- 4) S Kumaresan, Linear Algebra, A Geometric approach, PHI Learning Private Limited, Delhi.

Reference Books:

- 1) Topics in Algebra, I N Herstein, Wiley Eastern Ltd., NewDelhi, 2006.
- 2) A Course In Calculus And Real Analysis, Ghorpade-Limaye, Springer, 2006.
- 3) Schaum's Outline Series, Frank Ayres and Elliott Mendelson, 5th ed. USA: Mc. Graw Hill.,2008.
- 4) Contemporary abstract algebra by Joseph Gallian, Narosa publication.
- 5) Linear Algebra by Kenneth Hoffman & Ray Kunze, Pearson Publication.
- 6) Set theory and logic by Robert R. Stoll, Freeman & Co.

Generic Elective (Open Elective)

MAT152 Business Mathematics

Unit-I Percentage, Ratios and Proportions – Percentages (15 Lectures)

Definition, Calculation of percentage, **Ratios**- Types of Ratios, Duplicate, Triplicate and Sub-Duplicate of ratio, **Proportions** - Definitions and properties- cross product property and Reciprocal property, United proportions – Continued proportions – Compound proportions, Examples on commercial mathematics.

Permutation and Combination (15 Lectures)

Factorial Notation, Fundamental principle of counting, Permutation as arrangement, combination as selection, Relation between n_{c_r} and n_{p_r} , Examples on commercial application of permutation and combination.

Unit II: Shares and Mutual Funds (15 Lectures)

- a. **Shares:** Concept of share, face value, market value, dividend, equity shares, preferential shares, bonus shares. Simple examples.
- b. **Mutual Funds:** Simple problems on the 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.)

Unit III: Bivariate Linear Correlation and Regression (15 Lectures)

- a. **Correlation Analysis:** Meaning, Types of Correlation, and Determination of Correlation: Scatter diagram, Karl Pearson's method of Correlation Coefficient (excluding Bivariate Frequency Distribution Table), and Spearman's Rank Correlation Coefficient.
- b. **Regression Analysis:** Meaning, Concept of Regression equations, Slope of the Regression Line and its interpretation. Regression Coefficients (excluding Bivariate Frequency Distribution Table), Relationship between Coefficient of Correlation and Regression Coefficients, Finding the equations of Regression lines by method of Least Squares.

Unit-IV: Probability Theory and Decision Theory (15 Lectures)

- a. **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, Independence of Events: $P(A \cap B) = P(A)P(B)$, Simple examples.
- b. **Decision Theory:** Decision-making situation, Decision maker, Courses of Action, States of Nature, Pay-off and Pay-off matrix; Decision making under uncertainty, Maximin, Maximax, Minimax regret and Laplace criteria; simple examples to find optimum decision. Formulation of Payoff Matrix. Decision making under Risk, Expected Monetary Value (EMV); Decision Tree; Simple Examples based on EMV. Expected Opportunity Loss (EOL), simple examples based on EOL.

Tutorials: 1 Tutorial/batch/week. Batch size Max.30 students/batch.

Reference Books:

1. Business Mathematics by D. C. Sancheti and V. K. Kapoor, Sultan Chand & Sons, 2006, Chapter 1, 5, 7, 9 &10.
2. Probability & Statistics by Murray Spiegel, John Schiller, R. Alu Srinivasan, Debasree Goswami, Schaum Series
3. Modern Business Statistics - (Revised)-B. Pearles & C. Sullivan –Prentice Hall of India.

4. Indian Mutual Funds Handbook: by Sundar Shankaran, Vision Books, 2006, sections 1.7, 1.8.1, 6.5 & Annexure 1.1 to 1.3.
5. Business Mathematics & Statistics: B Aggarwal, Ane Book Pvt. Limited.
6. Business Mathematics by D. C. Sancheti & V. K. Kapoor, Sultan Chand & Sons.
7. Business Mathematics by A. P. Verma, Asian Books Pvt.: Limited.
8. Modern Business Statistics by B. Pearles & C. Sullivan –Prentice Hall of India.
9. Business Mathematics & Statistics by B. Aggarwal, Ane Book Pvt. Limited

MAT152 Business Mathematics

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

CO1. Know and recall core knowledge of the syllabus. (To measure this outcome, questions may be of the type- define, identify, state, match, list, name etc.)

CO2. Understand basic concepts. (To measure this outcome, questions may be of the type- explain, describe, illustrate, evaluate, give examples, compute etc.)

CO3. Analyze the problem and apply the appropriate concept. (To measure this outcome, questions will be based on applications of core concepts)

CO4. Give reasoning and explain. (To measure this outcome, questions may be of the type multiple choice questions with justification, theoretical fill-in-the-blanks, theoretical problems, prove implications or corollaries of theorems, etc.)

CO5. Apply core concepts to new situations. (To measure this outcome, some questions will be based on self-study topics and also comprehension of unseen passages.)

(All Results have to be done with proof unless otherwise stated).

ICT Tools Used: Videos, PPT, Pen-Tablet _

Students Centric Methods: Problem Solving and Participative
(Experimental, Participative, Problem Solving)

Links: SWAYAM / MOOCS:

1. <https://nptel.ac.in/courses/110101131>
2. <https://nptel.ac.in/courses/110105035>
3. <https://archive.nptel.ac.in/courses/110/105/110105121/>
4. <https://archive.nptel.ac.in/courses/111/104/111104079/>

The CO-PO Mapping Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1	-	-	-	-	-	-	-	1
CO2	2	-	1	-	-	-	-	-	-	-	-	1
CO3	1	1	-	-	-	-	-	-	-	-	-	1
CO4	1	-	1	-	-	-	-	-	-	-	-	1
CO5	-	2	-	-	-	-	-	-	-	-	-	1

VSE

MAT153 Integration with Applications

Unit-I Integration (Definite and indefinite) (15 Lectures)

(Recall fundamental formulae of integration) Techniques in Integration: Integration by Substitution, Integration by Parts, Integration of Rational Fractions, Change of Limits with Change of Variable,

Reduction formulae ($\int \sin^n x dx$, $\int \cos^n x dx$, $\int \sin^m \cdot \cos^n x dx$ for m and n positive integers), Rectification of Curves.

Unit-II Applications of Integration (15 Lectures)

Single Integration: Line integral, Area bounded by the curve, Double integration: Definition, linearity, additive property, examples with constants limits, Double integrals extended over more general regions. Triple integrations, examples with constants limits, examples on change of limit, Applications to Area, Volume, Mean and Root Mean Square Values, Mass, Center of Gravity and Moment of Inertia.

Text Book

- 1) Integral Calculus, Shanti Narayan and P. K. Mittal, S. Chand and Co. Pvt.Ltd., 2015.
- 2) Higher engineering mathematics by Grewal B. S. 44th Ed, Khanna Publications

Reference Book:

- 1) Differential and Integral Calculus, by N. Piskunov, Peace Publishers, Moscow.
- 2) Integral Calculus, Gorakh Prasad, Rashi Kansal (Pothishala).
- 3) Calculus by Frank Ayres and Elliott Mendelson, 5th ed. Schaum's Outline Series, USA: Mcgraw Hill.,2008.

SEC

MAT154 Advanced Excel

(Revision: Data entering, Sorting data in Excel, creating an Excel chart, Basic Functions sum, multiplication, division, average, percentage, MAX, MIN, Combine the Arithmetic Operators)

Unit-I (15 Lectures) Advanced Formulas in Excel: The IF Function, CountIF, Using logical functions (AND, OR, NOT), Power Functions (CountIf, CountIFS, SumIF, SumIFS), Date and time functions, Using lookup and reference functions (VLOOKUP, HLOOKUP, MATCH, INDEX),

Sorting and Data Filtering: Sorting tables, using multiple-level sorting, using custom sorting, Filtering data for selected view (AutoFilter), Using advanced filter options, and advanced filter functions (FILTER, SORT, UNIQUE).

Unit-II (15 Lectures) Pivot Table and Statistical Measures

Pivot Table, building a Pivot Table Report, Data Tools: Remove duplicates, text to column, what if Analysis: Scenario Manager, Goal Seek.

Statistical measures – Mean, Variance, Percentiles, Quartiles - Pearson correlation – Spearman's Rank correlation – Parametric tests – test for single population mean, equality of mean for two independent sample, paired t test, testing correlation coefficient, Non parametric tests – Mann Whitney U test, Wilcoxon signed rank test – Kruskal Wallis test – One way ANOVA – Simple and Multiple Linear regression.

References:

1. Michael Alexander and John Walkenbach (2013), Microsoft Excel Dashboards and Reports, 2nd Edition, Wiley.
2. Greg Harvey (2019). Microsoft Excel 2019 All-in-one for Dummies, Wiley.
3. John Walkenbach (2018), Excel 2016 Bible, Wiley.
4. Schmuller, Joseph (2020), Statistical Analysis with Excel, 4th Edition, Wiley.
5. Microsoft Excel 2016 Step by Step by Curtis Frye.

MAT154 Advanced Excel

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

CO1. Know and recall core knowledge of the syllabus. (To measure this outcome, questions may be of the type- define, identify, state, match, list, name, etc.)

CO2. Understand basic concepts. (To measure this outcome, questions may be of the type- explain,

describe, illustrate, evaluate, give examples, compute, etc.)
CO3. Analyze the problem and apply the appropriate concept. (To measure this outcome, questions will be based on applications of core concepts)
CO4. Give reasoning and explain. (To measure this outcome, questions may be of the type multiple choice questions with justification, theoretical fill-in-the-blanks, theoretical problems, prove implications or corollaries of theorems, etc.)
CO5. Apply core concepts to new situations. (To measure this outcome, some questions will be based on self-study topics and also comprehension of unseen passages.)
 (All Results have to be done with proof unless otherwise stated).

ICT Tools Used: Videos, PPT, Pen-Tablet

Students Centric Methods: Problem Solving and Participative
 (Experimental, Participative, Problem Solving)

Links: SWAYAM / MOOCS:

5. <https://onlinecourses.swayam2.ac.in/>

The CO-PO Mapping Matrix

CO\PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	2	-	2	1	-	-	-	-	-	-	-	1
CO2	2	-	1	-	-	-	-	-	-	-	-	1
CO3	-	1	1	-	-	-	-	-	-	-	-	1
CO4	1	-	1	-	-	-	-	-	-	-	-	1
CO5	-	2	-	-	-	-	-	-	-	-	-	1

■ Question Paper Pattern (100 Marks)

- Internal (40%)+External(60%)
- Internal (40%): Continuous Internal Evaluation by conducting Class Tests, assignments, seminars, Poster presentation

■ External (60% Marks): Semester End Examination (For 4 Credit course)

Que	Options	Unit	Marks
Question No 1	Any 3 out of 6	Unit-I	15
Question No 2	Any 3 out of 6	Unit-II	15
Question No 3	Any 3 out of 6	Unit-III	15
Question No 4	Objective	On all units	15

External (30 Marks): Semester End Examination (For 2 Credit course)

Que	Options	Unit	Marks
Question No 1	Any 3 out of 6	Unit-I	10

Question No 2	Any 3 out of 6	Unit-II	10
Question No 3	Objective	On all units	10

Practical Examination (25Marks): Semester End Examination

Que	Options	Unit	Marks
Question No 1	Objective	All Units	25