



**VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY**

**JNANASAGARA CAMPUS, BALLARI-583105**

**Department of Studies in**

**Mathematics**

**II Semester Syllabus**

**Bachelor of Science**

**With effect from 2021-22 and onwards**

**Name of the Department: Mathematics**

**Semester-II**

**DSC2: Algebra and Calculus**

<b>Course Title: Algebra and Calculus</b>	<b>Course code: 21BSC2C2ACL</b>
<b>Total Contact Hours: 56 Hours</b>	<b>Course Credits: 4</b>
<b>Internal Assessment Marks: 40</b>	<b>Duration of SEE: 03 Hours</b>
<b>Semester End Examination Marks: 60</b>	

Course Outcomes (CO's): This course will enable the students to

**At the end of the course, students will be able to:**

1. Recognize the mathematical objects called Groups.
2. Link the fundamental concepts of groups and symmetries of geometrical objects.
3. Explain the significance of the notions of Cosets, normal subgroups and factor groups.
4. Understand the concept of differentiation and fundamental theorems in differentiation and various rules.
5. Find the extreme values of functions of two variables.

**DSC2: Algebra and Calculus**

<b>Unit</b>	<b>Description</b>	<b>Hours</b>
1	<b>Real Number System:</b> Recapitulation of number system. Countable and uncountable sets-standard theorems. Real line, bounded sets, supremum and infimum of a set, completeness properties of $\mathbf{R}$ , Archimidean property of $\mathbf{R}$ . Intervals, neighbourhood of a point, open sets, closed sets, limit points and Bolzano-Weierstrass theorem (Without proof)..	12
2	<b>Groups:</b> Definition of a group with examples and properties, congruence, problems. Subgroups, center of groups, order of an element of a group and its related theorems, cyclic groups, Coset decomposition, Factor groups, Lagrange's theorem and its consequences. Fermat's theorem and Euler's Phi-function.	12
3	<b>Partial Derivatives:</b> Functions of two or more variables-explicit and implicit functions, partial derivatives. Homogeneous functions- Euler's theorem, total derivatives, differentiation of implicit and composite functions, Jacobians and standard properties and illustrative examples. Taylor's and Maclaurin's series for functions of two variables, Maxima-Minima of functions of two variables.	12
4	<b>Integral Calculus:</b> Recapitulation of definite integrals and its properties. <i>Line integral:</i> Definition of line integral and basic properties, examples on evaluation of line integrals.	08

5	<b>Double integral:</b> Definition of Double integrals and its conversion to iterated integrals. Evaluation of double integrals by changing the order of integration and change of variables. Computation of plane surface areas, volume underneath a surface of revolution using double integral. Triple integral: Definition of triple integrals and evaluation-change of variables, volume as triple integral. Differentiation under the integral sign by Leibnitzrule.	12
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**References:**

1. Topics in Algebra, I N Herstein, Wiley Eastern Ltd., New Delhi.
2. Higher algebra, Bernard & Child, Arihant, ISBN: 9350943199/ 9789350943199.
3. Modern Algebra, Sharma and Vasista, Krishna Prakashan Mandir, Meerut, U.P.
4. Differential Calculus, Shanti Narayan, S. Chand & Company, New Delhi.
5. Integral Calculus, Shanti Narayan and P K Mittal, S. Chand and Co. Pvt. Ltd.,
6. Schaum's Outline Series, Frank Ayres and Elliott Mendelson, 5th ed. USA: Mc. Graw Hill., 2008.
7. Mathematical Analysis, S C Malik, Wiley Eastern.
8. A Course in Abstract Algebra, Vijay K Khanna and S K Bhambri, Vikas Publications.
9. Text Book of B.Sc. Mathematics, G K Ranganath, S Chand & Company.

## DSC: Lab

<b>Course Title: PRACTICALS BASED ON Algebra and Calculus – II</b>	<b>Course code: 21BSC2C2ACP</b>
<b>Total Contact Hours: 56 Hours</b>	<b>Course Credits: 4</b>
<b>Internal Assessment Marks: 25</b>	<b>Duration of SEE: 03 Hours</b>
<b>Semester End Examination Marks: 25</b>	

**Course Outcomes (CO's):** This course will enable the students to

At the end of the course, students will be able to:

1. Learn *Free and Open Source Software (FOSS)* tools for computer programming
2. Solve problem on algebra and calculus theory studied in MATDSCT 1.1 by using FOSS software's.
3. Acquire knowledge of applications of algebra and calculus through FOSS

Practical/Lab Work to be performed in Computer Lab (FOSS)

**Suggested Software's:** Maxima/Scilab/Maple/MatLab/Mathematica/Python/R.

Introduction to the software and commands related to the topic.

1. Computation of addition and subtraction of matrices,
2. Computation of Multiplication of matrices.
3. Computation of Trace and Transpose of Matrix
4. Computation of Rank of matrix and Row reduced Echelon form.
5. Computation of Inverse of a Matrix using Cayley-Hamilton theorem.
6. Solving the system of homogeneous and non-homogeneous linear algebraic equations.
7. Finding the nth Derivative of  $e^{ax}$ , trigonometric and hyperbolic functions
8. Finding the nth Derivative of algebraic and logarithmic functions.
9. Finding the nth Derivative of  $e^{ax} \sin(bx + c)$ ,  $e^{ax} \cos(bx + c)$
10. Finding the Taylor's and Maclaurin's expansions of the given functions.
11. Finding the angle between the radius vector and tangent.
12. Finding the curvatures of the given curves.
13. Tracing of standard curves

## OEC2: Business Mathematics-II

<b>Course Title: Business Mathematics-II</b>	<b>Course code: 21BSC2O2MA2</b>
<b>Total Contact Hours: 42 Hours</b>	<b>Course Credits: 3</b>
<b>Internal Assessment Marks: 40</b>	<b>Duration of SEE:03 Hours</b>
<b>Semester End Examination Marks: 60</b>	

Course Outcomes (COs): This course will enable the students to

At the end of the course, students will be able to:

1. Integrate concept in international business concept with functioning of global trade.
2. Evaluate the legal, social and economic environment of business.
3. Apply decision-support tools to business decision making.
4. Will be able to apply knowledge of business concepts and functions in an integrated manner.

## OEC2: Business Mathematics-II

Unit	Description	Hours
1	<b>Commercial Arithmetic:</b> Interest: Concept of Present value and Future value, Simple interest, Compound interest, Nominal and Effective rate of interest, Examples and Problems Annuity: Ordinary Annuity, Sinking Fund, Annuity due, Present Value and Future Value of Annuity, Equated Monthly Installments (EMI) by Interest of Reducing Balance and Flat Interest methods, Examples and Problems	10
2	<b>Measures of central Tendency:</b> 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.,	08
3	<b>Measures of dispersion: Concept 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</b>	08
4	<b>Correlation:</b> Concept and types of correlation, Scatter diagram, Interpretation with respect to magnitude and direction of relationship. Karl Pearson's coefficient of correlation for ungrouped data. Spearman's rank correlation coefficient. (with tie and without tie)	08

5	<b>Regression: Concept of regression, Lines of regression for ungrouped data, predictions using lines of regression. Regression coefficients and their properties (without proof). Examples and problems.</b>	08
<p><b>References</b></p> <ol style="list-style-type: none"> <li>1. Practical Business Mathematics, S. A. Bari New Literature Publishing Company New Delhi</li> <li>2. Mathematics for Commerce, K. Selvakumar Notion Press Chennai</li> <li>3. Business Mathematics with Applications, Dinesh Khattar &amp; S. R. Arora S. Chand Publishing New Delhi</li> <li>4. Business Mathematics and Statistics, N.G. Das &amp; Dr. J.K. Das McGraw Hill New Delhi</li> <li>5. Fundamentals of Business Mathematics, M. K. Bhowal, Asian Books Pvt. Ltd New Delhi</li> <li>6. Mathematics for Economics and Finance: Methods and Modelling, Martin Anthony and Norman, Biggs Cambridge University Press Cambridge</li> <li>7. Financial Mathematics and its Applications, Ahmad Nazri Wahidudin Ventus Publishing APS Denmark</li> <li>8. Fundamentals of Mathematical Statistics, Gupta S. C. and Kapoor V. K., Sultan Chand and Sons, New Delhi.</li> <li>9. Statistical Methods, Gupta S. P.: Sultan Chand and Sons, New Delhi.</li> <li>10. Applied Statistics, Mukhopadhyaya Parimal New Central Book Agency Pvt. Ltd. Calcutta.</li> <li>11. Fundamentals of Statistics, Goon A. M., Gupta, M. K. and Dasgupta, B. World Press Calcutta.</li> <li>12. Fundamentals of Applied Statistics, Gupta S. C. and Kapoor V. K., Sultan Chand and Sons, New Delhi.</li> </ol>		

**CBCS Question Paper Pattern for UG Semester End**  
**Examination with effect from the AY 2021-22**  
**Languages /Discipline Core Courses (DSC) & Open Elective**  
**Courses (OEC)**

**Paper Code:**

**Paper Title:**

**Time: 3 Hours**

**Max. Marks: 60**

**Instruction:** Answer all Sections

**SECTION-A**

1. Answer the following sub-questions, each sub-question carries **ONE** mark. (10X1=10)

a).

b).

c).

.

.

j).

**Note for Section-A:** Two sub-questions from each unit.

**SECTION-B**

Answer any **FOUR** of the following questions, each question carries **FIVE** marks. (4X5=20)

2.

3.

4.

5.

6.

7.

**Note for Section-B:** Minimum One question from each unit (Q No 2 to 6) and remaining one question from unit II to V (Q.No. 7)

**SECTION-C**

Answer any **THREE** of the following questions, each question carries **TEN** marks. (3X10=30)

- 8.
- 9.
- 10.
- 11.
- 12.

**Note for Section- C:** One question from each unit. Sub-questions such as ‘a’ and ‘b’ may be given for a question in section-C only.

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**SEC & AECC Subjects**

**Paper Code:**

**Paper Title:**

**Time: 1 Hours**

**Max. Marks: 30**

There shall be Theory examinations of **Multiple Choice Based Questions [MCQs]**with Question Paper of **A, B, C and D Series** at the end of each semester for **AECCs (Environmental Studies and (ii) Constitution of India)** and **SECs (SEC-1: Digital Fluency, SEC-2: Artificial Intelligence, SEC-3: Cyber Security and SEC-4: Societal Communication)** for the duration of **One hour (First Fifteen Minutes for the Readiness of OMR and remaining Forty-Five Minutes for Answering thirty Questions)**. The Answer Paper is of **OMR (Optical Mark Reader) Sheet**.

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**Note:**

**Add the Scheme of Evaluation of UG ----- practicals.**

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