ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ.

ಜ್ಞಾನ ಗಂಗಾ, ಕಲಬುರಗಿ–585 106, ಕರ್ನಾಟಕ, ಭಾರತ

(ಕರ್ನಾಟಕ ರಾಜ್ಯ ವಿಶ್ವವಿದ್ಯಾಲಯಗಳ ಅಧಿನಿಯಮ 1976ರನ್ವಯ 10-09-1980 ರಂದು ಸ್ಥಾಪನೆಯಾದ ವಿಶ್ವವಿದ್ಯಾಲಯ ಮತ್ತು 2000ರ ಅಧಿನಿಯಮದ ಅಡಿಯಲ್ಲಿ ಬದಲಾಯಿಸಿದಂತೆ)

ದೂರವಾಣಿ ಸಂ.: 08472-263202 ಫ್ಯಾಕ್ಸ್: 08472-263206, ಇ-ಮೇಲ್: registrargug@rediffmail.com

ವಿದ್ಯಾಮಂಡಲ

ಕ್ರ.ಸಂ.ಗುವಿಕ/ವಿಮವಿ/ಬಿಓಎಸ್/2023–24/ 418 ದಿನಾಂಕ: 09.11.2023

ಅಧಿಸೂಚನೆ

ವಿಷಯ: ಸ್ನಾತಕ ಪದವಿ ಕೋರ್ಸಿನ **ಗಣಿತ ಅಧ್ಯಯನ** ವಿಷಯದ ಐದನೇ ಹಾಗೂ ಆರನೇ ಸೆಮೇಸ್ಟರ್ ಪಠ್ಯಕ್ರಮ ಅನುಮೋದಿಸಿ 2023–24ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಜಾರಿಗೊಳಿಸಿದ ಬಗ್ಗೆ.

ಉಲ್ಲೇಖ:1. ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ. ಇಡಿ 104 ಯುಎನ್ಇ 2023 ಬೆಂಗಳೂರು, ದಿನಾಂಕ:20.07.2023
2. ಪರಿಸರ ಅಧ್ಯಯನ ವಿಷಯದ ಸ್ನಾತಕ ಅಧ್ಯಯನ ಮಂಡಳಿಯ ನಿರ್ಣಯ ದಿನಾಂಕ: 22.09.2023.
3. ವಿಜ್ಞಾನ ನಿಕಾಯಗಳ ಸಮಿತಿ ಸಭೆಯ ನಿರ್ಣಯ ದಿನಾಂಕ: 06.11.2023
4. ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಅನುಮೋದನೆ ದಿನಾಂಕ: 08.11.2023

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ಸರ್ಕಾರದ ನಿರ್ದೇಶನದಂತೆ, 2023–24ನೇ ಶೈಕ್ಷಣಿಕ ಪ್ರಸಕ್ತ ಸಾಲಿನಿಂದ ಜಾರಿಗೊಳಿಸಿರುವ ಸ್ನಾತಕ ಪದವಿ ಐದನೇ ಮತ್ತು ಆರನೇ ಸೆಮಿಸ್ಟರ್ ಪಠ್ಯಕ್ರಮವನ್ನು ಜಾರಿಗೊಳಿಸಬೇಕಾಗಿರುವ ಪ್ರಯುಕ್ತ **ಗಣಿತ ಅಧ್ಯಯನ** ವಿಷಯದ ಅಧ್ಯಯನ ಮಂಡಳಿಯು ಪಠ್ಯಕ್ರಮವನ್ನು ಪರಿಷ್ಕರಿಸಿ ಶಿಫಾರಸ್ಸು ಮಾಡಿರುವುದರಿಂದ ಸದರಿ ಪಠ್ಯಕ್ರಮವನ್ನು ವಿಜ್ಞಾನ ನಿಕಾಯದ ಸಭೆಯಲ್ಲಿ ಒಪ್ಪಗೆ ಪಡೆದಿರುವಂತೆ, ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ಘಟನೋತ್ತರ ಅನುಮೋದನೆಯನ್ನು ನಿರೀಕ್ಷಿಸಿ ಸದರಿ ಪಠ್ಯಕ್ರಮವನ್ನು ಪ್ರಸ್ತುತ ಸ್ನಾತಕ ಪದವಿ ಕೋರ್ಸಿನ **ಗಣಿತ ಅಧ್ಯಯನ** ವಿಷಯದ ಐದನೇ ಮತ್ತು ಆರನೇ ಸೆಮೆಸ್ಟರ್ 2023–24ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಅನ್ವಯವಾಗುವಂತೆ ಜಾರಿಗೊಳೀಸಲಾಗಿದೆ.

ಈ ಮಾಹಿತಿಯನ್ನು ಸಂಬಂಧಪಟ್ಟ ಶಿಕ್ಷಕರ ಹಾಗೂ ವಿದ್ಯಾರ್ಥಿಗಳ ಗಮನಕ್ಕೆ ತರಲು ಸೂಚಿಸಲಾಗಿದೆ. ಪಠ್ಯಕ್ರಮದ ವಿವರಗಳನ್ನು ಗುಲಬರ್ಗ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್‌ಸೈಟ್ www.gug.ac.in ದಿಂದ ಪಡೆಯಬಹುದಾಗಿದೆ.

ಕುಲಸಚಿವರು 08.11.23
ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ.

ಗೆ,

1. ಮುಖ್ಯಸ್ಥರು, **ಗಣಿತ ಅಧ್ಯಯನ** ವಿಭಾಗ, ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ.
2. ಎಲ್ಲಾ ಪದವಿ ಕಾಲೇಜುಗಳ ಪ್ರಾಂಶುಪಾಲರುಗಳಿಗೆ.

ಪ್ರತಿಗಳು:

1. ಡೀನ್‌ರು, ವಿಜ್ಞಾನ ನಿಕಾಯ, ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
2. ಕುಲಸಚಿವರು (ಮೌಲ್ಯಮಾಪನ) ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ
3. ನಿರ್ದೇಶಕರು, ಪಿಎಂಇಬಿ ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
4. ಗ್ರಂಥಪಾಲಕರು, ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
5. ವಿಜ್ಞಾನ ನಿಕಾಯದ ಎಲ್ಲಾ ಅಧ್ಯಯನ ವಿಭಾಗಗಳ ಮುಖ್ಯಸ್ಥರಿಗೆ ಗು.ವಿ. ಕಲಬುರಗಿ
6. ಸಂಯೋಜಕರು, ಟಾಸ್ಕ್‌ಫೋರ್ಸ್ ಸಮಿತಿ, ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
7. ವಿಶೇಷಾಧಿಕಾರಿಗಳು, ಆಡಳಿತ, ವಿದ್ಯಾಮಂಡಲ, ಪರೀಕ್ಷಾ, ಅಭಿವೃದ್ಧಿ ಗು.ವಿ. ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
8. ಮುಖ್ಯಸ್ಥರು, ಗಣಕ ಕೇಂದ್ರ, ಗು.ವಿ. ಕಲಬುರಗಿ ರವರಿಗೆ ವೆಬ್‌ಸೈಟ್‌ನಲ್ಲಿ ಪ್ರತ್ಯೇಕ ಪೋರ್ಟಲ್‌ನಲ್ಲಿ ಪ್ರಕಟಿಸಲು ಸೂಚಿಸಲಾಗಿದೆ.
9. ನೋಡಲ್ ಅಧಿಕಾರಿಗಳು, UUCMS, ಗು.ವಿ.ಕಲಬುರಗಿ ಇವರ ಮಾಹಿತಿಗಾಗಿ
10. ಕುಲಪತಿಗಳ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿ/ಕುಲಸಚಿವರ ಆಪ್ತ ಸಹಾಯಕರ ಗು.ವಿ. ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.

Syllabus for

B.A./B.Sc. V SEMESTER & VI SEMESTER

with

MATHEMATICS as Major

W.e.f. the Academic Year
2023 – 2024 and Onwards

DEPARTMENT OF MATHEMATICS
GULBARGA UNIVERSITY
JNANAGANGA CAMPUS, KALABURAGI – 585 106
Phone: 08472 263296

SEPTEMBER, 2023

Name of the Degree Program : **B.A./B.Sc.**
Discipline Course : **Mathematics**
Starting Year of Implementation : **2023-24 (V & VI Semesters)**

Programme Outcomes (PO): By the end of the program the students will be able to :

PO 1	**Disciplinary Knowledge** : Bachelor degree in Mathematics is the culmination of in-depth knowledge of Algebra, Calculus, Geometry, differential equations and several other branches of pure and applied mathematics. This also leads to study the related areas such as computer science and other allied subjects
PO 2	**Communication Skills**: Ability to communicate various mathematical concepts effectively using examples and their geometrical visualization. The skills and knowledge gained in this program will lead to the proficiency in analytical reasoning which can be used for modeling and solving of real life problems.
PO 3	**Critical thinking and analytical reasoning:** The students undergoing this program develop ability of critical thinking and logical reasoning and analyzing and distinguishing the various aspects of real life problems.
PO 4	**Problem Solving** : The Mathematical knowledge gained by the students through this programme develop an ability to analyze the problems, identify and define appropriate computing requirements for its solutions. This programme enhances students overall development and also equip them with mathematical modelling ability, problem solving skills.
PO 5	**Research related skills**: The completing this programme develop the ability of critical thinking and analytical reasoning in Mathematical concepts in different areas of Mathematics.
PO 6	**Information/digital Literacy**: The completion of this programme will enable the learner to use appropriate software's to solve system of algebraic equation and differential equations.
PO 7	**Self – directed learning**: The student completing this program will develop an ability of working independently and to make an in-depth study of various notions of Mathematics.
PO 8	**Moral and ethical awareness/reasoning:** : The student completing this program will 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.
PO 9	**Lifelong learning**: This programme provides self directed learning and lifelong learning skills. This programme helps the learner to think independently and develop algorithms and computational skills for solving real word problems.
PO 10	Ability to peruse advanced studies and research in pure and applied Mathematical sciences.

Assessment

Weightage for the Assessments (in percentage)

Type of Course	Formative Assessment/ I.A.	Summative Assessment (S.A.)
Theory	40%	60 %
Practical	50%	50 %
Projects	40 %	60 %
Experiential Learning (Internship etc.)		

Courses for B.A./B.Sc. with Mathematics as Major Subject for V & VI Semester

Semester	Course No.	Theory/ Practical	Credits	Paper Title	Marks in percentage		Teaching Hours Per Week		Exam Duration
					S.A.	I.A.	T	P	
V	MATDSCT5.1	Theory	4	Real Analysis-II and Complex Analysis	60	40	4	--	2
	MATDSCP5.1	Practical	2	Theory based Practical's on Real Analysis-II and Complex Analysis	25	25	--	4	$1\frac{1}{2}$
	MATDSCT5.2	Theory	4	Vector calculus and Analytical geometry	60	40	4	--	2
	MATDSCP5.2	Practical	2	Theory based Practical's on Vector calculus and Analytical geometry	25	25	--	4	$1\frac{1}{2}$
	MATSECT-5.1	Theory	2	Programming with Python	30	20	2	--	2
	MATSECP-5.1	Practical	1	Practical's on Python Programming	--	25	--	2	--
VI	MATDSCT6.1	Theory	4	Linear Algebra	60	40	4	--	2
	MATDSCP6.1	Practical	2	Theory based Practical's on Linear Algebra	25	25	--	4	$1\frac{1}{2}$
	MATDSCT6.2	Theory	4	Numerical Analysis	60	40	4	--	2
	MATDSCP6.2	Practical	2	Theory based Practical's on Numerical Analysis	25	25	--	4	$1\frac{1}{2}$
	Internship	Internship	2	Internship Report	*				

- University will issue separate guideline for assessment

Syllabus for B.A./B.Sc. with Mathematics as Major Subject

SEMESTER – V

MATDSCT 5.1: Real Analysis-II and Complex Analysis	
Teaching Hours : 4 Hours/Week	**Credits: 4**
Total Teaching Hours: 60 Hours	**Max. Marks: 100 (S.A.-60 + I.A. – 40)**

Course Learning Outcomes:

The overall expectation from this course is that the student builds a basic understanding on Riemann integration and elementary complex analysis. The broader course outcomes are listed as follow. At the end of this course, the student will be able to:

1. Carry out certain computations such as computing upper and lower Riemann sums as well integrals
2. Describe various criteria for Integrability of functions.
3. Exhibit certain properties of mathematical objects such as integrable functions, analytic functions, harmonic functions and so on.
4. Prove some statements related to Riemann integration as well as in complex analysis
5. Carry out the existing algorithms to construct mathematical structures such as analytic functions
6. Applies the gained knowledge to solve various other problems.

Real Analysis-II

Unit – I: Riemann Integration-I

Definition & examples for partition of an interval, refinement of a partition and common refinement. **Riemann Darboux Sums** - Upper and lower (Darboux) sums –definition, properties & problems.

Riemann Integral – Upper and Lower integrals (definition & problems), Darboux's theorem and Criterion for Integrability, Integrability of sum, difference, product, quotient and modulus of integrable functions. **Integral as a limit of sum (Riemann sum)** – Problems. **Some integrable functions** – Integrability of continuous functions, monotonic functions, bounded function with finite number of discontinuity. **15 Hour**

Unit –II: Riemann-Stieltjes Integral and Improper Integral

Fundamental theorem of Calculus–related problems, change of variables, integration by parts, first and second mean value theorems of integral calculus. Riemann-Stieltjes Integral–Definition & examples. Riemann Integral as a special case. Improper Integral-Improper integrals of the first, second and third kind with examples. **15 Hours**

Complex Analysis

Unit – III: Complex numbers and functions of complex variables:
Complex numbers-Cartesian and polar form-geometrical representation-complex-Plane-Euler's formula- $e^{i\theta} = \cos\theta + i\sin\theta$. Functions of a complex variable-limit, continuity and differentiability of a complex function. Analytic function, Cauchy-Riemann equations in Cartesian and Polar forms-Sufficiency conditions for analyticity(Cartesian form only)-Harmonic function-standard properties of analytic functions-construction of analytic function when real or imaginary part is given-Milne Thomson method. **15 Hours**

Unit –IV: Transformations and Complex integration:
Transformations: Definition- Jacobian of a transformation- Identity transformation-Reflection- Translation- Rotation- Stretching- Inversion- Linear transformation- Definitions-Bilinear transformations- Cross-ratio of four points- Cross-ratio preserving property-Preservation of the family of straight lines and circles- Conformal mappings- Discussion of the transformations $w = 1/z$ $w = \sin z$, $w = e^z$, $w = \frac{1}{2}\left(z + \frac{1}{z}\right)$.

Complex integration– definition, Line integral, properties and problems. Cauchy's Integral theorem-proof using Green's theorem-direct consequences. Cauchy's Integral formula with proof-Cauchy's generalized formula for the derivatives with proof and applications for evaluation of simple line integrals. **15 Hours**

Reference Books:

1. S.C Malik, *Real Analysis,* New Age International (India) Pvt. Ltd.
2. S.C.Malik and Savita Arora, *Mathematical Analysis*, 2nd ed. New Delhi, India: New Age international (P) Ltd.
3. Richard R Goldberg, *Methods of Real Analysis*, Oxford and IBH Publishing
4. Ajit Kumr and S. Kumaresan - *A Basic Course in Real Analysis*, Taylor and Francis Group.
5. L. V. Ahlfors, *Complex Analysis*, 3rd Edition, McGraw Hill Education
6. Bruce P. Palka , *Introduction to the Theory of Function of a Complex Variable*, Springer
7. Serge Lang, *Complex Analysis*, Springer
8. Shanthinarayan, *Theory of Functions of a Complex Variable,* S. Chand Publishers.
9. S. Ponnuswamy, *Foundations of Complex Analysis*, 2nd Edition, Alpha Science International Limited.
10. R.V. Churchil & J.W. Brown, *Complex Variables and Applications*, 5th ed, McGraw Hill Companies

MATDSCP 5.1: Practical's on Real Analysis-II and Complex Analysis	
Practical Hours : 4 Hours/Week	**Credits: 2**
Total Practical Hours: 60 Hours	**Max. Marks: 50 (S.A.-25 + I.A. – 25)**

Course Learning Outcomes: This course will enable the students to

1. Learn *Free and Open Source Software (FOSS)* tools for computer programming
2. Solve problem on Real Analysis and Complex Analysis studied in **MATDSCT 5.1 by** using FOSS software's.
3. Acquire knowledge of applications of Real Analysis and Complex Analysis through FOSS.

Practical/Lab Work to be performed in Computer Lab (FOSS) Suggested Software's: Maxima/Scilab /Python/R.

Suggested Programs:

1. Program to check whether a given set of real numbers attains supremum or infimum.
2. Program to find upper and lower Riemann sums with respect to given partition
3. Program to test Riemann Integrability.
4. Program to evaluate Riemann integral as a limit of sum.
5. Program on verification of Cauchy – Riemann equations (Cartesian form) or test for analyticity.
6. Program on verification of Cauchy – Riemann equations (Polar form) or test for analyticity.
7. Program to check whether a function is harmonic or not.
8. Program to construct analytic functions (through Milne–Thompson method)
9. Program to find Cross ratio of points and related aspects.
10. Program to find fixed points of bilinear transformations.
11. Program to verify De Moivre's theorem.

MATDSCT5.2: Vector Calculus and Analytical Geometry	
Teaching Hours : 4 Hours/Week	**Credits: 4**
Total Teaching Hours: 60 Hours	**Max. Marks: 100 (S.A.-60 + I.A. – 40)**

Course Learning Outcomes: This course will enable the students to

1. Get introduced to the fundamentals of vector differential and integral calculus.
2. Get familiar with the various differential operators and their properties.
3. Get acquainted with the various techniques of vector integration.
4. Learn the applications of vector calculus.
5. Recollect the fundamentals of Analytical Geometry in 3D.
6. Interpret the geometrical aspects of planes and lines in 3D.

Vector Calculus

Unit – I: Vector Algebra

Vector Algebra – Multiple product – scalar triple product, vector triple product, geometrical interpretation, related problems; vector function of a scalar variable – interpretation as a space curve, derivative, tangent, normal and binormal vectors to a space curve; Curvature and Torsion of a space curve- definitions, derivation and problems, Serret-Frenet formulae.

Scalar field - Gradient of a scalar field, geometrical meaning, directional derivative, unit normal using surfaces - tangent plane and normal to the surface; Vector field - divergence and curl of a vector field, geometrical meaning, solenoidal and irrotational fields; Laplacian of a scalar field; Vector identities. **15 Hours**

Unit – II: Vector Integration

Vector Integration – Definition and basic properties, vector line integral, surface integral and volume integral; **Green's theorem in the plane** – Proof and related problems, Direct consequences of the theorem; **Gauss' Divergence theorem** – Statement and related problems, Direct consequences of the theorem; **Stokes' theorem** – Statement and related problems, Direct consequences of the theorem. **15 Hours**

Analytical Geometry

Unit-III: Straight Lines, Planes and Spheres Planes: Distance of a point from a plane, Angle between two planes, pair of planes, Bisectors of angles between two planes; Straight lines: Equations of straight lines, Distance of a point from a straight line, Distance between two straight lines, Distance between a straight line and a plane; Spheres: Different forms, Intersection of two spheres, Orthogonal intersection, Tangents and normal, Radical plane, Radical line, Coaxial system of spheres, Pole, Polar and Conjugacy. **15 Hours**

Unit-IV: Locus, Surfaces, Curves and Conicoids Space curves, Algebraic curves, Ruled surfaces, Some standard surfaces, Classification of quadric surfaces, Cone, Cylinder, Central conicoids, Tangent plane, Normal, Polar planes, and Polar lines. **15 Hours**

References:

1. Robert J. T. Bell (1994). An Elementary Treatise on Coordinate Geometry of Three Dimensions. Macmillan India Ltd.
2. D. Chatterjee (2009). Analytical Geometry: Two and Three Dimensions. Narosa Publishing House.
3. Shanthi Narayan and P. K. Mittal, *Analytical Solid Geometry*, S. Chand Publications.

4. A. N. Das, *Analytical Geometry of Two and Three Dimensions*, New Central Book Agency Pvt. Ltd.
5. M. D. Raisinghania, *Vector Calculus*, S Chand Co. Pvt. Ltd., 2013.
6. M. Spiegel, *Vector Analysis*, 2nd Edition, Schaum's Outline Series, Mc-Graw Hill, Education, 2017.
7. C. E. Weatherburn, *Elementary Vector Analysis*, Alpha edition, 2019.
8. P. N. Wartikar and J. N. Wartikar, *A Textbook of Applied Mathematics*, Vol. II, Pune Vidyarthi Griha Prakashan, Pune, 2009.
9. C. E. Weatherburn, *Differential Geometry of Three Dimension*, Khosla Publishing House, 2020.
10. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers.
11. G. B. Thomas and R. L. Finney, *Introduction to Calculus and Analytical Geometry*, Narosa Publishing House, 2010.

MATDSCP5.2: Practical's on Analytical Geometry and Vector Calculus	
Teaching Hours : 4 Hours/Week	**Credits: 2**
Total Teaching Hours: 60 Hours	**Max. Marks: 50 (S.A.-25 + I.A. – 25)**

Course Learning Outcomes: This course will enable the students to

1. Learn *Free and Open Source Software (FOSS)* tools for computer programming
2. Solve problems related to Analytical Geometry and Vector Calculus using FOSS software.

Practical/Lab Work to be performed in Computer Lab (FOSS) Suggested Software: Maxima/SciLab /Python/R.

Suggested Programs:

1. Program on multiple product of vectors – Scalar and Cross product.
2. Program on vector differentiation and finding unit tangent.
3. Program to find curvature and torsion of a space curve.
4. Program to find the gradient and Laplacian of a scalar function, divergence and curl of a vector function.
5. Program to demonstrate the physical interpretation of gradient, divergence and curl.
6. Program to evaluate a vector line integral.
7. Program to evaluate a surface integral.
8. Program to evaluate a volume integral.
9. Program to verify Green's theorem.
10. Program to find equation and plot sphere, cone and cylinder
11. Program to find distance between a straight line and a plane.
12. Program to construct and plot some standard surfaces.

Skill Enhancement Course

MATDSECT 5.1: Programming with Python	
Teaching Hours : 2 Hours/Week	**Credits: Theory : 2**
Total Teaching Hours: Theory : 30 Hours	**Max. Marks: 50 (S.A.-30 + I.A. – 20)**

Course Learning Outcomes: On the completion of this course the students will be able to

1. Learn the syntax and semantics of Python programming language.
2. Write Python functions to facilitate code reuse and manipulate strings.
3. Understand the use of built-in functions to navigate the file system
4. Apply the concepts of file handling.

Unit-1: Introduction, Basics and Program flow **(15 Hours)**

Python character set, Tokens, Variables and assignments, print statement, comments, Python data structure and data types, string operation in Python, Simple input and output (including simple output-formatting, operators in Python, expressions, standard library modules, Debugging, indentation, Flow of control (if, if-else, if-elif, nested if), range function, iteration/looping statements, String and list manipulation, Tuples, dictionaries, sorting techniques

Unit-2: Functions, Libraries and File handling **(15 Hours)**

Understanding and creating your own functions, Function parameters, Flow of execution in a function call, passing parameters, Returning values from functions, Scope of a function, Importing modules in a Python, Using standard library functions and Modules, Creating a Python library, Data files, Operating and closing files, working with text files, Standard, input, output and error streams, Working with binary and CSV files.

References

1. Automate the Boring Stuff with Python -, Al Sweigart, Willam Pollock, 2015
2. Python Cook Book-, David Beazely and Brain K. Jones 2022.
3. Basic Python Programming for Beginners- Varada Rajkumar, Marapalli Krishna, Jaya Prakash, Blue Rose Publishers, 2022.
4. Python- John Shovic and Alan Simpson, Paperback, 2020.
5. Learning Python- Mark Lutz, O'Reilly Media, Paperback, 2nd edition, 2020.
6. Programming and Problem Solving Through Python- Satish Jain and Shashi Singh, BPB Publications, 2020

MATDSECT 5.1: Practical's on Python Programming	
Practical Hours : 2 Hours/Week	**Credits: Theory : 1**
Total Practical Hours: 30 Hours	**Max. Marks: 25 (S.A.- - + I.A. – 25)**

Practical Implementation of Python

1. Write python programs using the concepts of control structures.
2. Implement Python programs using functions and strings.
3. Implement methods to create and manipulate lists, tuples and dictionaries.
4. Apply the concepts of file handing and regExusing packages.
5. Illustrate the working of scraping websites with CSV.