SARDAR PATEL UNIVERSITY , VALLABH VIDYANAGAR
SYLLABUS FOR B.Sc. SEMESTER - 3
US03CMTH21(T) (NUMERICAL METHODS)
FOUR HOURS PER WEEK (4 CREDIT)
Effective from June 2019
Marks:-100 (30 Internal + 70 External)

UNIT-1

Errors and Their Computations , A General Error Formula , Errors in a series approximation , Solutions of Algebraic and Transcendental Equations:Bisection Method , Iteration Method, Aitken's Δ^2 Process , Method of False Position , Newton-Raphson Method , Ramanujan's Method .

UNIT-2

Interpolation : Finite Differences, Forward ,Backward and Central Differences , Symbolic Relations of Operators , Detection of Errors by Use of Difference Tables, Differences of a Polynomial , Newton's Forward and Backward Formulae , Gauss Forward and Backward Formulae , Stirling's ,Bessel's and Everett's Formulae .

UNIT-3

Interpolation with Unequally Spaced Points , Lagrange's Interpolation Formula (Without proof) , Divided Difference and Their Properties , Newton's General Interpolation Formula , Interpolation by Iteration , Inverse Interpolation . Method of Successive Approximations , Numerical Differentiation:- Newton's Forward and Backward , Gauss's Method , Maximum and Minimum Values of a Tabulated Function .

UNIT-4

Numerical Integration :- Trapezoidal Rule , Simpson's $(\frac{1}{3})^{rd}$ and $(\frac{3}{8})^{th}$ Rules , Romberg Integration , Numerical Solution of Ordinary Differential Equation by Taylor's Series , Picards' Method , Euler's Method , Modified Euler's Method , Range-Kutta Method .

NOTE : Use of non- programmable Scientific Calculator is Allowed .

Recommended Texts :

(1) S.S.Sastry, Introductory methods of Numerical analysis,4th Ed., Prentice hall of India,2010.
Chapter : 1(1.3,1.4,1.5) , 2(2.1 to 2.6), 3(3.3.1,3.32,3.3.3,3.6,3.7,3.9.1,3.10,3.11), 5(5.1,5.2,5.3,5.4.1,5.4.2,5.4.3,5.4.6), 7(7.1 to 7.5)

Reference Texts:

(1) Brain Bradie , A Friendly Introduction to Numerical analysis , Pearson Education , India , 2007 .
(2) M.K.Jain, S.R.K.Iyengar and R.K.Jain , Numerical Methods for Scientific and Engineering Computation, 6th Ed.,New Age International Publisher,India 2007 .
(3) C.F.Gerald,P.O.Wheatly, Applied Numerical Analysis,Pearson Education, India,2008.
(4) G. Sankar rao , Numerical analysis.
(5) B.S.Grawal , Numerical analysis , Khanna pub.

SARDAR PATEL UNIVERSITY , VALLABH VIDYANAGAR
SYLLABUS FOR B.Sc. SEMESTER - 3
US03CMTH22T)(MULTIVARIATE CALCULUS)
FOUR HOURS PER WEEK (4 CREDIT)
Effective from June 2019
Marks:-100 (30 Internal + 70 External)

UNIT-1
Beta and Gamma Functions and Their Properties, Relation Between Beta and Gamma functions and Examples , Vector Calculus : Gradient of scalar field , Directional derivatives ,Tangent Plane and Normal Vector to a Surface , Divergence and Curl of a Vector Field.

UNIT-2
Line integral , Evaluation of Line Integrals , Double Integral , Change of Variables in Double Integral , Application of Double integral ,Change of Order of Integration in Cartesian Form

UNIT-3
Line Integral Independent of Path , Green's Theorem and its Application with Examples ,Area of Plane Region , Vector Form of Green's Theorem ,Surfaces , Tangent Plane and Normal Line to the Surface , First Fundamental Form , Area of a Surface, Surface Integrals , Moment of Inertia of Surface

UNIT-4
Triple Integrals,Divergence Theorem of Gauss and its Applications With Examples, First and Second Form of Green's Theorem , Application of Triple Integral (Total Mass ,Moment of Inertia , Volume) , Stoke's Theorem and its Applications with Examples .

Recommended Texts :

(1) E.Kreyszing , Advanced Engineering Mathematics , Fifth edition , New Age International (P) Ltd., New Delhi , 1997.
Chapter : 9

(2) Shanti Narayan , A course of Mathematical Analysis ,S.Chand & Company Ltd.
Appendix I (A.4,A.5,A.6)

Reference texts:

(1) Maurice D.Weir, Joel Hass,Frank R.Giordano , Thomas'Calculus ,Pearson Education,India.

(2) Dr.Dinesh Karia,M.L.Patel,N.Y.Patel,B.P.Patel,A Textbook of Calculus with an Introduction to Differential Equations.

(3) B.S.Grewal, Higher Engineering Mathematics, Thirty-fifth edition,Khanna Publ.

(4) Dr.K.R.Kachot, Higher Engineering Mathematics Vol- 1 ,Mahajan Pub. House, Ahmedabad

SARDAR PATEL UNIVERSITY , VALLABH VIDYANAGAR
SYLLABUS FOR B.Sc. SEMESTER - 3
US03CMTH23(P)(MATHEMATICS PRACTICAL)
FOUR HOURS PER WEEK (2 CREDIT)
Effective from June 2019
Marks:-50 (External)

PROBLEMS AND EXERCISES IN NUMERICAL METHODS

List of Practical :

(1) Inherent Errors and truncated errors ; Errors in a series approximation.
(2) Solution of algebraic and transcendental equations : Bisection method, Iteration method, Aitken's Δ^2 process, method of false position, Newton Raphson's method , Ramanujan's Method .
(3) Interpolation : Finite Differences, Forward ,Backward and Central Differences, Symbolic Relations of Operators , Detection of Errors by Use of Difference Tables , Differences of a Polynomial , Newton's Forward and Backward Formulae , Gauss Forward and Backward Formulae.
(4) Stirling's , Bessel's , Newton's General and Lagrange's formulae .
(5) Interpolation with Unequally Spaced Points , Lagrange's Interpolation Formula , Divided Difference and Their Properties , Newton's General Interpolation Formula , Interpolation by Iteration , Inverse Interpolation.
(6) Numerical differentiation :- Differentiation of Newton's forward and backward. Gauss's Method , Maximum and Minimum Values of a Tabulated Function.
(7) Trapezoidal rule ,Simpson's $(\frac{1}{3})^{rd}$ and $(\frac{3}{8})^{th}$ rules, Romberg method
(8) Numerical solution of ordinary differential equations :- Solution by Taylor's series , Picard's method , Euler's Method , Modified Euler's method , Runge-kutta method

Notes :

(1) Problem solving skill in mathematics is an important aspect in the teaching of mathematics.
(2) Use of the standard texts books may be permitted at the time of Practical Examination.
(3) Use of Scientific Calculator is Allowed.
(4) There would be a batch of problem solving session will be of four hours per week and they will be conducted in batches of students of size 20 to 25 per batch.
(5) The candidate shall have to produce at the time practical Examination the record of their prescribed Laboratory work , certified by the Head of the Department.

Recommended Texts :

(1) S.S.Sastry , Introductory methods of Numerical analysis , Prentice Hall Of India, 2010 .
(2) Brain Bradie, A Friendly Introduction to Numerical analysis, Pearson Education,India,2007.
(3) M.K.Jain, S.R.K.Iyengar and R.K.Jain , Numerical Methods for Scientific and Engineering Computation, 6th Ed.,New Age International Publisher,India 2007 .
(4) C.F.Gerald,P.O.Wheatly, Applied Numerical Analysis,Pearson Education, India,2008.
(5) G. Sankar rao , Numerical analysis.
(6) B.S.Grawal , Numerical analysis.
(7) Scarborough, Numerical Mathematical Analysis
(8) Bajpai, calus and farly, Numerical Analysis for scientists and Engineers, John Wiely.
(9) J.E.Whitesitt , Boolean Algebra .

SARDAR PATEL UNIVERSITY , VALLABH VIDYANAGAR
SYLLABUS FOR B.Sc. SEMESTER - 3
[illegible] (P) (MATHEMATICS PRACTICAL)
FOUR HOURS PER WEEK (2 CREDIT)
Effective from June 2019
Marks:-50 (External)

PROBLEMS AND EXERCISES IN MULTIVARIATE CALCULUS

List of Practical :

(1) Improper integrals , Beta Functions , Gamma Functions , Relation Between Beta and Gamma functions
(2) Vector Calculus : Gradient ,Divergence and Curl, Directional derivatives ,Tangent Plane and Normal Vector to a Surface
(3) Line integral ,Double Integral , Change of Variables in Double Integral
(4) Application of Double integral, Change of Order of Integration in Cartesian Form.
(5) Area of a Surface , Surface Integrals , Moment of Inertia of Surface
(6) Verify Green's Theorem , Triple Integrals ,Application of Divergence Theorem of Gauss
(7) Application of Triple Integral (Total Mass ,Moment of Inertia , Volume)
(8) Verify Stoke's Theorem

NOTE :

(1) Problem solving skill in mathematics is an important aspect in the teaching of mathematics.

(2) There would be a batch of problem solving session will be of four hours per week and they will be conducted in batches of students of size 20 to 25 per batch.

(3) The candidate shall have to produce at the time practical Examination the record of their prescribed Laboratory work, certified by the Head of the Department.

Recommended Texts :

(1) E.Kreyszing , Advanced Engineering Mathematics , Fifth edition , New Age International (P) Ltd., New Delhi , 1997.
(2) Shanti Narayan , A course of Mathematical Analysis ,S.Chand & Company Ltd.
(3) Maurice D.Weir, Joel Hass,Frank R.Giordano , Thomas'Calculus , Pearson Education,India .
(4) Dr.Dinesh Karia,M.L.Patel,N.Y.Patel,B.P.Patel,A Textbook of Calculus with an Introduction to Differential Equations.
(5) B.S.Grewal, Higher Engineering Mathematics, Thirty-fifth edition,Khanna Publ.
(6) Dr.K.R.Kachot, Higher Engineering Mathematics Vol- 1 ,Mahajan Pub. House