

Shri Shivaji Education Society Amravati's

SHRI SHIVAJI SCIENCE AND ARTS COLLEGE , CHIKHALI , DIST BULDANA

NAAC Reaccredited with ' B++' Grade (CGPA-2.82)

DEPARTMENT OF MATHEMATICS

SYLLABUS (MAJOR)

(Prescribed by Sant Gadge Baba Amravati University ,Amravati)

B.Sc.Part-II (Semester-III)

MATHEMATICS I :_ Trigonometric Series and Calculus

Unit	Content
Unit I	Trigonometric Series: Gregory series ,Euler's series , Machin's series and Rutherford series.
Unit II	Differentiability: Successive differentiation ,Leibnitz theorem ,L' Hospital Rule
Unit III	Partial Differentiation: Partial derivatives and differentiation of real valued function of two variables, Homogeneous functions, Euler's theorem on homogeneous functions.
Unit IV	Integration: Evaluation of Double and Triple integral, Improper Integral (Definition only) ,Beta and Gamma functions, Properties of Beta and Gamma functions, Relation Between Beta and Gamma functions.

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SYLLABUS (MAJOR)

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B.Sc. Part-II (Semester-III)

MATHEMATICS II :_ Advanced Calculus

Unit I	Limit and Continuity of functions of two variables, Algebra of limit and continuity, Taylor's theorem for function of two variables.
Unit II	Maxima and Minima of two variables, Lagrange's multipliers method, Jacobian
Unit III	Definition of sequence, Uniqueness of limit of sequence, Algebra of limit of a sequence, Monotonic and Bounded sequence (Definition only), Cauchy sequence.
Unit IV	Series of non-negative terms, convergence of geometric series, P-series, Comparison test, Cauchy's integral test, Ratio test, Root test (Only theorem).

Practical :- The Distribution of marks for practical examination will be as follows

(For Both Papers)

Practical Assessment (50 Marks)	Internal Practical Assessment (25 Marks)	1. Practical Record-15Marks 2. Viva voce-10Marks
	External Practical Assessment (25 Marks)	1. Practical Perform-20 Marks (Perform any four, each carry 05Marks) 2. Viva voce-05Marks

List Of Practicals : (For Both Papers Together)

1	To find the trigonometric series.
2	To find n^{th} derivative by using Leibnitz's rule.
3	To find the value of limit by using L' Hospital Rule
4	To find the partial derivatives of some functions.
5	To find the degree of homogeneous function.
6	To verify Euler's theorem on homogeneous functions.
7	To Evaluate the integral by using Beta and Gamma function.
8	To solve the examples on relation between Beta and Gamma function.
9	To expand the function by using Taylor's series of function of two Variables .
10	To find absolute maximum and minimum value of the function of two variables.
11	To find the maximum and minimum value of the function by using Lagrange's multiplier's method.
12	To find m Jacobian of function
13	To solve the examples on monotonic and bounded sequence.
14	To verify the convergence and divergence of series by geometric and p- series tests.
15	To verify the convergence and divergence of series by comparison test, Cauchy's integral test and root test.

REFERENCE BOOKS : (For Both Papers Together)

- 1] V.A .Sharma ,V .R. Patil, S .R. Bhoyar , G.U. Khapekar ,A .N. Rangari: A Textbook of Algebra and Trigonometry, Dnyanpath Publication, Amravati, First Edition, 2022.
- 2] V.A. Sharma, V.R.Patil, S.R.Bhoyar, G.U.Khapekar, A.N.Rangari :A Text book of Differential and Integral Calculus: Dnyanpath Publication, Amravati, First Edition, 2022.
- 3] V. A.Sharma ,V.R.Patil,S.R.Bhoyar,G.U.Khapekar, A.N.Rangari, Y.S.Solanke: A Text Book of Advanced Calculus, Dnyanpath publication, Amravati, First edition 2023.
- 4] T.M.Karade, J.N.Salunke,A.G.Deshmukh,M.S. Bendre: Lectures on Advanced Calculus ,Sonu- Nilu Publication, Nagpur.
- 5] Leonord Eugene Dickson: Introduction to the theory of Algebraic equations, Maxwell Press.
- 6] Shanti Narayanand Dr.P.K.Mittal: Differential Calculus by, S.Chandand Co.Ltd .Revised Edition 2012 (Reprint 2014).
- 7] Mangal Giri: Algebra and Trigonometry ,Krishna's Publication, Nagpur.
- 8] Gorakh Prasad : Text book on Differential Calculus by ,Pothisha la Private limited Allahabad. 9]Ayres F: Calculus, Schaum's outline series, Mc Graw Hill, 1981.
- 10] Mac Millan : Differential calculus by Edwards, and Co .Ltd.
- 11] Murray and R Spiegel : Theory and Problems on Advance Calculus by ,Schaum Pub. Co .New York. 12] Edwards J: Differential Calculus for Beginners, MacMillan and Co.Ltd.,1963.
- 13]Forsynth A.R : A Treatise on Differential Equations, (SixthEdition), MacMillanand Co.1956. 14] Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum Outline Series.

SYLLABUS (MINOR)

(Prescribed by Sant Gadge Baba Amravati University, Amravati)

B.Sc. Part-II (Semester-III)

MATHEMATICS : _ Integral Calculus and Trigonometric Series

Unit I	Integration of irrational algebraic functions.
Unit II	Reduction formulae for $\int \sin^n x dx$, $\int \cos^n x dx$, $\int \tan^n x dx$, $\int \cot^n x dx$, $\int \sec^n x dx$, $\int \operatorname{osec}^n x dx$, and $\int \sin^n x \cos^m x dx$.
Unit III	Evaluation of Double integrations, Evaluation of Triple Integrations.
Unit IV	Gregory series, Euler's series, Machin's series and Rutherford series.

Practical :- The Distribution of marks for practical examination will be as follows

Practical Assessment (50 Marks)	Internal Practical Assessment (25Marks)	1. Practical Record- 15 Marks 2. Viva voce- 10 Marks
	External Practical Assessment (25Marks)	1. Practical Perform- 20 Marks (Perform any four ,each carry 05 Marks) 2. Viva voce- 05 Marks

List Of Practicals :

1	To find integration of type $\int \frac{dx}{\sqrt{Q}}$, where $Q=ax^2+bx+c$.
2	To find integration of type $\int \frac{P_n(x)dx}{\sqrt{Q}}$, where $P_n(x)$ = polynomial Inx of degree n.
3	To evaluate the integral by using reduction formulae.
4	To find the value of integration by using Walli's formula.
5	To find Area under curves by using integration
6	To find Work done by a force by using integration
7	To find the surface area of conic section by using integration.
8	To find the arc length of conic section by using integration.
9	To find the volume of a solid of revolution by using integration.
10	Evaluate the integral by changing the order of integration.
11	To evaluate the triple integral.
12	To find the sum of trigonometric series.

REFERENCE BOOKS :

- 1] V. A.Sharma, V.R.Patil, S.R.Bhoyar, G.U.Khapekar, A.N.Rangari : A Text book of Differential and Integral Calculus: Dnyanpath Publications, Amravati, First Edition, 2022.
- 2] V. A.Sharma, V.R.Patil, S.R.Bhoyar, G.U.Khapekar, A.N.Rangari : A Text book of Algebra and Trigonometry, Dnyanpath Publication, Amravati, First Edition, 2022.
- 3] T. M. Karade, J. N. salunke, A. G. Deshmukh, M. S. Bendre: Lectures on Advanced Calculus, Sonu-Nilu, Publication, Nagpur.
- 4] Gorakh Prasad : Integral Calculus,PothishalaPvt.Ltd.,Allahabad,1981.
- 5]Gorakh Prasad: Differential Calculus, Pothishala Pvt. Ltd., Allahabad.
- 6]N.Piskunov : Differential and Integral Calculus, Peace publishers, No scow.
- 7]Greenspan D.: Introduction to Calculus, Harper and Row, 1968.
- 8]EdwardsJ.: Integral Calculus for Beginners, AITBS, Publishers and Distributors,1994

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DEPARTMENT OF MATHEMATICS

SYLLABUS (MAJOR)

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B.Sc .Part-II (Semester-IV)

MATHEMATICS I :_ Ordinary Differential Equations

Unit I	Formation of ordinary differential equation, degree and order of ordinary differential equation, homogeneous differential equation, linear differential equation, Bernoulli's equation, differential equations reducible to the linear form, exact differential equations.
Unit II	Differential equations of first order and higher degree , differential equations solvable for p, x and y.
Unit III	Linear differential equations with constant coefficients, complementary function of the differential equations, particular integral of the differential equations, homogeneous linear ordinary differential equations.
Unit IV	Second order differential equations, Wronskian , method of change of dependent and Independent variable , variation of parameter.

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SYLLABUS (MAJOR)

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B.Sc.Part-II (Semester-IV)

MATHEMATICS II :_ Elements of Algebra

Unit I	Group :Definition of a group with examples , Properties of group , Subgroups ,Cyclic group, Order of a generator of a cyclic group.
Unit II	Cosets and Normal subgroups : Cosets, Lagrange's theorem, Normal subgroups, Different Characterization of normal subgroups, Quotient group.
Unit III	Homo morphism and Isomorphism :Homomorphism , Homomorphic image , Kernel of Homomorphism, Isomorphism of a group, Fundamental theorem of homomorphism of a group, second isomorphism theorem, third isomorphism theorem.
Unit IV	Ring : Definition, examples and Properties of a ring(Commutative ring , ring with unity , zero divisor, without zero divisor), Subring, Characterization of ring, Integral domain, Field, Sub field, Prime field (Definition only)

Practical :- The Distribution of marks for practical examination will be as follows : (For Both Papers)

Practical Assessment (50 Marks)	Internal Practical Assessment(25Marks)	1. Practical Record- 15 Marks 2. Viva voce– 10 Marks
	External Practical Assessment(25Marks)	1. Practical Perform – 20 Marks (Perform any four, each carry 05 Marks) 2. Viva voce- 05 Marks

List Of Practicals : (For Both Papers Together)

- 1 To solve the examples on Clairaut's form of differential Equation
- 2 To find orthogonal Trajectories of the curve.
- 3 To find the solution of second order differential equations.
- 4 To find the solution of second order differential equations by Normal form
- 5 To find solution of ordinary simultaneous differential equations.
- 6 To find Wronskian of the differential equation.
- 7 To solve the examples on Group.
- 8 To solve the examples on Ring.
- 9 To find the permutation of given set.
- 10 To apply ordinary differential equation for solving Electric circuit problem.
- 11 To apply ordinary differential equation for solving Steady state heat flow.
- 12 To apply ordinary differential equation for solving Radioactive decay.
- 13 To apply ordinary differential equation for carbon dating.
- 14 To apply ordinary differential equation for Newton's law of cooling.
- 15 To apply ordinary differential equation for finding compound interest.

REFERENCE BOOKS :

- 1] A Text book of, Ordinary Differential Equations : V.A.Sharma, V.R.Patil ,S.R.Bhoyar ,G.U. Khapekar, A. N. Rangari, Dnyanpath Publication, Amravati, First Edition, 2022.
- 2] A Text Book of Elements Algebra:V.A.Sharma,S.R.Bhoyar,V.R.Patil,G.U.Khapekar,A.N. Rangari, N. S. Bayaskar, R. V. Kene, P. B. Deshmukh, M. C. Dhabe: Dnyanpath publication, Amravati, Firstedition2023.
- 3] Ayres F Jr.: Differential equations,Schaum'soutlineseries,MacGrawHill,1981.
- 4] Coddington : An introduction of Ordinary Differential Equations, E.A.Prentice Hall of india, 1998.
- 5] T. M. Karade, N. T. Karade: Ordinary Differential Equation, Sonu-Nilu, Nagp ur, 2016.
- 6]MurrayD.A . : Introductory course in Differential Equations, Orient Longman(India),1967.
- 7] Piaggio HTS: Differential Equations, CBS Publishers & Distributors, Delhi, 1985.
- 8] SiminonsG.F.: Differential Equations,TataMcGrawHill,1972.
- 9] A.R.Forsyth:A Treatise on Differential Equations, Macmillan and Co.Ltd.London.
- 10] 10] H. K. Dass: Advanced Engineering Mathematics, S. Chand Publication, 2010.
- 11] B.S.Grewal : Higher Engineering Mathematics, Khanna Publisher,NewDelhi,2017.
- 12] I.N.Herstein : Topic in Algebra, Wiley Eastern Ltd,NewDelhi,1975.
- 13] N. Jacobson : Basic Algebra, Vol . I and IIW.H.Freeman, Hindustan Publishing Co., 1980.
- 14] 14] Shanti Narayan : A Text Book of Modern Abstract Algebra, S . Chand and Co. New Delhi.
- 15] 15] K. B. Datta: Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd. New Delhi,2000.
- 16]P.B.Bhattacharya,S.K.JainandS.R.Nagpal : Basic Abstract Algebra (IInd Edition) Cambridge University Indian Edition, 1997.

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SYLLABUS (MINOR)

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B.Sc.Part-II (Semester-IV)

MATHEMATICS :_ Foundations of Integral and Differential Equations

Unit I	Improper integral (Definition only), Gamma function, Properties of Gamma function, Examples.
Unit II	Beta function, Properties of Beta function, Relation between Gamma and Beta function, Examples, Jacobian
Unit III	Formation of ordinary differential equation, degree and order of ordinary differential equation, homogeneous differential equation, linear differential equation, Bernoulli's equation, differential equations reducible to the linear form, exact differential equations.
Unit IV	Linear differential equations with constant coefficients, complementary function of the Differential equations, particular integral of the differential equations, homogeneous linear ordinary differential equations

Practical :- The Distribution of marks for practical examination will be as follows :

Practical Assessment (50 Marks)	Internal Practical Assessment (25 Marks)	1. Practical Record- 15 Marks 2. Viva voce– 10 Marks
	External Practical Assessment (25Marks)	1. Practical Perform – 20 Marks (Perform any four, each carry 05 Marks) 1. Viva voce- 05 Marks

List Of Practicals :

- 1 To solve some proper integrals
- 2 To solve some improper integrals
- 3 To find the integral by using gamma integral.
- 4 To evaluate the integral by using Beta function.
- 5 To evaluate some Beta function
- 6 To evaluate some Gamma function.
- 7 To solve the examples on relation between Beta and gamma function.
- 8 To find the Jacobian of given functions.
- 9 To solve some linear differential Equations.
- 10 To solve some Bernoulli's differential equations
- 11 To solve homogeneous ordinary differential equations.
- 12 To find Complementary function and particular integral of second order differential equations.

REFERENCE BOOKS :

- 1] V. A. Sharma, V R. Patil, S. R. Bhoyar, G. U Khapekar, A. N. Rangari , Y. S. Solanke : A Text Book of Advanced Calculus, Dnyanpath publication, Amravati, First edition 2023.
- 2] V.A.Sharma,V.R.Patil,S.R.Bhoyar,G.U.Khapekar,A.N.Rangari:A Textbook of, Ordinary Differential Equations, Dnyanpath Publication, Amravati, First Edition, 2022.
- 3] V.A.Sharma,V.R.Patil,S.R.Bhoyar,G.U.Khapekar,A.N.Rangari,V.J.Gaikwad,R.M.Dhaigude: A Text Book of Mathematical Analysis, Dnyanpath Publication, Amravati, First edition 2022.
- 4] T. M . Karade , J . N. Salunke ,Maya S. Bendre, D .T .Solanke , C. S. Khodre ,S .P .Gaikwad ,N .B .Nawale : Advanced Calculus, SONU-NILU, Nagpur, 2023.
- 5] Gorakh Prasad : Integral Calculus , Pothishala Pvt. Ltd. , Allahabad.
- 6] N.Piskunov : Differential and Integral Calculus , Peace publishers , No scow.
- 7] Shanti Narayan : A Course of Mathematical Analysis ,S . Chand & Co . , New Delhi. 8]S. C. Malik and Arora : Mathematical Analysis, Wiley Estern Ltd., New Delhi.
- 9] Murray R . Spiegel : Theory and Problems of Advanced Calculus , Schaum Outline Series.
- 10] EdwardsJ. ,Integral Calculus for Beginners, AITBS, Publishers and Distributors,1994.