



KARNATAK UNIVERSITY, DHARWAD
ACADEMIC (S&T) SECTION
ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಧಾರವಾಡ
ವಿದ್ಯಾಮಂಡಳ (ಎಸ್&ಟಿ) ವಿಭಾಗ



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NAAC Accredited
'A' Grade 2014

website: kud.ac.in

No.KU/Aca(S&T)/RPH-394A/2021-22/1155

Date: 29 OCT 2021

ಅಧಿಸೂಚನೆ

ವಿಷಯ: 2021-22ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಎಲ್ಲ ಸ್ನಾತಕ ಕೋರ್ಸುಗಳಿಗೆ 1 ಮತ್ತು 2ನೇ ಸೆಮಿಸ್ಟರ್
NEP-2020 ಮಾದರಿಯ ಪಠ್ಯಕ್ರಮವನ್ನು ಅಳವಡಿಸಿರುವ ಕುರಿತು.

- ಉಲ್ಲೇಖ: 1. ಸರ್ಕಾರದ ಅಧೀನ ಕಾರ್ಯದರ್ಶಿಗಳು(ವಿಶ್ವವಿದ್ಯಾಲಯ 1) ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆ ಇವರ ಆದೇಶ
ಸಂಖ್ಯೆ: ಇಡಿ 260 ಯುಎನ್ಇ 2019(ಭಾಗ-1), ದಿ:7.8.2021.
2. ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ನಿರ್ಣಯ ದಿನಾಂಕ: 19.08.2021
3. ಈ ಕಚೇರಿ ಸುತ್ತೋಲೆ ಸಂ.No. KU/Aca(S&T)/RPH-394A/2021-22/18 ದಿ:21.08.2021.
4. ಸರ್ಕಾರಿ ಆದೇಶ ಸಂ ಇಡಿ 260 ಯುಎನ್ಇ 2019(ಭಾಗ-1),ಬೆಂಗಳೂರು ದಿ. 15.9.2021.
5. ಎಲ್ಲ ಅಭ್ಯಾಸಸೂಚಿ ಮಂಡಳಿ ಸಭೆಗಳ ನಡವಳಿಗಳು
6. ಎಲ್ಲ ನಿಖಾಯಗಳ ಸಭೆಗಳು ಜರುಗಿದ ದಿನಾಂಕ: 24,25-09-2021.
7. ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ನಿರ್ಣಯ ಸಂಖ್ಯೆ: 01 ದಿನಾಂಕ: 28.9.2021.
8. ಈ ಕಚೇರಿ ಸುತ್ತೋಲೆ ಸಂ.No. KU/Aca(S&T)/RPH-394A/2021-22/954 ದಿ:30.09.2021.
9. ಎಲ್ಲ ನಿಖಾಯದ ಡೀನರು / ಸಂಪನ್ಮೂಲ ತಜ್ಞರ ಸಭೆ ದಿನಾಂಕ 21.10.2021.
10. ಎಲ್ಲ ಸ್ನಾತಕ ಅಭ್ಯಾಸಸೂಚಿ ಮಂಡಳಿ ಅಧ್ಯಕ್ಷರುಗಳ ಸಭೆ ದಿನಾಂಕ 22.10.2021.
11. ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ನಿರ್ಣಯ ಸಂಖ್ಯೆ: 01 ದಿನಾಂಕ: 27.10.2021.
12. ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶ ದಿನಾಂಕ: 29-10-2021

ಮೇಲ್ಕಾಣಿಸಿದ ವಿಷಯ ಹಾಗೂ ಉಲ್ಲೇಖಗಳನ್ವಯ ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶದ ಮೇರೆಗೆ, 2021-22ನೇ
ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಅನ್ವಯವಾಗುವಂತೆ, ಎಲ್ಲ B.A./ BPA (Music)/BVA/ BTM/ BSW/ B.Sc./B.Sc. Pulp & Paper
Science/ B.Sc. (H.M)/ BCA/ B.A.S.L.P./ B.Com/ B.Com (CS)/ & BBA ಸ್ನಾತಕ ಕೋರ್ಸುಗಳ 1 ಮತ್ತು 2ನೇ
ಸೆಮಿಸ್ಟರ್‌ಗಳಿಗೆ NEP-2020 ರಂತೆ ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ಅನುಮೋದಿತ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಈಗಾಗಲೇ
ಪ್ರಕಟಪಡಿಸಿದ್ದು, ಮುಂದೆ ದಿನಾಂಕ 04.10.2021 ವರೆಗೆ ಸರಕಾರವು ಕಾಲಕಾಲಕ್ಕೆ ನೀಡಿದ ನಿರ್ದೇಶನಗಳನ್ನು ಅಳವಡಿಸಿಕೊಂಡು
ದಿನಾಂಕ 27.10.2021 ರಂದು ಜರುಗಿದ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯಲ್ಲಿ ಅನುಮೋದನೆ ಪಡೆದು ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲ
www.kud.ac.in ದಲ್ಲಿ ಭಿತ್ತರಿಸಲಾಗಿದೆ. ಸದರ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲದಿಂದ ಡೌನ್‌ಲೋಡ್ ಮಾಡಿಕೊಳ್ಳಲು
ಸೂಚಿಸುತ್ತ ವಿದ್ಯಾರ್ಥಿಗಳ ಹಾಗೂ ಸಂಬಂಧಿಸಿದ ಎಲ್ಲ ಬೋಧಕರ ಗಮನಕ್ಕೆ ತಂದು ಅದರಂತೆ ಕಾರ್ಯಪ್ರವೃತ್ತರಾಗಲು ಕ.ವಿ.ವಿ
ಅಧೀನದ/ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ ಸೂಚಿಸಲಾಗಿದೆ.

ಆಡಕ: ಮೇಲಿನಂತೆ
ಗೆ,

ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವ್ಯಾಪ್ತಿಯಲ್ಲಿ ಬರುವ ಎಲ್ಲ ಅಧೀನ ಹಾಗೂ ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ
ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ. (ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲ ಹಾಗೂ ಮಿಂಚಂಚೆ ಮೂಲಕ ಬಿತ್ತರಿಸಲಾಗುವುದು)

ಪ್ರತಿ:

1. ಕುಲಪತಿಗಳ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
2. ಕುಲಸಚಿವರ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
3. ಕುಲಸಚಿವರು (ಮೌಲ್ಯಮಾಪನ) ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
4. ಅಧೀಕ್ಷಕರು, ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ / ಗೌಪ್ಯ / ಜಿ.ಎ.ಡಿ. / ವಿದ್ಯಾಮಂಡಳ (ಪಿ.ಜಿ.ಪಿ.ಎಚ್.ಡಿ) ವಿಭಾಗ, ಸಂಬಂಧಿಸಿದ
ಕೋರ್ಸುಗಳ ವಿಭಾಗಗಳು ಪರೀಕ್ಷಾ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
5. ನಿರ್ದೇಶಕರು, ಕಾಲೇಜು ಅಭಿವೃದ್ಧಿ / ವಿದ್ಯಾರ್ಥಿ ಕಲ್ಯಾಣ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.

Haniff 29/10/21
ಕುಲಸಚಿವರು.



KARNATAK UNIVERSITY, DHARWAD

04 - Year B.Sc. (Hons.) Program

SYLLABUS

Subject: Mathematics

[Effective from 2021-22]

**DISCIPLINE SPECIFIC CORE COURSE (DSCC) FOR SEM I & II,
OPEN ELECTIVE COURSE (OEC) FOR SEM I & II and
SKILL ENHANCEMENT COURSE (SEC) FOR SEM I**

AS PER NEP - 2020

Karnatak University, Dharwad
Four Years Under Graduate Program in Mathematics for B.Sc. (Hons.)
Effective from 2021-22

Sem	Type of Course	Theory/ Practical	Instruction hour per week	Total hours of Syllabus / Sem	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks	Credits
I	DSCC 1	Theory	04 hrs	56	02 hrs	40	60	100	04
		Practical	04 hrs	52	03 hrs	25	25	50	02
	OEC-1	Theory	03 hrs	42	02 hrs	40	60	100	03
	*SEC-1	Practical	03 hrs	30	02 hrs	25	25	50	02
II	DSCC2	Theory	04 hrs	56	02 hrs	40	60	100	04
		Practical	04 hrs	52	03 hrs	25	25	50	02
	OEC-2	Theory	03 hrs	42	02 hrs	40	60	100	03
Details of the other Semesters will be given later									

* Student can opt digital fluency as SEC or the SEC of his/ her any one DSCC selected

Name of Course (Subject): Mathematics

Programme Specific Outcome (PSO):

On completion of the 03/ 04 years Degree in Mathematics students will be able to:

- PSO 1 : Culminate in-depth knowledge of Algebra, Calculus, Geometry, differential equations and several other branches of mathematics and also in other allied subjects.**
- PSO 2 : To communicate various mathematical concepts effectively using examples and their geometrical visualization which can be used for modeling and solving of real life problems.**
- PSO 3 : Acquire ability of critical thinking and logical reasoning and capability of recognizing and distinguishing the various aspects of real life problems.**
- PSO 4 : Develop an ability to analyze the problems, identify and define appropriate computing requirements for its solutions.**
- PSO 5 : Develop the capability of inquiring about appropriate questions relating to the Mathematical concepts in different areas of Mathematics.**
- PSO 6 : Use appropriate softwares to solve system of algebraic equation and differential equations.**
- PSO 7 : Develop an ability of working independently and to make an in-depth study of various notions of Mathematics.**
- PSO 8 : Develop an ability to identify unethical behavior such as fabrication, falsification or misinterpretation of data and adopting objectives, unbiased and truthful actions in all aspects of life in general and Mathematical studies in particular.**
- PSO 9 : Think independently and develop algorithms and computational skills for solving real word problems.**
- PSO 10 : Peruse advanced studies and research in Mathematical sciences.**

B.Sc. Semester – I

Subject: Mathematics Discipline Specific Course (DSC)

The course Mathematics in I semester has two papers (Theory Paper –I for 04 credits & Practical Paper -II for 2 credits) for 06 credits: Both the papers are compulsory. Details of the courses are as under.

Course No.-1 (Theory)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
Course-01	DSCC	Theory	04	04	56 hrs	2 hrs	40	60	100

Course No.1 (Theory): Title of the Course (Theory): **Algebra - I and Calculus - I**

Course Outcome (CO):

After completion of course (Theory), students will be able to:

- CO 1:** Learn to solve the system of homogeneous and non homogeneous linear equations in m variables by using concept of rank of matrix, finding eigenvalues and eigenvectors.
- CO 2:** Sketch curves in Cartesian, polar and pedal equations.
- CO 3:** Learn geometrical representation and problem solving on MVT and Rolls theorems.
- CO 4:** Get familiar with the techniques of integration and differentiation of function with real variables.
- CO 5:** Identify and apply the intermediate value theorems and L'Hospital rule and Trace the curves.

Syllabus- Course 1(Theory): Title- Algebra - I and Calculus - I	Total Hrs: 56
Unit-I	14 hrs
Matrices: Elementary row and column transformations, Row reduction to Echelon form. Rank of a matrix; Reduction to normal form; Solution of system of linear equations by Gauss Elimination and Gauss-Jordan methods. Condition for existence of non-trivial solutions of homogeneous system of linear equations. Solution of non-homogeneous system of linear equations. Eigenvalues and Eigenvectors of square matrices, real symmetric matrices and their properties, reduction of such matrices to diagonal form, Cayley-Hamilton theorem (without proof), inverse of matrices by Cayley-Hamilton theorem.	
Unit-II	14 hrs
Differentiation in polar Co-ordinates: Polar coordinates, angle between the radius vector and tangent. Angle of intersection of curves (polar forms), Length of perpendicular from pole to the tangent, pedal equations. Derivative of an arc length in Cartesian, parametric and polar forms, curvature of plane curve-radius of curvature formula in Cartesian, parametric and polar and pedal forms. - center of curvature, Asymptotes, Evolutes and envelops of plane curves.	

Unit-III	14 hrs
Differential Calculus: Limits and Continuity, ε - δ from definition only. Differentiability: Definition and Problems, Properties of continuous functions, Intermediate value theorem, Rolles Theorem, Lagranges Mean Value Theorem, Cauchy's Mean Value Theorem. Taylor's theorem (without proof), Taylor's series, Maclaurin's expansions, Indeterminate forms: Evaluation of Limits using L-Hospital rule.	
Unit-IV	14 hrs
Successive Differentiation: nth Derivatives of Standard functions e^{ax+b} , $(ax + b)^n$, $\log(ax + b)$, $\sin(ax + b)$, $\cos(ax + b)$, $e^{ax}\sin(bx + c)$, $e^{ax}\cos(bx + c)$, Leibnitz theorem and its applications. Tracing of Curves (standard curves).	

Books recommended.

1. University Algebra - N.S. Gopala Krishnan, New Age International (P) Limited
2. Theory of Matrices - B S Vatsa, New Age International Publishers.
3. Matrices - A R Vasista, Krishna Prakashana Mandir.
4. Elements of Real Analysis - Shanti Narayan, S. Chand & Company, New Delhi.
5. Differential Calculus - Shanti Narayan, S. Chand & Company, New Delhi.
6. Calculus – Lipman Bers, Holt, Rinehart & Winston.
7. Calculus - S Narayanan & T. K. Manicavachogam Pillay, S. Viswanathan Pvt. Ltd., vol. I & II.
8. Schaum's Outline of Calculus - Frank Ayres and Elliott Mendelson, 5th ed. USA: Mc. Graw.

B.Sc. Semester – I

Subject: Mathematics
Discipline Specific Course (DSC)

Course No.-1 (Practical)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
Course-01	DSCC	Practical	02	04	52 hrs	3 hrs	25	25	50

Course No.1 (Practical): Title of the Course (Practical): **Practicals on Algebra - I and Calculus – I**

Course Outcome (CO):

After completion of course (Practical), students will be able to:

CO 1: Learn Free and Open Source Software (FOSS) tools for computer programming

CO 2: Solve problem on algebra and calculus using FOSS softwares.

CO 3: Acquire knowledge of applications of algebra and calculus through FOSS.

List of the Experiments for 52 hrs / Semesters

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 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.

General instructions: Suggested Softwares: Maxima/Scilab/Maple/MatLab/Mathematica/Python/R.

Scheme of Practical Examination (distribution of marks): 25 marks for Semester end examination

- 1. Programme writing and problem solving: 10 Marks**
- 2. Programme Execution: 5 Marks**
- 3. Viva: 5 Marks**
- 4. Journal: 5 Marks**

Total 25 marks

Note: Same Scheme may be used for IA (Formative Assessment) examination

Books recommended.

1. Scilab by example: M. Affouf 2012, ISBN: 978-1479203444
2. Scilab (A free software to Matlab): H. Ramchandran, A.S.Nair.2011S.Chand and Company
3. Scilab for very beginners. - www.scilab-enterprises.com
4. University Algebra - N.S. Gopala Krishnan, New Age International (P) Limited
5. Theory of Matrices - B S Vatsa, New Age International Publishers.
6. Matrices - A R Vasista, Krishna Prakashana Mandir.
7. Elements of Real Analysis - Shanti Narayan, S. Chand & Company, New Delhi.
8. Differential Calculus - Shanti Narayan, S. Chand & Company, New Delhi.
9. Calculus – Lipman Bers, Holt, Rinehart & Winston.
10. Calculus - S Narayanan & T. K. Manicavachogam Pillay, S. Viswanathan Pvt. Ltd., vol. I & II.
11. Schaum's Outline of Calculus - Frank Ayres and Elliott Mendelson, 5th ed. USA: Mc. Graw.

B.Sc. Semester – I

Subject: Mathematics Open Elective Course (OEC-1) (OEC for other students)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-1	OEC	Theory	03	03	42 hrs	2 hrs	40	60	100

OEC-1: Title of the Course: **Business Mathematics-I**

Course Outcome (CO):

After completion of course, students will be able to:

- CO 1:** Apply sets, relations, functions in business.
- CO 2:** Use permutations and combinations.
- CO 3:** Use matrices in commercial field.
- CO 4:** Apply trigonometric function in real world.

Syllabus- OEC: Title- Business Mathematics-I	Total Hrs: 42
Unit-I	14 hrs
Algebra: Sets, relations, functions, indices, logarithms, permutations and combinations, Examples on commercial mathematics	
Unit-II	14 hrs
Matrices: Definition of a matrix; types of matrices; Algebra of matrices, Determinants, Properties of determinants; calculations of values of determinants up to third order. Adjoint of a matrix, elementary row and column operations; solution of a system of linear equations involving not more than three variables. Examples on commercial mathematics	
Unit-III	14 hrs
Trigonometric Functions: Recapitulation of basic Definitions of trigonometric functions. Signs of trigonometric functions and sketch of their graphs. Trigonometric functions of sum and difference of two angles. Trigonometric ratios of multiple angles (Simple problems).	

Books recommended.

1. Allel R.G.A: Basic Mathematics: Macmilan, New Delhi.
2. Dowling, E.T. Mathematics for Economics: Schaum Series, McGraw Hill, London.
3. Soni R.S.: Business Mathematics: Pitamber Publishing House, Delhi
4. N. Rudraiah and Others: College Mathematics for B.Sc Series I and II SBS Publication Co. Bangalore.

B.Sc. Semester - I

Subject: Mathematics
SKILL ENHANCEMENT COURSE (SEC)-I

Title of Paper: Scilab

Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Mode of Examination	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
SEC-I	Theory + Practical	02	03 hrs	30	Practical	2 hrs	25	25	50

Course Outcome (CO):

After completion of Skill Enhancement course, students will be able to:

- CO 1:** Understand the Scilab and apply commands in Scilab
- CO 2:** Use looping in Scilab
- CO 3:** Build Scilab functions
- CO 4:** Plot graphs
- CO 5:** Develop skills to write programme in Scilab

Syllabus- SEC: Title- Scilab	Total Hrs: 30
Unit-I	15 hrs
Introduction to Scilab, The general environment, The editor, Command Window, graphics window, window management and workspace customization, Variables assignments, display array in terms of matrices and vectors, Displaying output data, data file, Scilab functions.	
Unit-II	15 hrs
Relational and logical operators, Branching Statements and program design, Loops, the while loop, for loop, Tests, 2D and 3D plotting, developing the skills of writing a program Solving differential equations	

Scheme of Practical Examination (distribution of marks): 25 marks for Semester end examination

1. Programme writing and problem solving: 10 Marks
2. Programme Execution: 5 Marks
3. Viva: 5 Marks
4. Journal: 5 Marks

Total 25 marks

Note: Same Scheme may be used for IA(Formative Assessment) examination

Books recommended.

1. Scilab by example: M. Affouf 2012, ISBN: 978-1479203444
2. Scilab (A free software to Matlab): H. Ramchandran, A.S.Nair.2011S.Chand and Company
3. Scilab for very beginners. - www.scilab-enterprises.com

Details of Formative assessment (IA) for DSCC theory/OEC: 40% weightage for total marks

Type of Assessment	Weightage	Duration	Commencement
Written test-1	10%	1 hr	8 th Week
Written test-2	10%	1 hr	12 th Week
Seminar	10%	10 minutes	--
Case study / Assignment / Field work / Project work/ Activity	10%	-----	--
Total	40% of the maximum marks allotted for the paper		

**Faculty of Science
04 - Year UG Honors programme:2021-22**

**GENERAL PATTERN OF THEORY QUESTION PAPER FOR DSCC/ OEC
(60 marks for semester end Examination with 2 hrs duration)**

Part-A

1. Question number 1-06 carries 2 marks each. Answer any 05 questions : 10marks

Part-B

2. Question number 07- 11 carries 05Marks each. Answer any 04 questions : 20 marks

Part-C

3. Question number 12-15 carries 10 Marks each. Answer any 03 questions : 30 marks

(Minimum 1 question from each unit and 10 marks question may have sub questions for 7+3 or 6+4 or 5+5 if necessary)

Total: 60 Marks

Note: Proportionate weightage shall be given to each unit based on number of hours prescribed.



B.Sc. Semester – II

Subject: Mathematics
Discipline Specific Course (DSC)

The course Mathematics in II semester has two papers (Theory Paper –I for 04 credits & Practical paper-II for 2 credits) for 06 credits: Both the papers are compulsory. Details of the courses are as under.

Course No.-2 (Theory)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
Course-02	DSCC	Theory	04	04	56 hrs	2 hrs	40	60	100

Course No.2 (Theory): Title of the Course (Theory): **Algebra - II and Calculus - II**

Course Outcome (CO):

After completion of course (Theory), students will be able to:

- CO 1:** Recognize the countable set and groups.
- CO 2:** Link the fundamental concepts of groups and symmetries of geometrical objects.
- CO 3:** Explain the significance of the notions of Cosets, normal subgroups and factor groups.
- CO 4:** Finding the extreme values of functions.
- CO 5:** Evaluate multiple integration.

Syllabus- Course 2 (Theory): Title- Algebra - II and Calculus - II	Total Hrs: 56
Unit-I	14 hrs
Real Number System: Countable and uncountable sets-standard theorems. Real line, Bounded sets, supremum and infimum of a set, completeness properties of \mathbb{R} , Archimedean property of \mathbb{R} . Intervals, neighbourhood of a point, open sets, closed sets, limit points and Bolzano-Weierstrass theorem (without proof).	
Unit-II	14 hrs
Groups: Definition of a group with examples and properties, congruence, problems. Subgroups, center of groups, definition of 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 ϕ function.	
Unit-III	14 hrs
Multivariate Calculus: Functions of two or more variables, explicit and implicit functions, Partial derivatives of implicit and composite functions. Homogeneous functions- Euler's theorem and its extension. Total differentials, 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. Lagrange's method of undetermined multipliers.	

Unit-IV	14 hrs
<p>Integral Calculus: <i>Line integral:</i> Definition of line integral and basic properties, examples on evaluation of line integrals. <i>Double integral:</i> 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. <i>Triple integral:</i> Definition of triple integrals and evaluation-change of variables, volume as triple integral. Differentiation under the integral sign by Leibnitz rule.</p>	

Books recommended.

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 Vasishta, 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 BSc Mathematics-G K Ranganath, S Chand Publications.

B.Sc. Semester – II

Subject: Mathematics
Discipline Specific Course (DSC)

Course No.-2 (Practical)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
Course-02	DSCC	Practical	02	04	52 hrs	3 hrs	25	25	50

Course No.2 (Practical): Title of the Course (Practical): **Practicals on Algebra -II and Calculus - II**

Course Outcome (CO):

After completion of course (Practical), students will be able to:

- CO 1:** Learn Free and Open Source Software (FOSS) tools for computer programming
- CO 2:** Solve problem on algebra and calculus using FOSS softwares.
- CO 3:** Acquire knowledge of applications of algebra and calculus through FOSS.

List of the Experiments for 52 hrs / Semesters

1. Program for verification of binary operations.
2. Program to construct Cayley table and test abelian for given finite set.
3. Program to find all possible cosets of the given finite group.
4. Program to find generators and corresponding possible subgroups of a cyclic group.
5. Programs to verification of Lagrange's theorem with suitable examples.
6. Program to verify the Euler's ϕ function for a given finite group.
7. Program to check homogeneous function.
8. Program to verify the Euler's theorem and its extension.
9. Programs to construct series using Maclaurin's expansion for functions of two variables.
10. Program to evaluate the line integrals with constant and variable limits.
11. Program to evaluate the Double integrals with constant and variable limits.
12. Program to evaluate the Triple integrals with constant and variable limits.

General instructions: Suggested Softwares: Maxima/Scilab/Maple/MatLab/Mathematica/Python/R.

Scheme of Practical Examination (distribution of marks): 25 marks for Semester end examination

- 1. Programme writing and problem solving: 10 Marks**
- 2. Programme Execution: 5 Marks**
- 3. Viva: 5 Marks**
- 4. Journal: 5 Marks**

Total 25 marks

Note: Same Scheme may be used for IA(Formative Assessment) examination

Books recommended.

1. Scilab by example: M. Affouf 2012, ISBN: 978-1479203444
2. Scilab (A free software to Matlab): H. Ramchandran, A.S.Nair.2011S.Chand and Company
3. Scilab for very beginners. - www.scilab-enterprises.com
4. Topics in Algebra- I N Herstein, Wiley Eastern Ltd., New Delhi.
5. Higher algebra - Bernard & Child, Arihant, ISBN: 9350943199/ 9789350943199.
6. Modern Algebra - Sharma and Vasishta, Krishna Prakashan Mandir, Meerut, U.P.
7. Differential Calculus - Shanti Narayan, S. Chand & Company, New Delhi.
8. Integral Calculus - Shanti Narayan and P K Mittal, S. Chand and Co. Pvt. Ltd.,
9. Schaum's Outline Series - Frank Ayres and Elliott Mendelson, 5th ed. USA: Mc. Graw Hill., 2008.
10. Mathematical Analysis- S C Malik, Wiley Eastern.
11. A Course in Abstract Algebra- Vijay K Khanna and S K Bhambri, Vikas Publications.
12. Text Book of BSc Mathematics-G K Ranganath, S Chand Publications.

B.Sc. Semester – II

Subject: Mathematics Open Elective Course (OEC-2) (OEC for other students)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-2	OEC	Theory	03	03	42 hrs	2 hrs	40	60	100

OEC-2: Title of the Course: **Business Mathematics-II**

Course Outcome (CO):

After completion of course, students will be able to:

- CO 1:** Integrate concept in business concept with functioning of global trade.
- CO 2:** Understand the commercial arithmetic.
- CO 3:** Apply decision-support tools to business decision making.
- CO 4:** Apply knowledge of business concepts and functions in an integrated manner.

Syllabus- OEC: Title- Business Mathematics-II	Total Hrs: 42
Unit-I	14 hrs
Commercial Arithmetic: <i>Interest:</i> Concept of Present value and Future value, Simple interest, Compound interest, Nominal and Effective rate of interest, Examples and Problems <i>Annuity:</i> 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.	
Unit-II	14 hrs
Measures of central Tendency and Dispersion: Frequency distribution: Raw data, attributes and variables, Classification of data, frequency distribution, cumulative frequency distribution, Histogram and ogive 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.	

Unit-III	14 hrs
Correlation and regression: 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) Concept of regression, Lines of regression for ungrouped data, predictions using lines of regression. Regression coefficients and their properties (without proof). Examples and problems.	

Books recommended.

1. Practical Business Mathematics S. A. Bari New Literature Publishing Company New Delhi
2. Mathematics for Commerce K. Selvakumar Notion Press Chennai
3. Business Mathematics with Applications Dinesh Khattar & S. R. Arora S. Chand Publishing New Delhi
4. Business Mathematics and Statistics N.G. Das & Dr. J.K. Das McFraw Hill New Delhi
5. Fundamentals of Business Mathematics M. K. Bhowal Asian Books Pvt. Ltd New Delhi
6. Mathematics for Economics and Finance: Methods and Modelling, Martin Anthony and Norman Biggs Cambridge University Press Cambridge
7. Financial Mathematics and Its Applications Ahmad Nazri Wahidudin Ventus Publishing ApS Denmark
8. Fundamentals of Mathematical Statistics Gupta S. C. and Kapoor V. K.: Sultan Chand and Sons 23, Daryaganj, New Delhi 110002
9. Statistical Methods Gupta S. P.: Sultan Chand and Sons 23, Daryaganj, New Delhi 110002
10. Applied Statistics Mukhopadhyaya Parimal New Central Book Agency Pvt. Ltd. Calcutta.
11. Fundamentals of Statistics Goon A. M., Gupta, M. K. and Dasgupta, B. World Press Calcutta.
12. Fundamentals of Applied Statistics Gupta S. C. and Kapoor V. K.: Sultan Chand and Sons 23, Daryaganj, New Delhi 110002

Details of Formative assessment (IA) for DSCC theory/OEC: 40% weightage for total marks

Type of Assessment	Weightage	Duration	Commencement
Written test-1	10%	1 hr	8 th Week
Written test-2	10%	1 hr	12 th Week
Seminar	10%	10 minutes	--
Case study / Assignment / Field work / Project work/ Activity	10%	-----	--
Total	40% of the maximum marks allotted for the paper		

**Faculty of Science
04 - Year UG Honors programme:2021-22**

**GENERAL PATTERN OF THEORY QUESTION PAPER FOR DSCC/ OEC
(60 marks for semester end Examination with 2 hrs duration)**

Part-A

1. Question number 1-06 carries 2 marks each. Answer any 05 questions : 10marks

Part-B

2. Question number 07- 11 carries 05Marks each. Answer any 04 questions : 20 marks

Part-C

3. Question number 12-15 carries 10 Marks each. Answer any 03 questions : 30 marks

(Minimum 1 question from each unit and 10 marks question may have sub questions for 7+3 or 6+4 or 5+5 if necessary)

Total: 60 Marks

Note: Proportionate weightage shall be given to each unit based on number of hours prescribed.

