RANI CHANNAMMA UNIVERSITY BELAGAVI

REVISED CURRICULUM FRAMEWORK FOR UNDER GRADUATE COURSE

STRUCTURE & SYLLABUS OF BACHELOR OF SCIENCE

MATHEMATICS

1ST TO 2ND Semesters

w.e.f.

Academic Year 2024-25 and Onwards

Submitted by

Chairman,
Board of Studies (UG),
Bachelor of Science,
Rani Channamma University, Belagavi.

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RANI CHANNAMMA UNIVERSITY, BELGAVI

VIDYA SANAGAMA

Accredited with B+ Grade by NAAC

FACULTY OF SCIENCE : DEPARTMENT OF MATHEMATICS

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Board of Studies in Mathematics

Sl. No.	Name and Address	Designation
01	Prof. Vijayalakshmi S. Shigehalli Professor, Department of Mathematics, Rani Channamma University, Belagavi	Chairperson
02	Prof. S.H.Sankanagoudar Associate Professor, Department of Mathematics, Shri. SBM. Arts, Science and Commerce College, Badami	Member
03	Dr. Sridhar Principal, Government First Grade College, Paschapur	Member
04	Prof. Nagasuresh M. S. Associate professor, Department of Mathematics, GSS College, Tilakwadi, Belagavi	Co-opt member
05	Dr. N.K. Enagi Assistant Professor, KRCE Society's GGD Arts, BMP Commerce and SVV Science Degree College, Bailhongal	Co-opt member

PREAMBLE

The subject wise expert committee to draft model curriculum contents in Mathematics constituted by the Department of Higher Education, Government of Karnataka, Bengaluru vide GO No. ED 166 UNE 2023 BENGALURU DATED 08.05.2024 is pleased to submit its partial report on the syllabus for the First Year (First & Second Semesters) B.A./B.Sc Mathematics and detailed Course Structure for B.A./B.Sc Mathematics Three Majer up to 4^{th} Semester and Specialization in one subject in 5^{th} and 6^{th} semester

The committee discussed various models suggested by the Karnataka State Higher Education Council in its joint meetings with the Chairpersons of Board of Studies of all state universities in Karnataka and resolved to adopt a Model 3-Majors with a general degree.

To achieve the core objectives it is unanimously resolved to introduce computer based practical courses by using Free and Open Source Software's (FOSS) tools for implementation of theory based courses as it is also suggested by the LOCF committee that the papers may be taught using various Computer Algebra System (CAS) software's such as Mathematica, MATLAB, Maxima and R to strengthen the conceptual understanding and widen up the horizon of students' self-experience. In view of these observations the subject expert committee suggested the software's Phython /R /Maxima/ Scilab/ Maple/MatLab/Mathematica for hands on experience of implementation of mathematical concepts in computer- based lab.

The expert committee suggested to the implementation of this curriculum structure in Department of Mathematics in UG Colleges in Karnataka.

The subject expert committee designed the Course Learning Outcome (CO) to help the learners to understand the main objectives of studying the courses by keeping in mind of the Programme outcomes (PO) of the graduate degree in Mathematics or a graduate degree with Mathematics as a major subject.

As the Mathematics subject is a vast with several branches of specializations, it is difficult for every student to learn each branch of Mathematics, even though each paper has its own importance. Hence the subject expert committee suggested to consider elective papers in this course, so student can select elective paper as per her/his needs and interest.

PROGRAM OUTCOMES:

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.

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 modelling and solving of real-life problems.

3. **Critical thinking and analytical reasoning:** The students undergoing this programme acquire ability of critical thinking and logical reasoning and capability of recognizing and distinguishing the various aspects of real life problems.

4. **Problem Solving:** The Mathematical knowledge gained by the students through this programme develop an ability to analyse 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.

5. **Research related skills**: The completing this programme develop the capability of inquiring about appropriate questions relating to the Mathematical concepts in different areas of Mathematics.

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.

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.

8. **Moral and ethical awareness/reasoning:** The student completing this program will develop an ability to identify unethical behaviour 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.

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.

10. Ability to peruse advanced studies and research in pure and applied Mathematical sciences.

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FACULTY OF SCIENCE: DEPARTMENT OF MATHEMATICS

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COURSE STRUCTURE FOR B.Sc. PROGRAMME

Semester	Subjects	Teaching Hours/week	Duration of Exams	Marks			Credits
				IA	Exam	Total	
1	Major1 Theory	04	03	20	80	100	03
	Major1 Practical	04	04	10	40	50	02
	Major2 Theory	04	03	20	80	100	03
	Major2 Practical	04	04	10	40	50	02
	Major3 Theory	04	03	20	80	100	03
	Major3 Practical	04	04	10	40	50	02
	Language1	04	03	20	80	100	04
	Language2	04	03	20	80	100	04
	Compulsory-1	02	02	10	40	50	02
2	Major1 Theory	04	03	20	80	100	03
	Major1 Practical	04	04	10	40	50	02
	Major2 Theory	04	03	20	80	100	03
	Major2 Practical	04	04	10	40	50	02
	Major3 Theory	04	03	20	80	100	03
	Major3 Practical	04	04	10	40	50	02
	Language1	04	03	20	80	100	04
	Language2	04	03	20	80	100	04
	Compulsory-2	02	02	10	40	50	02
Total							**50**

First Semester B.Sc. Mathematics Theory

Paper Title: Algebra–I and Calculus–I -1T	**Marks: Th-80+IA-20**
Paper Code: SEPBSCMAT T1	**Total hours: 60**
Teaching Hours: 4 Hours/Week	**Credits : 03**

UNIT-I: MATRICES AND DETERMINANTS	**15 Hours**
Recapitulation of Elementary Transformations of matrices, Rank of a Matrix, Row and column reduction to Echelon form. Reduction to Normal forms, Inverse of matrix by elementary transformations, Cayley-Hamilton theorem (Without Proof), Verification of and inverse of matrices by Cayley-Hamilton theorem. Solution of System of linear equations.	
UNIT-II: REAL NUMBER SYSTEM	**15 Hours**
Properties of real number system, inequalities & absolute values, l.u.b, g.l.b and Archimedean properties of real numbers. LIMITS AND CONTINUITY: Recapitulation of limits and continuity. Algebra of limits (with proofs). Algebra of continuous functions (without proofs). Properties of Continuous functions. Boundedness of continuous functions, Intermediate value theorems.	
UNIT-III: HIGHER ORDER DERIVATIVES	**15 Hours**
The nth derivative of a polynomial function $(ax+b)^n$, $1/ax+b$, logarithmic function (ax+b), exponential function (ax+b), Trigonometric function sin(ax+b), cos(ax+b), eax..sin (bx+c), eax. cos (bx+c), Leibntz's theorem for nth derivative of a product of two functions and its applications.	
UNIT-IV: MEAN VALUE THEOREMS	**15 Hours**
Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem, Taylor's Theorem (with Sclomilch and Rouche's form of reminder), Maclaurin's Series	

Reference Books:

1. Differential Calculus – Shantinarayan and Mittal
2. Real Analysis-N P Bali
3. First Course in Real Analysis-M.K.Singal and Asha Rani
4. Text book of B.sc Mathematics- G.K. Raganath
5. Matrices and determinants- M.L. Khanna

First Semester B.Sc. Mathematics Practicals

Paper Title: Mathematics-1P	**Marks: PR-40+IA-10**
Paper Code : SEPBSCMATP1	**Total Marks: 50**
Teaching Hours: 4 Hours/Week	**Credits: 02**

Introduction to SciLab / Maxima and commands related to the topic.

1. Computation of Sum, Difference and Product of two Matrices.
2. Computation of trace and transpose of matrices.
3. Computation of rank of matrix and row reduced echelon form.
4. Computation of inverse of a matrix using Cayley – Hamilton theorem.
5. Solution of system of homogeneous and Non-homogeneous equations.
6. Finding nth derivative of eax, trigonometric and hyperbolic functions.
7. Finding nth derivative of algebraic functions and Logarithmic functions.
8. Finding nth derivative of Finding nth derivatives of eaxsin(ax+b), eaxcos(ax+b) .
9. Examples on Rolle's theorem, Lagrange's and Cauchy's mean value theorem.
10. Taylor's and Mac Laurin's series expansion of a given function.

NOTE: Use the SciLab / MAXIMA Open – source Software to execute the practical problems. SciLab: is an open-source software and it can be downloaded from http://www.scilab.org/download. Some materials for SciLab can be found on http://wiki.scilab.org/Tutorialsarchives.

MAXIMA: is an Open source Computer Algebra System for solving typical calculus problems. The latest version is available on http://maxim.source.forge,net/documentation.html

ASSESSMENT METHODS

Evaluation Scheme for Theory Internal Assessment

Assessment Criteria	
1st Internal Assessment Test for 20 marks of duration 1 hr after 8 weeks (to be reduced to 04 marks)	04 Marks
2nd Internal Assessment Test for 20 marks 1 hr after 15 weeks. (to be reduced to 10 marks)	10 Marks
Attendance	03 Marks
Assignment	03 Marks
TOTAL	20 Marks

Practical

Assessment Criteria	
Internal Practical Test	10 Marks

Semester End Practical Examination

Scheme for Lab Examination

Assessment Criteria		
Programme-01	Writing Program	7 Marks
	Execution of program	8 Marks
Programme-02	Writing Program	7 Marks
	Execution of program	8 Marks
Journal		05 Marks
Viva Voce		05 Marks
Total		40 Marks

RANI CHANNAMMA UNIVERSITY, BELAGAVI.

QUESTION PAPER PATTERN OF UG MATHEMATICS SEP SYLLABUS

TIME: 3 HOURS. **MAX. MARKS: 80.**

PART – A:

[10 X 2 = 20MARKS]

Q. NO.: I . ANSWER ANY **TEN**

a)
b)
c)
d)
e)
f)
g)
h)
i)
j)
k)
l)

PART – B

Q. NOS: II ANSWER ANY **FOUR** [**4 X 5 = 20 MARKS]**

2)
3)
4)
5)
6)
7)

PART – C

Q. NOS: III ANSWER ANY **FOUR** [**4 X 10 = 40 MARKS]**

8 a)

b)

9 a)

b)

10 a)

b)

11 a)

b)

12 a)

b)

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FACULTY OF SCIENCE: DEPARTMENT OF MATHEMATICS

Certificate Course

Certificate Course in Vedic Arithmetic-I	
Teaching Hours: 2Hours/Week	**Total hours: 15**
Practicals	**4 hours**

Objectives: 1. To Create interest to solve multiplicative problems in Short-cut method.

2. To Create interest among all the students to solve tedious problems.

3. To develop interest among the students towards Vedic Mathematics.

4. To face Competitive exams.

Syllabus

UNIT-I: Multiplication	**15 Hours**
Introduction, Vedic Sutras- Antyayor dasakepi, Nikhilam Navatascaramam Dastatah, Anurupyena, Ekanyuena Purvena, Antyayoshatakepi, Vamanlvavoh Dasake api, Vamanlyayoh Dasake Gunijah Api and Urdhva-Tiryak their meanings and applications. Dot & Stick Method of multiplication of three numbers, Multiplication of four numbers.	

Practical 4x2=8 hrs

1. **3-digits Multiplication & its techniques based on Vedic Mathematics Sutras**
2. **4-digits Multiplication & its techniques based on Vedic Mathematics Sutras**

References:

1. Vedic mathematics -Maths with smile part-II: Sindhu Prakashana 533-2/VI Chikkansal Road Kundapura.
2. Nagu Naguta Ganita -Veda Ganita Bhaga-2 Sindhu Prakashana 533-2/VI Chikkansal Road Kundapura. -Sheshachal Rao, Dandeli Edu Society, Dandeli.
3. Vedic Mathematics Sumita Bose Secret Skills for Quick, Accurate Mental Calculations

Scheme of Examination

Multiple Choice Questions **25x2 marks=50 Marks**

Second Semester B.Sc. Mathematics Theory

Paper Title: Calculus–II and 3-Dimensional Geometry -2T	**Marks: Th-80+IA-20**
Paper Code: SEPBSCMAT T2	**Total hours: 60**
Teaching Hours: 4 Hours/Week	**Credits: 03**

UNIT-I: Polar Coordinates	**15 Hours**
Polar coordinates of a point and polar curve. Angle between the radius vector and the tangent at a point on the curve. Angle of intersection of two curves. Polar and pedal equation of the curves. Polar sub-tangent and polar sub - normal. Derivative of arc length, Curvature, Radius of curvature in Cartesian, Parametric, polar and pedal forms. Centre of curvature.	
UNIT-II: Partial derivatives & Jacobian.	**15 Hours**
Limits, continuity of functions of two variables. Partial derivatives, higher order partial derivatives, Euler's theorem on homogeneous functions. Total derivatives and differentiation of implicit and composite functions. Jacobian of second and third orders and its properties	
UNIT-III: Reduction Formulae	**15 Hours**
Reduction formulae for integration of $\sin^n x$, $\text{Cos}^n x$, $\tan^n x$, $\cot^n x$, $\text{Sec}^n x$, $\text{Cosec}^n x$, sinmx cosnx, x^n, e^{ax}, $x^m.(\log x)^n$.	
UNIT-IV: Sphere	**15 Hours**
Sphere: Equation of a sphere, section of a sphere by a plane, Equation of a sphere through a circle, Equation of a sphere through two given points as ends of a diameter. Equation to a tangent and normal planes of a sphere, Condition for tangency, Orthogonality of two spheres. Radical plane and coaxial system of spheres..	

Books of reference:

1. Differential Calculus : Santinarayan and Dr. P.K. Mittal
2. Integral Calculus : Santinarayan and Dr. P.K. Mittal
3. Differential Calculus and integral Calculus : N.P. Bali
4. Text Book of B.Sc Mathematics: G. K. Ranganath
5. Differential Calculus and integral Calculus :P. N. Chatterji.
6. Analytical Solid geometry: Santinarayan and Dr. P.K. Mittal
7. Solid Geometry: N.P. Bali

Second Semester B.Sc. Mathematics Practicals

Paper Title: Mathematics-2P	**Marks: PR-40+IA-10**
Paper Code : SEPBSCMATP2	**Total Marks: 50**
Teaching Hours: 4 Hours/Week	**Credits: 02**

1. Program to find the angle between radius vector and tangent of a polar curve
2. Finding radius of curvature of the given curves.
3. Finding center of curvature of the given curves.
4. Computation of arc length of Cartesian, Parametric curves
5. Computation of arc length of Polar form
6. Evaluation of definite integrals and Reduction formulae.
7. Program to verify Euler's theorem and its extension.
8. Program to find Jacobian of second and third orders.
9. Program to find equation of a sphere and plot the graph.
10. Program to verify the condition for orthogonality of two spheres.

NOTE: Use the SciLab / MAXIMA Open – source Software to execute the practical problems. SciLab: is an open-source software and it can be downloaded from http://www.scilab.org/download. Some materials for sciLab can be found on http://wiki.scilab.org/Tutorialsarchives.
MAXIMA: is an Open source Computer Algebra System for solving typical calculus problems. The latest version is available on http://maxim.source.forge,net/documentation.html

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QUESTION PAPER PATTERN OF UG MATHEMATICS SEP SYLLABUS

TIME: 3 HOURS. **MAX. MARKS: 80.**

PART – A:

[10 X 2 = 20MARKS]

Q. NO.: I . ANSWER ANY **TEN**

a)
b)
c)
d)
e)
f)
g)
h)
i)
j)
k)
l)

PART – B

Q. NOS: II ANSWER ANY **FOUR** [**4 X 5 = 20 MARKS]**

2)
3)
4)
5)
6)
7)

PART – C

Q. NOS: III ANSWER ANY **FOUR** [**4 X 10 = 40 MARKS]**

8 a)

b)

9 a)

b)

10 a)

b)

11 a)

b)

12 a)

b)

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FACULTY OF SCIENCE: DEPARTMENT OF MATHEMATICS

Certificate Course

Certificate Course in Vedic Arithmetic-II	
Teaching Hours: 2Hours/Week	**Total hours: 15**
Practicals	**4 hours**

Objectives: 1. To Create interest to solve problems on division in Short-cut method.

2. To Create interest among all the students to solve tedious problems.

3. To develop interest among the students towards Vedic Mathematics.

4. To face Competitive exams.

Syllabus

UNIT-I: Division	**15 Hours**
Division, Dhwajank and Nihkhilam method and their applications Squaring of numbers: Ekadhika method, Yavanunam method, Anurupyena method, Duplex method, Cubing of numbers by Nikhilam and Anurupyena methods. Simple problems.	

Practical 4x2=8 hrs

1. **Solve the Problems on division using simple techniques based on Vedic Mathematics Sutras**
2. **Solve difficult problems on Squaring, Cubing using simple techniques based on Vedic Mathematics Sutras**

References:

1. Vedic mathematics -Maths with smile part-II: Sindhu Prakashana 533-2/VI Chikkansal Road Kundapura.
2. Nagu Naguta Ganita -Veda Ganita Bhaga-2 Sindhu Prakashana 533-2/VI Chikkansal Road Kundapura. -Sheshachal Rao, Dandeli Edu Society, Dandeli.
3. Vedic Mathematics Sumita Bose Secret Skills for Quick, Accurate Mental Calculations

Scheme of Examination

Multiple Choice Questions **25x2 marks=50 Marks**

VIDYASANGAMA

RANI CHANNAMMA UNIVERSITY BELAGAVI

THE COURSE STRUCTURE AND SYLLABUS OF

UNDER GRADUATE BACHELOR OF SCIENCE

MATHEMATICS

III and IV Semester

w. e. f

Academic Year 2025-26 and Onwards

Submitted by

Chairman
Board of Studies (UG)
Bachelor of Science,
Rani Channamma University, Belagavi

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FACULTY OF SCIENCE: DEPARTMENT OF MATHEMATICS

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COURSE STRUCTURE FOR B.Sc. PROGRAMME

Semester	Subjects	Teaching Hours/week	Duration of Exams	Marks			Credits
				IA	Exam	Total	
III	Major1 Theory	04	03	20	80	100	03
	Major1 Practical	04	04	10	40	50	02
	Major2 Theory	04	03	20	80	100	03
	Major2 Practical	04	04	10	40	50	02
	Major3 Theory	04	03	20	80	100	03
	Major3 Practical	04	04	10	40	50	02
	Language1	04	03	20	80	100	03
	Language2	04	03	20	80	100	03
	Elective-1	03	02	10	40	50	02
	Environmental Science	04	02	10	40	50	02
						Total	**25**
IV	Major1 Theory	04	03	20	80	100	03
	Major1 Practical	04	04	10	40	50	02
	Major2 Theory	04	03	20	80	100	03
	Major2 Practical	04	04	10	40	50	02
	Major3 Theory	04	03	20	80	100	03
	Major3 Practical	04	04	10	40	50	02
	Language1	04	03	20	80	100	03
	Language2	04	03	20	80	100	03
	Elective-2	03	02	10	40	50	02
	Skill-1	04	02	10	40	50	02
						Total	**25**

III SEMESTER B.SC MATHEMATICS MAJOR THEORY-3	
Title of the Paper: Algebra-II, Real Analysis-II and Differential Equations-I	**Total Marks: Th-80+IA-20=100**
Paper Code: BSCMAT-T3	**Total Teaching Hours: 60 Hours**
Teaching Hours: 4 Hours/Week	**Credits:03**

UNIT-I: Group Theory	**15 Hours**
Groups, Semi groups, Abelian group, Standard examples of group, Properties of groups, Subgroups and its properties, Permutation group. Cyclic group & its properties, Cosets. Lagrange's theorem, Normal subgroups, Quotient group, Homeomorphism and Isomorphism of group.	
UNIT-II: Real Analysis-II	**15 Hours**
Lagrange's mean value theorem for functions of two variables. Taylor's and Maclaurian's theorems for functions of two variables (only statement). Examples on Maclaurian's theorems. Maxima and Minima of functions two and three variables, Lagrange Method of undetermined multipliers.	
UNIT-III: Infinite Sequences	**15 Hours**
Sequences, Bounded Sequences. Infimum and Supremum of a sequence. Limit of a sequences, Convergent, Divergent, and Oscillatory sequences. Algebra of convergent sequences. Monotonic sequences, theorems on monotonic sequences. Cauchy's sequences, Cauchy's first and second theorems on limits. Cauchy's criterion for convergence of a sequences (only statement)	
UNIT-IV: Differential equation-I	**15 Hours**
Bernoulli's form of differential equation, Exact differential equations, Necessary and sufficient condition for the differential equation to be exact, solution of differential equation by finding a suitable integrating factor. Differential equations of the first order higher degree, Solvable for p, Solvable for x, Solvable for y, Clairaut's form of differential equations and reducible to Clairaut's form.	

REFERENCES:

1. Shanti Narayana and P K Mittal: Textbook of Mathematical analysis: S. Chand and Com Ltd.
2. Nisha Rani and Gupta: Text book of real analysis: Vikas Publishing House Pvt, Ltd.
3. N P Bali: Real analysis (Golden Series): Laxmi Publication Pvt Ltd.
4. J N Sharma and A R Vasistha: Real analysis: New age International Pvt Ltd.
5. G. K. Ranganath: A text book of College Mathematics. S. Chand and Com Ltd.
6. D. Murray: Introductory Course in Differential Equations.
7. Ayres F: Differential Equations: Schaum Publishing Co, New York.
8. Herstein I. N: Topics in Algebra.: New York: Wiley.

III SEMESTER B.SC MATHEMATICS PRACTICAL-3	
Title of the Paper: Mathematics-3 P	**Total Marks: Th-40+IA-10=50**
Paper Code: BSCMAT-P3	**Total Teaching Hours :48 Hours**
Teaching Hours: 4 Hours/Week	**Credits:02**

1. Construction of Cayley table and verification of abelian property of a finite set.
2. Finding the Identity and Inverse elements of a group.
3. Finding the order of an element of a group and the generators of a cyclic group.
4. Verification of Lagrange's theorem for a finite group.
5. Verification of Lagrange's theorem for functions of two variables.
6. Finding Maclaurin's expansion of given functions.
7. Finding supremum and infimum of a sequence.
8. Examining the convergence of a sequences.
9. Verification of Cauchy's first and second theorem on limit.
10. Verification of exactness of a differential equation.
11. Finding solution of differential equations that are solvable for x, y and p.
12. Finding singular solution of Clairaut's form of differential equations.

NOTE: Use the SciLab / MAXIMA Open – source Software to execute the practical problems.

SciLab: is an open-source software and it can be downloaded from http://www.scilab.org/download. Some materials for sciLab can be found on http://wiki.scilab.org/Tutorialsarchives.

MAXIMA: is an Open source Computer Algebra System for solving typical calculus problems.The latest version is available on http://maxim.source.forge,net/documentation.html

III SEMESTER B.SC MATHEMATICS ELECTIVE-1	
Title of the Paper: Set Theory and Number Theory	**Total Marks: Th-40+IA-10=50**
Paper Code: BSCMAT-E1	**Total Teaching Hours: 45 Hours**
Teaching Hours: 3 Hours/Week	**Credits:02**

UNIT-I: Set Theory	**15 Hours**
Equivalence relations, partition of a set, arbitrary unions and intersections. De Morgan's laws, countable and uncountable sets.	
UNIT-II: Number theory -I	**15 Hours**
Divisibility of numbers and properties, division algorithm, properties of prime and composite numbers. Congruences and its properties, Fundamental theorem of arithmetic.	
UNIT-III: **Number theory-II**	**15 Hours**
Bracket function, properties, Euler's function, Fermat theorem, Euler and Wilson's theorems.	

REFERENCES:

1. Modern Algebra-D.C.Pavate: London MacMillan and co Ltd
2. Modern Algebra-A R Vasishtha and A K Vasishtha: Krishna Series Publication
3. Theory of Numbers Prakash Om (Golden series): Laxmi Publication Pvt Ltd Bangalore.
4. Higher Algebra- Bernard and Child: London Macmillan and co Ltd

IV SEMESTER B.SC MATHEMATICS MAJOR THEORY-4

Title of the Paper: Vector Calculus, Infinite series, Laplace transforms and Differential Equations-II.	**Total Marks: Th-80+IA-20=100**
Paper Code: BSCMAT-T4	**Total Teaching Hours: 60 Hours**
Teaching Hours: 4 Hours/Week	**Credits:03**

UNIT-I: Vector Calculus:	**15 Hours**
Dot and cross product of vectors, ordinary derivatives of vectors. Continuity and differentiability of a vector function. Derivatives of sum, difference, dot and cross product of vectors. Triple product of vectors. Constant vector functions, Partial differentiation of vector functions and examples. The vector differential operator del. The gradient of a scalar point function with examples. The divergence and curl of a vector function with examples. Solenoidal and irrotationalvectors. Identities on gradient, Divergence and Curl of a vector point function.	
UNIT-II: Infinite series:	**15 Hours**
Infinite series and examples. Convergent, Divergent and Oscillatory series. Partial sum of series. Series of non-negative terms, Necessary and sufficient condition for convergence, Cauchy's general principle of convergence. Geometric series. The P- series (Harmonic), Comparison tests (different forms). D' Alembert's ratio test, Raabe's test, Cauchy's Root test. Absolute convergence and conditional convergence of a series. Alternating series, Leibnitz theorem.	
UNIT-III: Laplace transforms:	**15 Hours**
Definition, basic properties. Laplace transforms of some common functions. First shifting theorem, change of scale property. Laplace transforms of periodic functions, Laplace transforms of derivatives and integrals, inverse Laplace transforms. Heaviside function, Dirac-delta function, unit step function, convolution theorem and Laplace transform method of solving differential equation of first and second order differential equations with constant coefficients.	
UNIT-IV: Differential Equations II:	**15 Hours**
Linear differential equation of n^{th} order with constant co-efficient. Particular integral when RHS is of the form e^{ax}, Sin(ax), Cos(ax), x^n, e^{ax} V and xV where V is function of x. Homogeneous linear differential equations of n^{th} order.	

REFERENCES:

1. Murray R. Spiegel: Vector Analysis: Schaum Publishing Co, New York
2. N.P.Bali: Sequence and series (Golden Series): Laxmi Publication Pvt Ltd.
3. Shanti Narayana: Mathematical Analysis. S. Chand and Com Ltd.
4. G. K. Ranganath: Text book of B.Sc. Mathematics. S. Chand and Com Ltd.
5. N. Rudraiah and others: College Mathematics. Sapna Book House Bangalore.
6. Walter Rudin: Principles of Mathematical analysis: Schaum Publishing Co, New York
7. N. P. Bali: Real Analysis:(Golden Series): Laxmi Publication Pvt Ltd.
8. N.P.Bali: Differential equations (Golden Series): Laxmi Publication Pvt Ltd.

IV SEMESTER B.SC MATHEMATICS PRACTICAL-4

Title of the Paper: Mathematics-4 P	**Total Marks: Th-40+IA-10=50**
Paper Code: BSCMAT-P4	**Total Teaching Hours :48 Hours**
Teaching Hours: 4 Hours/Week	**Credits:02**

1. Finding gradient, divergence and curl of a vector point function.
2. Verification of Solenoidal and irrotational vectors.
3. Finding Laplace transform of standard functions.
4. Finding Laplace transform of some simple functions.
5. Verification of convolution theorem.
6. Verification of Geometric series.
7. Verification of convergence of a series by Ratio test and Raabe's test.
8. Verification of convergence of a series by Cauchy's root test.
9. Examples on convergence of alternating series using Leibnitz's theorem
10. Finding the C.F of linear differential equations with constant coefficients
11. Finding the C.F of homogeneous differential equations with constant coefficients
12. Finding the P.I of differential equations up to second order.

NOTE: Use the SciLab / MAXIMA Open – source Software to execute the practical problems.

SciLab: is an open-source software and it can be downloaded from http://www.scilab.org/download. Some materials for sciLab can be found on http://wiki.scilab.org/Tutorialsarchives.

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IV SEMESTER B.SC MATHEMATICS ELECTIVE-2

Title of the Paper: **Fourier series and Graph Theory.**	**Total Marks: Th-40+IA-10=50**
Paper Code: BSCMAT-E2	**Total Teaching Hours:45 Hours**
Teaching Hours: 3 Hours/Week	**Credits:02**

UNIT-I: Fourier series:	**15 Hours**
Periodic functions, Fourier series of functions of period 2π and $2l$. Fourier series of odd and even functions, half range sine and cosine series. Finite sine and Cosine transform.	
UNIT-II: Basic Concepts of Graphs:	**15 Hours**
Introduction, graphs, finite and null graphs, loops, multi graphs, pseudo graph, simple graph, degree of a vertex, isolated and pendent vertices, connectedness and complete graphs, regular and complementary graphs. Minimum and maximum degree and related theorems with proofs. Isomorphism, line and total graphs. (Definitions and examples only).	
UNIT-III: Sub – Graphs:	**15 Hours**
Sub – graphs, spanning and induced sub-graphs, walk, trail, path, cycle, shortest path problems, bipartite graph. Characterization of bipartite graphs.	

REFERENCES:

1. Shanti Narayana: Mathematical Analysis: S. Chand and Com Ltd.
2. G. K. Ranganath: Textbook of B.Sc. Mathematics: S. Chand and Com Ltd.
3. N. Rudraiah and others: College Mathematics: Sapna Book House Bangalore.
4. Graph theory – Frank Harary: Addison-Wesley Publishing Company
5. Introduction to graph theory – Robin J Wilsoson, Longman
6. Graph theory and application -Narsing Deo: PHI Learning

IV SEMESTER B.SC MATHEMATICS SKILL-1

Title of the Paper: Indeterminate forms, Multiple Integrals and Fourier Series and Transforms (Skill-1)	**Total Marks: Th-40+IA-10=50**
Paper Code: BSCMAT-Skill-1	**Total Teaching Hours :48 Hours**
Teaching Hours: 4 Hours/Week	**Credits:02**

1. Evaluation of indeterminate form $\frac{0}{0}$
2. Evaluation of indeterminate form $\frac{\infty}{\infty}$
3. Evaluation of indeterminate form $0x\infty$
4. Evaluation of indeterminate form $\infty - \infty$
5. Evaluation of double integral with constant limits.
6. Evaluation of double integral with variable limits.
7. Evaluation of triple integral with constant limits.
8. Evaluation of triple integral with variable limits.
9. Finding Fourier series with period $2\pi \ and \ 2l$
10. Finding half range Fourier series.
11. Finding Fourier sine and cosine transform.

NOTE: Use the SciLab / MAXIMA Open – source Software to execute the practical problems.

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RANI CHANNAMMA UNIVERSITY, BELAGAVI.

QUESTION PAPER PATTERN OF UG MATHEMATICS

Major Theory 3 and 4

TIME: 3 HOURS. **MAX. MARKS: 80.**

PART – A

1. Answer any Ten of the following. **10 X 2 = 20 Marks**

a.
b.
c.
d.
e.
f.
g.
h.
i.
j.
k.
l.

PART – B

Answer any Four of the following. **4X 5 = 20 Marks**

2.
3.
4.
5.
6.
7.

PART – C

Answer any Four of the following. **4 X 10 = 40 Marks**

8. a.
b.
9. a.
b.
10. a.
b.
11. a.
b.
12. a.
b.

NOTE:

1. PART – A: At least two questions from each unit
2. PART – B: At least One questions from each unit
3. PART – C: One full question from each unit

RANI CHANNAMMA UNIVERSITY, BELAGAVI.

QUESTION PAPER PATTERN OF UG MATHEMATICS

Elective Theory E1 and E2

TIME: 2 HOURS. **MAX. MARKS: 40.**

PART – A:

1. Answer any FIVE of the following. **5 X 2 = 10 Marks**

a.
b.
c.
d.
e.
f.
g.

PART – B:

Answer any SIX of the following. **6X 5 = 30 Marks**

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

NOTE:

1. PART – A: At least two Question from each unit.
2. PART – B: Three Question from each unit.

RANI CHANNAMMA UNIVERSITY, BELAGAVI

ASSESSMENT CRITERIA

Formative Assessment Criteria for Theory

SI No	Assessment Criteria	Test Time	Marks
1	First Internal Test for 20 marks (Reduced to 4 Marks)	After 8 weeks from the start of the course	05 Marks
2	Second Internal Test for 20 marks (Reduced to 10 Marks)	After 14 weeks from the start of the course	05 Marks
3	Work Book Part A	Once 50% of the syllabus is completed	05 Marks
	Work Book Part B	With remaining 50 % of the Syllabus	05 Marks
4		**Total**	**20 Marks**

Formative Assessment Criteria for Practical

SI No	Assessment Criteria	Test Time	Marks Distribution	Marks
1	Practical Test for 10 Marks	At the end of each semester	Writing Programme	03 Marks
			Execution of Programme	07 Marks
2			**Total**	**10 Marks**

Summative Assessment Criteria for Theory

SI No	Assessment Criteria	Duration of Examination	Marks
1	Theory examinations are conducted at the end of each semester in accordance with RCU guidelines.	3 Hours	80 marks
		2 Hours	40 marks

Summative Assessment Criteria for Practical

SI No	Assessment Criteria	Marks Distribution	Marks
1	Practical examinations of four hours' duration are scheduled at the end of each semester	Writing Programme-1	07 Marks
		Execution of Programme-1	08 Marks
		Writing Programme-2	07 Marks
		Execution of Programme-2	08 Marks
		Journal	05 Marks
		Viva Voce	05 Marks
2		**Total**	**40 marks**

RANI CHANNAMMA UNIVERSITY BELAGAVI

THE COURSE STRUCTURE AND SYLLABUS OF

UNDER GRADUATE BACHELOR OF SCIENCE

MATHEMATICS

V and VI Semester

w. e. f

Academic Year 2026-27 and Onwards

Submitted by

Chairman
Board of Studies (UG)
Bachelor of Science,
Rani Channamma University, Belagavi

VIDYASANGAMA

RANI CHANNAMMA UNIVERSITY BELAGAVI

Accredited with B+ Grade by NAAC

FACULTY OF SCIENCE: DEPARTMENT OF MATHEMATICS

****

COURSE STRUCTURE FOR B.Sc. PROGRAMME

Semester	Subjects	Teaching Hours/week	Duration of Exams	Marks			Credits
				IA	Exam	Total	
V	Major1A Theory	04	03	20	80	100	03
	Major1A Practical	04	04	10	40	50	02
	Major1B Theory	04	03	20	80	100	03
	Major 2 A Theory	04	03	20	80	100	03
	Major 2 A Practical	04	04	10	40	50	02
	Major 2 B Theory	04	03	20	80	100	03
	Major 3 A Theory	04	03	20	80	100	02
	Major 3 A Practical	04	04	10	40	50	03
	Major 3 B Theory	04	03	20	80	100	03
	Skill-2	04	02	10	40	50	02
						Total	**26**
VI	Major1A Theory	04	03	20	80	100	03
	Major1A Practical	04	04	10	40	50	02
	Major1B Theory	04	03	20	80	100	03
	Major 2 A Theory	04	03	20	80	100	03
	Major 2 A Practical	04	04	10	40	50	02
	Major 2 B Theory	04	03	20	80	100	03
	Major 3 A Theory	04	03	20	80	100	02
	Major 3 A Practical	04	04	10	40	50	03
	Major 3 B Theory	04	03	20	80	100	03
	Skill-3	04	02	10	40	50	02
						Total	**26**

RANI CHANNAMMA UNIVERSITY BELAGAVI

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FACULTY OF SCIENCE: DEPARTMENT OF MATHEMATICS

****

Programme Outcomes (POs)

1. **Mathematical Knowledge:**
   Acquire a strong foundation in core areas of mathematics including calculus, numerical methods, complex analysis, differential equations, and topology.
2. **Problem-Solving Skills:**
   Apply mathematical concepts and techniques to solve theoretical and applied problems across science, engineering, and technology.
3. **Analytical Thinking:**
   Develop logical reasoning and the ability to analyze convergence, integrability, singularities, and function properties.
4. **Computational Proficiency:**
   Use numerical tools such as finite differences, interpolation, iterative methods, and quadrature rules for practical computation.
5. **Integration & Application:**
   Employ integration techniques, contour methods, and PDE solutions in applied contexts like physics, engineering, and probability.
6. **Research Readiness:**
   Build mathematical maturity and adaptability to pursue higher studies and research in pure and applied mathematics.
7. **Critical Evaluation:**
   Assess the validity of mathematical models, convergence tests, and computational methods with rigor and precision.
8. **Interdisciplinary Application:**
   Apply mathematical knowledge to interdisciplinary domains such as computer science, engineering design, and data science.
9. **Communication of Mathematics:**
   Present mathematical reasoning, proofs, and solutions clearly and effectively in both academic and applied settings.
10. **Lifelong Learning:**
    Cultivate continuous learning habits and adaptability to keep pace with evolving mathematical and computational techniques.

V SEMESTER B.SC MATHEMATICS MAJOR THEORY-5	
Title of the Paper: Real Analysis	**Total Marks: Th-80+IA-20=100**
Paper Code: BSCMAT-T5	**Total Teaching Hours: 60 Hours**
Teaching Hours: 4 Hours/Week	**Credits:03**

Course Outcomes (COs)

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

CO1: Understand the theoretical foundations of Riemann integration.

CO2: Apply integration techniques to continuous, monotonic, and bounded functions.

CO3: Analyze convergence of improper integrals using standard tests.

CO4: Evaluate integrals involving special functions (Beta & Gamma) with advanced techniques.

UNIT-I: Riemann Integration-I:	**15 Hours**
Partition of a closed interval, Norm and refinement of a partition. Upper and Lower Darboux sums. Upper and Lower Riemann Integrals, Riemann integral and examples. Necessary and sufficient conditions for integrability. Riemann sum, integral as the limit of a sum. Algebra of integrable functions (constant, sum, difference, product, quotient, and modulus)	
UNIT-II: Riemann Integration-II	**15 Hours**
Integrability of continuous functions, monotonic functions, bounded function with finite number of discontinuities. Fundamental theorem of integral calculus, Change of variables, Integration by parts. The first and second mean value theorem (Bonnet & Weirstrass form) of integral calculus.	
UNIT-III: **Improper integrals**	**15 Hours**
Improper integral, Improper integrals of first and second kind, Improper integral as limit of a proper integral. Convergence of improper integrals and examples. Comparison tests for convergence and examples. Abel's test and Dirichlet's test and examples.	
UNIT-IV: Beta Gama functions:	**15 Hours**
Definition, Properties and convergence of Beta and Gama functions, Recurrence formula for Gama function. Relation between Beta & Gamma functions. Evaluation of definite integrals using Gama function. Duplication formula.	

REFERENCES:

1. Fundamental Real analysis – S. L. Gupta &Nisha Rani, Vikas Publishing House Pvt. Ltd
2. Mathematical Analysis—Shantinarayan P. K. Mittal, S. Chand Publishing
3. A Course of Mathematical Analysis—M D Raisinghania, S. Chand Publishing
4. Real Analysis- N.P.Bali, Golden Series / New Age International Publishers
5. A text book of B.Sc. Mathematics- G.K.Ranganath, S. Chand Publishing

V SEMESTER B.SC MATHEMATICS PRACTICAL-5	
Title of the Paper: Mathematics-5 P	**Total Marks: Th-40+IA-10=50**
Paper Code: BSCMAT-P5	**Total Teaching Hours :48 Hours**
Teaching Hours: 4 Hours/Week	**Credits:02**

1. Finding the lower and upper Riemann sums.
2. Verification of Riemann integrability.
3. Verification of Riemann integral as a limit of sum.
4. Verification of the convergence of an improper integral of first kind.
5. Verification of the convergence of an improper integral of second kind.
6. Verification of the convergence of an improper integral by Abel's test.
7. Verification of the convergence of an improper integral by Dirichlet's test.
8. Evaluation of $\Gamma(n)$, if n is an integer.
9. Evaluation of $\Gamma(n)$, if n is a non-integer.
10. Evaluation of $\beta(m,n)$ for m>0, n>0.

NOTE: Use the SciLab / MAXIMA Open – source Software to execute the practical problems.

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V SEMESTER B.SC MATHEMATICS MAJOR THEORY-6	
Title of the Paper: Numerical Analysis	**Total Marks: Th-80+IA-20=100**
Paper Code: BSCMAT-T6	**Total Teaching Hours: 60 Hours**
Teaching Hours: 4 Hours/Week	**Credits:03**

Course Outcomes (COs)

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

CO1: Solve nonlinear and linear systems using iterative numerical methods.

CO2: Apply finite difference and interpolation techniques for function approximation.

CO3: Analyze and compute numerical differentiation and integration with standard rules.

CO4: Evaluate solutions of initial value problems using Euler, Taylor, and Runge-Kutta approaches.

UNIT-I: Solutions of algebraic and transcendental equations:	**15 Hours**
Bisection method, Newton-Raphson method and Secant method, Regula-Falsi method. Solution of system linear equations by Jacobi Iteration method and Gauss-Seidel Iteration method with examples.	
UNIT-II: Finite differences:	**15 Hours**
Finite difference operators: Δ (Delta),∇ (Del) & E (Shift), definitions and their properties. n^{th} order difference of a polynomial. Interpolation: Newton Gregory forward and backward difference interpolation formulae and examples. Lagrange's interpolation formula and examples.	
UNIT-III: Numerical differentiation & integration:	**15 Hours**
Numerical differentiation: Forward and backward difference formulae. Computation of first and second ordered derivatives. **Numerical integration:** General Quadrature formula, Trapezoidal rule, Simpson $1/3^{rd}$ and $3/8^{th}$ rules.	
UNIT-IV: Solution of initial value problems:	**15 Hours**
Solution of initial value problems of first order differential equations by Taylor's series method, Euler's method and modified Euler method, Runge- Kutta method of second and fourth order.	

REFERENCES:

1. Introductory method of numerical anaylsis- S.S.Shastri, PHI Learning
2. Calculus of finite differences – H.C,Saxena, S. Chand Publishing
3. Numerical methods for scientific and Engineering computation-
   - M.K.Jain, S.R.K.Iyengar, & R.K.Jain, New Age International Publications)
4. Text Book of Mathematics-G.K.Raganath, S. Chand Publishing
5. Numerical Analysis by G. Balaguruswamy, McGraw Hill Education India

V SEMESTER B.SC MATHEMATICS SKILL-2	
Title of the Paper: Numerical Analysis (Skill-2).	**Total Marks: Th-40+IA-10=50**
Paper Code: BSCMAT-Skill-2	**Total Teaching Hours:45 Hours**
Teaching Hours: 4 Hours/Week	**Credits:02**

1. Finding roots of an equation by Bisection method.
2. Finding roots of an equation by Newton-Raphson method.
3. Finding roots of an equation by Secant method.
4. Finding roots of an equation by Regula-Falsi method.
5. Solution of system of equations by Jacobi iteration method.
6. Solution of system of equations by Gauss - Seidel iterative method.
7. Finding f(x) by using Newton-Gregory forward and backward interpolation formula.
8. Finding the missing value of f(x) by using Lagrange's interpolation formula.
9. Numerical integration by Trapezoidal rule.
10. Numerical integration by Simpson's (1/3)rd and (3/8)th rule.
11. Solution of initial value problem by Euler's method.
12. Solution of initial value problem by modified Euler's method.
13. Solution of initial value problem by Runge-Kutta second and fourth order methods.

NOTE: Use the SciLab / MAXIMA Open – source Software to execute the practical problems.

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VI SEMESTER B.SC MATHEMATICS MAJOR THEORY-7	
Title of the Paper: Complex Analysis	**Total Marks: Th-80+IA-20=100**
Paper Code: BSCMAT-T7	**Total Teaching Hours: 60 Hours**
Teaching Hours: 4 Hours/Week	**Credits:03**

Course Outcomes (COs)

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

CO1: Understand complex variables, analytic functions, Cauchy-Riemann equations, harmonic functions, and construction of analytic functions using Milne-Thomson's method.

CO2: Apply Cauchy's Theorem, Morera's Theorem, and Cauchy's Integral Formula to evaluate integrals and derivatives of analytic functions.

CO3: Develop Taylor and Laurent series expansions, identify zeros and singularities, and analyze their implications.

CO4: Use Cauchy's Residue Theorem, Jordan's Lemma, and contour integration techniques to evaluate complex integrals.

UNIT-I: Complex Analysis:	**15 Hours**
Recapitulation of complex number, Complex variable and function of complex variable. Analytic function, Cauchy-Riemann equations, Harmonic function, Harmonic conjugate. Construction of analytic function using Milne-Thomson's method and examples.	
UNIT-II: Complex Integration:	**15 Hours**
Cauchy's Theorem, Morera's Theorem, Cauchy's Integral formula, Cauchy's Integral formula for derivative of an analytical function, Cauchy's inequality, Liouville's Theorem.	
UNIT-III: Taylor's and Laurent's Series:	**15 Hours**
Taylor's and Laurent's series, zeroes and singularities of analytic functions and examples.	
UNIT-IV: Residue Calculus:	**15 Hours**
Cauchy's Residue Theorem, Jordan's lemma and Contour Integration and examples.	

REFERENCES:

1. Theory of functions of a Complex variable- Shanti narayan and Mittal, S. Chand & Co. Ltd
2. The book Complex Variables– B.S Tyagi, Pragati Prakashan.
3. Complex Variables – J.N Sharma, Krishna Prakashan
4. Modern Algebra by A.R.Vasistha , Krishna Prakashan
5. Rings and Modules by C.S.Musli, Narosa Publishing House
6. A Text book of B.Sc. Mathematics by Dr. S.S. Bhusanoormath and others, S. Chand Publishing

VI SEMESTER B.SC MATHEMATICS PRACTICAL -7	
Title of the Paper: Mathematics-7 P	**Total Marks: Th-40+IA-10=50**
Paper Code: BSCMAT-P7	**Total Teaching Hours :48 Hours**
Teaching Hours: 4 Hours/Week	**Credits:02**

1. Construction of analytic function when real part of f(z) is given.
2. Construction of analytic function when imaginary part of f(z) is given.
3. Verification of Cauchy-Riemann equations for an analytical function.
4. Verification of harmonic function.
5. Construction of analytical function by the Milne-Thompson method.
6. Evaluation of contour integral by Cauchy's integral formula and plot the solutions.
7. Evaluation of complex integrals when the point lies outside the contour and plot the solution.
8. Computation of residues with simple poles.

10 Computation of residues when the pole is of order m , where m>1

NOTE: Use the SciLab / MAXIMA Open – source Software to execute the practical problems.

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VI SEMESTER B.SC MATHEMATICS MAJOR THEORY-8	
Title of the Paper: Differential Equations and Topology	**Total Marks: Th-80+IA-20=100**
Paper Code: BSCMAT-T8	**Total Teaching Hours: 60 Hours**
Teaching Hours: 4 Hours/Week	**Credits:03**

Course Outcomes (COs)

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

CO1: Formulate and solve ordinary and partial differential equations using standard methods.

CO2: Apply analytical techniques to solve non-linear PDEs including Charpit's method.

CO3: Demonstrate understanding of basic topological concepts such as open/closed sets, neighborhoods, and limit points.

CO4: Analyze and classify topological spaces using bases, subspaces, and separation axioms (T1 & T2).

UNIT-I: Ordinary and Partial Differential Equations:	**15 Hours**
Simultaneous differential equations with two variables. Total differential equation, Conditions of integrability and its solutions. Formation of partial differential equation by eliminating arbitrary constants and functions. Lagrange's linear partial differential equation Pp+Qq = R.	
UNIT-II: Non-Linear and Linear Partial differential Equations:	**15 Hours**
Non-linear differential equations of standard forms I, II, III and IV and Charpit's method with examples.	
UNIT-III: Topology-I	**15 Hours**
Definition of topological space, Open set, closed set, closure of a set, neighborhood, limit point, derived sets, interior, exterior and boundary point of a set	
UNIT-IV: Topology-II:	**15 Hours**
Base & sub-base, Sub spaces, Separation axioms with examples. T_1 & T_2 spaces, properties and examples.	

REFERENCES:

1. Differential equations – D.A.Murray, Longmans, Green & Co.
2. Differential equations – Bhudev Sharma, KNRN Publications
3. Differential equations – J.N.Sharma and R.K.Gupta, Krishna Prakashan Mandir, Meerut.
4. Text book of Mathematics – G.K.Ranganath, S. Chand Publishing
5. Higher Engineering Mathematics - B. S.Grewal, Khanna Publishers
6. Modern algebra and Topology – E- Sampatkumar and K. S Amur
7. Topology - J. N Sharma, Krishna Prakashan Media Pvt. Ltd., Meerut
8. Topology – R S Agrawal, S. Chand & Co. Ltd.

VI SEMESTER B.SC MATHEMATICS SKILL-3	
Title of the Paper: Differential Equations (Skill-3)	**Total Marks: Th-40+IA-10=50**
Paper Code: BSCMAT-Skill-3	**Total Teaching Hours :48 Hours**
Teaching Hours: 4 Hours/Week	**Credits:02**

1. Solution to the simultaneous differential equations.
2. Verification of integrability of total differential equation $P\,dx+Q\,dy+R\,dz=0$
3. Solution to the total differential equations.
4. Solution of partial differential equation of the form Pp + Qq = R.
5. Solutions of linear partial differential equation of standard forms f(p, q)=0.
6. Solutions of linear partial differential equation of standard forms f(x, p)=g(y,q)
7. Solutions of linear partial differential equation of standard forms f(p, q, z)=0
8. Solutions of linear partial differential equation of standard forms f(x,y) = px+qy+f(p,q)
9. Solution of non-linear partial differential equations by Charpit's method.

NOTE: Use the SciLab / MAXIMA Open – source Software to execute the practical problems.

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RANI CHANNAMMA UNIVERSITY, BELAGAVI.

QUESTION PAPER PATTERN OF UG MATHEMATICS

Major Theory 5 to 8

TIME: 3 HOURS. **MAX. MARKS: 80.**

PART – A

1. Answer any Ten of the following. **10 X 2 = 20 Marks**

a.
b.
c.
d.
e.
f.
g.
h.
i.
j.
k.
l.

PART – B

Answer any Four of the following. **4X 5 = 20 Marks**

2.
3.
4.
5.
6.
7.

PART – C

Answer any Four of the following. **4 X 10 = 40 Marks**

8. a.
b.
9. a.
b.
10. a.
b.
11. a.
b.
12. a.
b.

NOTE:

1. PART – A: Three questions from each unit
2. PART – B: Atleastone questions from each unit
3. PART – C: One full question from each unit

RANI CHANNAMMA UNIVERSITY, BELAGAVI

ASSESSMENT CRITERIA

Formative Assessment Criteria for Theory

SI No	Assessment Criteria	Test Time	Marks
1	First Internal Test for 20 marks (Reduced to 4 Marks)	After 8 weeks from the start of the course	05 Marks
2	Second Internal Test for 20 marks (Reduced to 10 Marks)	After 14 weeks from the start of the course	05 Marks
3	Work Book Part A	Once 50% of the syllabus is completed	05 Marks
	Work Book Part B	With remaining 50 % of the Syllabus	05 Marks
4		**Total**	**20 Marks**

Formative Assessment Criteria for Practical

SI No	Assessment Criteria	Test Time	Marks Distribution	Marks
1	Practical Test for 10 Marks	At the end of each semester	Writing Programme	03 Marks
			Execution of Programme	07 Marks
2			**Total**	**10 Marks**

Summative Assessment Criteria for Theory

SI No	Assessment Criteria	Duration of Examination	Marks
1	Theory examinations are conducted at the end of each semester in accordance with RCU guidelines.	3 Hours	80 marks
		2 Hours	40 marks

Summative Assessment Criteria for Practical

SI No	Assessment Criteria	Marks Distribution	Marks
1	Practical examinations of four hours' duration are scheduled at the end of each semester	Writing Programme-1	07 Marks
		Execution of Programme-1	08 Marks
		Writing Programme-2	07 Marks
		Execution of Programme-2	08 Marks
		Journal	05 Marks
		Viva Voce	05 Marks
2		**Total**	**40 marks**