ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ.

ಜ್ಞಾನ ಗಂಗಾ, ಕಲಬುರಗಿ–585 106, ಕರ್ನಾಟಕ, ಭಾರತ

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

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

ವಿದ್ಯಾಮಂಡಲ

ಕ್ರ.ಸಂ.ಗುವಿಕ/ವಿಮವಿ/ಬಿಓಎಸ್/2024–25/177 ದಿನಾಂಕ: 23/7/24

ಅಧಿಸೂಚನೆ

ವಿಷಯ: ಸ್ನಾತಕ ಪದವಿ ಕೋರ್ಸಿನ **ಗಣಿತಶಾಸ್ತ್ರ ವಿಷಯದ** ಪಠ್ಯಕ್ರಮ ಅನುಮೋದಿಸಿ 2024–25ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಜಾರಿಗೊಳಿಸಿದ ಬಗ್ಗೆ.

ಉಲ್ಲೇಖ:1. ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ. ಇಡಿ 166 ಯುಎನ್ಇ 2023 ಬೆಂಗಳೂರು, ದಿನಾಂಕ:08.05.2024
2. ಗಣಿತಶಾಸ್ತ್ರ ವಿಷಯದ ಸ್ನಾತಕ ಅಧ್ಯಯನ ಮಂಡಳಿಯ ನಿರ್ಣಯ ದಿನಾಂಕ: 28.06.2024
3. ವಿಜ್ಞಾನ ನಿಕಾಯಗಳ ಸಮಿತಿ ಸಭೆಯ ನಿರ್ಣಯ ದಿನಾಂಕ: 11.07.2024
4. ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ಅನುಮೋದನೆ ದಿನಾಂಕ: 15.07.2024
5. ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಅನುಮೋದನೆ ದಿನಾಂಕ:19.07.2024

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ಸರ್ಕಾರದ ನಿರ್ದೇಶನದಂತೆ, 2024–25ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಜಾರಿಗೊಳಿಸಿರುವ ಸ್ನಾತಕ ಪದವಿ ಪಠ್ಯಕ್ರಮವನ್ನು ಜಾರಿಗೊಳಿಸಬೇಕಾಗಿರುವ ಪ್ರಯುಕ್ತ **ಗಣಿತಶಾಸ್ತ್ರ ವಿಷಯದ** ಅಧ್ಯಯನ ಮಂಡಳಿಯು ಪಠ್ಯಕ್ರಮವನ್ನು ಪರಿಷ್ಕರಿಸಿ ಶಿಫಾರಸ್ಸು ಮಾಡಿರುವುದರಿಂದ ಸದರಿ ಪಠ್ಯಕ್ರಮವನ್ನು ವಿಜ್ಞಾನ ನಿಕಾಯದ ಸಭೆಯಲ್ಲಿ ಒಪ್ಪಗೆ ಪಡೆದಿರುವಂತೆ, ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ಅನುಮೋದನೆಯಂತೆ ಪದವಿ ಕೋರ್ಸಿನ **ಗಣಿತಶಾಸ್ತ್ರ ವಿಷಯದ** ಸ್ನಾತಕ ಪಠ್ಯಕ್ರಮವನ್ನು 2024–25ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಅನ್ವಯವಾಗುವಂತೆ ಜಾರಿಗೊಳಿಸಲಾಗಿದೆ.

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

ಕುಲಸಚಿವರು
ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ

ಗೆ,

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

ಪ್ರತಿಗಳು:

1. ಡೀನ್‌ರು, ಕಲಾ 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.

GULBARGA UNIVERSITY

KALABURAGI

SYLLABUS FOR

B.Sc.

MATHEMATICS

WITH EFFECT FROM

ACADEMIC YEAR 2024-2025 AND ONWARDS

DEPARTMENT OF MATHEMATICS
GULBARGA UNIVERSITY, KALABURAGI

Approved by UG BOS in Mathematics
in its meeting held on 25.06.2024

Professor & Chairman
Department of Mathematics
Gulbarga University, KALABURAGI

B.Sc. Mathematics Syllabus
under State Education Policy(SEP)

Sem	Course code	Course Title	Type of instruction & hours Per week	No. of Credits	Hours of Exam(SEE)	Max. Marks for IA	Max. Marks for SEE	Max Marks
I	MATDSC 1T	Algebra and Calculus	T4	4	3	20	80	100
	MATDSC 1P	Practical-I	P4	2	3	10	40	50
II	MATDSC 2T	Real Analysis and Differential Calculus	T4	4	3	20	80	100
	MATDSC 2P	Practical-II	P4	2	3	10	40	50
III	MATDSC 3T	Modern Algebra and Integral Calculus	T4	4	3	20	80	100
	MATDSC 3P	Practical-III	P4	2	3	10	40	50
IV	MATDSC 4T	Differential Equations	T4	4	3	20	80	100
	MATDSC 4P	Practical-IV	P4	2	3	10	40	50
V	MATDSC 5T	Vector Calculus and Complex Analysis	T4	4	3	20	80	100
	MATDSC 5P	Practical-V	P4	2	3	10	40	50
VI	MATDSC 6T	Numerical Analysis	T4	4	3	20	80	100
	MATDSC 6P	Practical-VI	P4	2	3	10	40	50

Professor & Chairman
Department of Mathematics

ELECTIVE PAPERS FOR III & IV SEMESTERS

(Students have to choose any one of the elective courses for Sem. III & Sem. IV)

Sem	*Course code*	*Course Title*	*Type of instruction & hours Per week*	*Credits*	*Hours of Exam(SEE)*	*Marks IA*	*Max Marks for SEE*	*Max Marks*
III	MATE1-3T1	GRAPH THEORY	T2	2	2	10	40	50
	MATE1-3T2	Linear Programming and Game Theory	T2	2	2	10	40	50
IV	MATE2-4T1	Riemann Integration and Improper Integrals	T2	2	2	10	40	50
	MATE2-4T2	Integral Transforms	T2	2	2	10	40	50

Semester -I

MATDSC1T : Algebra and Calculus	
Teaching Hours: 4 Hours/Week	**Credits:04**
Total Teaching Hours:56 hours	**Max. Marks :100 (SEE 80 + I.A -20)**

Course Learning Objectives:

The primary objectives of this course is to

a) Introduce the basic tools of theory of equations and matrices to understand their linkage to the real-world problems. Perform matrix algebra with applications.

b) Find the roots of Quadratic and bi-Quadratic Equations

c) Find the nth derivatives of algebraic, logarithmic and trigonometric functions.

d) Understand deeply about Curvature , Evolutes and Envelopes.

i) Course outcomes:

a) Learn to solve system of linear equation

b) Students will be familiar with the techniques to find the roots of Quadratic and bi-Quadratic Equations

c) Students will be Understand Concepts of derivatives of different functions and Sketch curves in Cartesian and polar forms

d) Students will become familiar with the techniques to find the roots of Quadratic and bi-Quadratic Equations.

Unit-I Matrix

Symmetric and skew symmetric matrices, Algebra of matrices; row and column reduction to echelon form. rank of a matrix; Inverse of a matrix by elementary operations; solution of system of linear equations; Criteria for existence of non-trivial solutions of homogeneous system of linear equations. Solution of non-homogeneous system of linear equations. Eigen values and Eigen vectors of square matrices.

Cayley-Hamilton theorem (without proof), inverse of matrices by Cayley-Hamilton theorem.

(14 Hrs.)

Unit-II Theory of Equations

Relation between roots and co-efficient, Nature of roots – Descarte's rule of signs and example. Solution of cubic equation, Cardan's method to solve cubic equation, dividing the polynomial by using the synthetic division method and examples trigonometric method, Biquadratic equation.

(14 Hrs.)

Unit-III Successive Differentiation

Limits, continuity and bounds of a function, Algebra of continuous functions, theorems on continuous functions. Successive Differentiation, formulae for n^{th} derivatives of the following 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.

(14 Hrs.)

Unit-IV Polar Co-ordinates

Polar co-ordinates, angle between the radius vector and tangent. Angle of intersection of two curves (polar forms), length of perpendicular from pole to the tangent, Pedal equations, derivative of an arc in Cartesian , parametric and polar forms, Curvature of plane curve –radius of curvature formula in Cartesian, Parametric, polar and pedal forms, center of curvature, circle of curvature, Asymptotes, Evolutes & Involute and Envelops with examples.

(14 Hrs.)

Reference Books

1. Matrices-A R Vasista, Krishna Prakashana Mandir
2. Application of Calculus-Debasish Sengupta
3. College Mathematics –N R Jayaram , R V Prabhakara, Sanathkumar Sastry, G S Sundareshan.
4. Schaum,s outline of calculus- frank Ayres and Elliott MAndelson 5th ed USA: Mc. Graw
5. Differential Calculus – Shanti Narayan
6. Calculus-Lipman Bers, Holt, Rinehart and sinston
7. Calculus- S Barayanan and T. K. Manicavachogam pillay, S Viswanathan
8. Higher Engineering Mathematics by B. S. Grewal

PRACTICALS

MATDSC1P: Practical's on Algebra and Calculus	
Teaching Hours: 4 Hours/Week	**Credits:02**
Total Teaching Hours: 56 hour	**Max. Marks :50 (SEE 40 + I.A -10)**

Course Learning Objectives: This course will enable the students to

1. Learn Free and SciLab software.
2. Tools for computer programming.
3. Solve problems on algebra and calculus theory studied in **MATDSC1P** by using SciLab software .
4. Acquire knowledge of application of algebra and calculus through SciLab software

- **Introduction to SciLab and commands related to the topic.**

1. Computation of addition, subtraction and multiplication of matrix.
2. Computation of trace , transpose and inverse of matrix
3. Computation of rank of matrix and row reduces echelon form.
4. Computation of inverse of matrix using Cayley-Hamilton Method.
5. Solutions of homogeneous system of linear equations.
6. Solution of non-homogeneous system of linear equations.
7. Finding the n^{th} derivatives of exponential, hyperbolic and trigonometric function.
8. Finding the n^{th} derivatives of algebraic function.
9. Finding the n^{th} derivatives of Logarithmic function.
10. Finding the n^{th} derivatives of $e^{ax}\sin(bx+c)$, $e^{ax}\cos(bx+c)$.
11. Computation of angle between the radius vector and the tangent.
12. Tracing of standard curves in 2D.
13. Finding Roots of Cubic and Biquadratic Equations.
14. Finding Root by Cardon's Method.

Note: Use the SciLab software to execute the practical problems and verify manually.

Semester -II

MATDSC2T: Real Analysis and differential Calculus	
Teaching Hours: 4 Hours/Week	**Credits:04**
Total Teaching Hours:56hours	**Max. Marks :100 (SEE 80 + I.A -20)**

Course Learning Objectives:

The main objectives of this course is to

a.) Introduce the Convergence and Divergence of Sequences by using different tests.

b.) Introduce the Convergence and Divergence of Series by using different tests.

c) Know the Geometric meaning of derivatives by using Intermediate value Theorems.

d) Know the basic tools of calculus and to understand the extension of the studies of single variable differential calculus to functions of two or more independent variables.

Course outcomes:

After completion of this course the students

a) Will learn the concept of convergence and divergence of a sequence.
b) Will be able to handle and understand the limits and their use in sequences, series,
c) Will learn the conceptual variations when advancing in calculus from one variable to multivariable discussions.
d) Will understand the concept of differentiation and fundamental theorems in differentiation and various rules of intermediate value theorems and L'Hospitals rule.

Unit-I Sequences

Definition of finite and infinite sequence, Bounded and unbounded sequence. Limit of a sequence, Convergent, divergent and oscillatory sequences, Monotonic sequence, every convergent sequence is bounded, sum, difference, product and quotient of two convergent sequence is convergent, $(1+\frac{1}{n})^n \cong e$

(14 Hrs.)

Unit- II Infinite Series

Definition of series, positive terms series, Geometric Series, p-series, Comparison tests for positive term series, D 'Alembert's ratio test, Raabe's test, Cauchy's root test, Alternating series, Leibnitz's theorem (without Proof) and examples. Summation of Series, Exponential ,Logarithmic, Binomial Series and Related Examples

(14 Hrs.)

Unit-III Differential Calculus

Differentiability of function. Every differential function is continuous but not conversely. Intermediate value theorem, Rolle's Theorem, Lagrange's mean value theorem. Cauchy's mean value theorem and examples. Taylor's theorem, Maclaurin's series, Indeterminate forms and evaluation of limits using L'Hospital rule.

(14 Hrs.)

Unit-IV Functions of two and three variable

Limit , continuity, partial derivatives of function of two and three variables, homogenous functions, Euler's theorem (up to Second order), Total derivatives, Jacobin's and its properties, Maxima and minima for two variables.

(14 Hrs.)

Reference Books

1. A course in Abstract algebra : Vijay K Khannan and S K Bhambri,
2. Real analysis ; M. Patil
3. Introduction to Real Analysis ; S Narayan and Raisighaniya
4. Introduction to Sequences, Series: OE stanitics
5. Differential Calculus by Shanthi Narayan
6. Advanced Calculus by Mury R spiegal
7. Higher Engineering Mathematics by B. S. Grewal

PRACTICALS

MATDSC2P : Practical's on Real Analysis and Differential Calculus	
Teaching Hours: 4 Hours/Week	**Credits:02**
Total Teaching Hours: 56 hour	**Max. Marks :50 (SEE 40 + I.A -10)**

Course Learning Outcomes: This course will enable the students

1. Learn Free and SciLab software.tools for computer programming.
2. Solve problem on Real Analysis and Differential Calculus studied in **MATDSC1P PRATICAL-I** by using SciLab software .
3. Acquire knowledge of application of Real Analysis and Differential Calculus through SciLab software

- **Introduction to SciLab and commands related to the topic.**

1. Examining the convergence of sequence.
2. Example on $(1+\frac{1}{n})^n \cong e$.
3. Example on convergence of + ve terms series.
4. Example on ratio test,
5. Example on Raabe's test
6. Example on Cauchy's root test.
7. Example on convergence Alternating series,
8. Verification of Leibnitz's theorem examples.
9. Examples on Rolle's theorem.
10. Examples on Lagrange's theorem.
11. Examples on Cauchy's theorem.
12. Taylor's and Mauclaurin's series.
13. Verification of Euler's Theorem
14. Verification of Homogeneous Theorem Theorem

Note: Use the SciLab software to execute the practical problem and verify manually.

THEORY EXAMINATION **QUESTION PAPER PATTERN** FOR MATHEMATICS

(Semesters I –VI)

SUBJECT: MATHEMATICS

Course Code:

Course Title:

Time:3 Hours **Max.Marks:80**

Instructions to candidates:

- All sections are compulsory

SECTION-A

1. Answer **all** the following questions: **(2×10=20)**

(Minimum Two Questions from each Unit)

a)
b)
c)
d)
a)
b)
c)
d)
e)
f)

SECTION-B

Answer any **SIX** of the following: **(5×6=30)**

(Two Questions from each unit)

2.
3.
4.
5.
6.
7.
8.
9.

SECTION-C

Answer **Any Three** of the following: **(10×3=30)**

(One Questions from each unit)

10.

11.

12.

13.

MATHEMATICS PRACTICAL PAPER EXAMINATION I-VI SEMESTER

DURATION: 3Hrs **Maximum Marks : 40**

1. To write two Scilab program - 2*5=10
2. To verify two problems manually- 05
3. To execute ONE program - 10
4. Viva - 10
5. Record Book(Certified Record Book) 05

Total Marks **40**

INTERNAL ASSESSSMENT FOR MATHEMATICS PRACTICAL I- VI SEMESTER

Maximum Marks : 10

Test	05Marks
Record, Journal and Attendance	05Marks
Total Marks	**10**

Continuous Assessment /Internal Assessment /Formative Assessment for MATHEMATICS (Semester-I to Semester-VI)

Sl. No.	Continuous Assessment /Internal Assessment	Maximum Marks
(1)	(2)	(3)
01	Two Session Tests with proper record for assessment (5+5=10)	10
02	Assessment of Skill Development activities/Seminars/Group Discussion/ Assignment etc., with proper record	05
03	• Attendance with proper record	05
	TOTALMARKS	20

- **Attendance Marks-breakup**

<75%	-	00Marks
75-80%	-	01Mark
80-85%	-	02Marks
85-90%	-	03Marks
90-95%	-	04Marks
>95%-		05 Marks

Professor & Chairman
Department of Mathematics
Gulbarga University, GULBARGA

Continuous Assessment /Internal Assessment/Formative Assessment for Elective Papers of MATHEMATICS (Semester-III and Semester-IV)

Sl. No.	Continuous Assessment Programme/Internal Assessment	Maximum Marks
(1)	(2)	(3)
01	Two Session Tests with proper record for assessment (2+2=4)	04
02	Assessment of Skill Development activities/Seminars/Group Discussion/ Assignment etc., with proper record	03
03	• Attendance with proper record	03
	TOTALMARKS	10

- **Attendance Marks-breakup**

<75%	-	00Marks
75-80%	-	01Mark
85-90%	-	02Marks
90-100%	-	03Marks

Approved by UG BOS in Mathematics Meeting held on 28.06.2024