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Recognized by UGC as 'College with potential for Excellence'
I B.Sc Mathematics (for 2016-2019 batch, w.e.f 2016-17)
Paper I A, Syllabus for I semester
Differential Equations

UNIT - I: (12 Hours)**Differential equations of first order and first degree** (10 Marks-2,5 Marks-2)
Linear differential equations; Differential equations reducible to linear form; Exact differential equations; Integrating factors; Change of variables.

UNIT – II (12 Hours) **Orthogonal Trajectories, Differential Equations of first order but not of the first degree :** (10Marks-2, 5Marks- 1)
Equations solvable for p, Equations solvable for y, Equations solvable for x, Equations that do not contain x (or) y, Equations of the first degree in x and y- Clairaut's Equation.

UNIT-III: (12 Hours) **Higher order linear differential equations I** (10Marks-2, 5Marks-1)
Solution of homogeneous linear differential equations of order n with constant coefficients; Solution of the non-homogeneous linear differential equations with constant coefficients by means of polynomial operators.
General Solution of f(D)y=0
General Solution of f(D)y=Q when Q is a function of x.
$\frac{1}{f(D)}$ is Expressed as partial fractions.
P.I. of f(D)y = Q when Q= be^{ax}
P.I. of f(D)y = Q when Q = b sin ax or b cos ax.

UNIT-IV: (12 Hours) **Higher order linear differential equations II** (10Marks-2, 5Marks-2)
Solution of the non-homogeneous linear differential equations with constant coefficients.
P.I. of f(D)y = Q when Q= bx^k
P.I. of f(D)y = Q when Q= $e^{ax}V$
P.I. of f(D)y = Q when Q= xV
P.I. of f(D)y = Q when Q= x^mV

UNIT-V: (12 Hours) **Higher order linear differential equations III** (10Marks-2, 5Marks-2)
Method of Variation of Parameters; Linear Differential Equations with Non-Constant Coefficients, The Cauchy-Euler equation.

Prescribed Text Book: (1) A Text Book of B.Sc Mathematics Volume-I (S.Chand & Company)
(V.Venkateswara Rao, N.Krishnamurthy, B.V.S.S.Sarma, S.Anjaneya Sastry)

Reference Books: (1) Ordinary and Partial Differential Equations Raisinghania, published by S. Chand & Company, New Delhi.
(2) Differential Equations with applications and programs – S. Balachandra Rao & HR Anuradha- universities press.
(3) Differential Equations and Their Applications by Zafar Ahsan, published by Prentice-Hall of India Learning Pvt. Ltd. New Delhi- Second edition.

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SEMESTER-I
BLUE PRINT

Time: 3Hrs. Max. Marks:75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Differential equations of first order and first degree	: 2 questions
Differential equations of the first order but not of the first degree	: 1 question
Higher order Linear differential equations I	: 1 question
Higher order Linear differential equations II	: 2 questions
Higher order Linear differential equations III	: 2 questions

PART-II(5 x 10 M= 50 M)

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

Note: Under SECTION-A (Q.NO:13) & SECTION-B (Q.NO:14) will be given from UNIT-III.

SECTION-A

Differential equations of the first order and first degree	: 2 questions
Differential equations of the first order but not of the first degree	: 2 questions
Higher order Linear differential equations I	: 1 question

SECTION-B

Higher order Linear differential equations I	: 1 question
Higher order Linear differential equations II	: 2 questions
Higher order Linear differential equations III	: 2 questions

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I B.Sc. Mathematics – Paper I (A)
Differential Equations
Model Question Paper (for 2016-19 batch w. e. f 2016-2017)

Time: 3Hrs Max Marks: 75

PART-I

Answer any FIVE Questions, each question carries FIVE marks. 5x5M =25M

1. Solve $\left[y\left(1+\frac{1}{x}\right)+\text{Cos}\,y\right]dx+[x+\log x-x\,\text{sin}y]dy=0.$
2. Solve $(1-x^2)\frac{dy}{dx}+2xy=x\sqrt{1-x^2}.$
3. Solve $x^2(y-px)=p^2y.$
4. Solve $(D^2-3D+2)y = \text{Cosh}x.$
5. Solve $(D^2-4D+3)y = x^3.$
6. Solve $(D^2+4)y = x\sin x$
7. $(x\sin x+\cos x)\frac{d^2y}{dx^2}-x\cos x\frac{dy}{dx}+y\cos x=0.$
8. Solve $(x^2D^2+2xD-12)y=x^3(\log x).$

PART-II

Answer any FIVE questions. Choosing atleast TWO questions from each section.
Each question carries 10 marks. 5x10M = 50M

SECTION – A

9. Solve $(2x^2y-3y^2)\,dx+(2x^3-12xy+\log y)dy=0.$
10. Solve $\frac{dy}{dx}+\frac{y}{x}=y^2\,x\sin x\,,x>0.$
11. Show that the family of confocal conics $\frac{x^2}{(a^2+\lambda)}+\frac{x^2}{(b^2+\lambda)}=1$ is self orthogonal, where λ is a parameter.
12. Solve $p^2+2py\cot x=y^2.$
13. Solve $(D^2+a^2)y=\sec ax.$

SECTION-B

14. Solve $(D^2+9)y=\cos^3 x.$
15. Solve $(D^2+3D+2)y=xe^x\sin x.$
16. Solve $(D^2-4D+1)y=e^{2x}\cos^2 x.$
17. Solve $(x+2)\frac{d^2y}{dx^2}-(2x+5)\frac{dy}{dx}+2y=(x+1)e^x$, given that $y=e^{2x}$ is a part of C.F.
18. Solve $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}-y=x^2e^x$ by the method of variation of parameters.

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I B.Sc Mathematics
Syllabus and Paper pattern for mid semesters

I Semester. Total: 20 Marks.

Paper pattern

Section-A: Two questions will be given and one question has to be answered

1×10 = 10 Marks

Section-B: Four questions will be given and two questions has to be answered.

2×5 = 10 Marks.

II Semester Total :20 Marks

Paper pattern

Section-A: Two questions will be given and one question has to be answered

1×10 = 10 Marks

Section-B: Four questions will be given and two questions has to be answered.

2×5 = 10 Marks.

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Paper I B, Syllabus for II semester
Solid Geometry

UNIT – I (12 hrs) : The Plane : (10 Marks-2,5 Marks-1)

Equation of plane in terms of its intercepts on the axis, Equations of the plane through the given points, Length of the perpendicular from a given point to a given plane, Bisectors of angles between two planes, Combined equation of two planes, Orthogonal projection on a plane.

UNIT – II (12 hrs) : The Line : (10Marks-2, 5Marks- 2)

Equation of a line; Angle between a line and a plane; The condition that a given line may lie in a given plane; The condition that two given lines are coplanar; Number of arbitrary constants in the equations of straight line; Sets of conditions which determine a line; The shortest distance between two lines; The length and equations of the line of shortest distance between two straight lines; Length of the perpendicular from a given point to a given line.

UNIT – III (12 hrs) : Sphere : (10Marks-1, 5Marks-2)

Definition and equation of the sphere; Equation of the sphere through four given points; Plane sections of a sphere; Intersection of two spheres; Equation of a circle; Sphere through a given circle; Intersection of a sphere and a line; Power of a point; Tangent plane; Plane of contact; Polar plane; Pole of a Plane; Conjugate points; Conjugate planes.

UNIT – IV(12 hrs):Sphere&Cones : (10Marks-3, 5Marks-2)**(10 Marks Questions from Sphere 2 and Cone 1)**

Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres; Simplified form of the equation of two spheres, limiting points.

Definitions of a cone; vertex; guiding curve; generators; Equation of the cone with a given vertex and guiding curve; Enveloping cone of a sphere; Equations of cones with vertex at origin are homogenous; Condition that the general equation of the second degree should represent a cone; Condition that a cone may have three mutually perpendicular generators.

UNIT – V (12 hrs) Cones: (10Marks-2, 5Marks-1)

Intersection of a line and a quadric cone; Tangent lines and tangent plane at a point; Condition that a plane may touch a cone; Reciprocal cones; Intersection of two cones with a common vertex; Right circular cone; Equation of the right circular cone with a given vertex; axis and semi-vertical angle.

Prescribed Text Book: (1) A Text Book of B.Sc Mathematics Volume-I (S.Chand & Company)
(V.Venkateswara Rao, N.Krishnamurthy, B.V.S.S.Sarma, S.Anjaneya Sastry)

Reference Books :

1. Analytical Solid Geometry by Shanti Narayan and P.K. Mittal, Published by S. Chand & Company Ltd. 7th Edition.

2. A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, Published by Wiley Eastern Ltd., 1999.

3. Co-ordinate Geometry of two and three dimensions by P. Balasubrahmanyam, K.Y. Subrahmanyam, G.R. Venkataraman published by Tata-MC Gran-Hill Publishers Company Ltd., New Delhi.

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SEMESTER-II
BLUE PRINT

Time: 3Hrs. Max. Marks:75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Unit-I (The Plane)	: 1 question
Unit-II(The Line)	: 2 questions
Unit-III(The Sphere)	: 2 questions
Unit-IV(The Sphere & Cones)	: 2 questions
Unit-V (The Cones)	: 1 question

PART-II(5 x 10 M= 50 M)

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

SECTION-A

Unit-I (The Plane)	: 2 questions
Unit-II (The Line)	: 2 questions
Unit-III (The Sphere)	: 1 question

SECTION-B

Unit-IV (The Sphere & Cones)	: 3 questions
Unit-V (The Cones)	: 2 questions

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I B.Sc. Mathematics – Paper I (B)
Solid Geometry
Model Question Paper (for 2016-19 batch w. e. f 2016-2017)

Time: 3Hrs Max Marks: 75

PART-I

Answer any FIVE Questions, each question carries FIVE marks. 5x5M =25M

1. Prove that the equation of the plane through the points (1,-2,4) and (3,-4,5) and parallel to x-axis is y +2z =6.
2. Find the equations of the straight line passing through the point (1,0,-1) and intersecting the lines $4x - y - 13 = 0 = 3y - 4z - 1; y - 2z + 2 = 0 = x - 5.$
3. Prove that the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$; $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ are coplanar, also find their point of intersection.
4. Find the equation of the sphere circumscribing the tetrahedron whose faces are x = 0, y = 0, z = 0 and $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1.$
5. Find the pole of the plane x+2y+3z= 7 w.r.t the sphere $x^2 + y^2 + z^2 - 2x - 4y - 6z + 11 = 0.$
6. Find the equation of the sphere through the circle $x^2 + y^2 + z^2 - 2x + 3y - 4z + 6 = 0,$ 3x-4y+5z-15=0 and cutting the sphere $x^2 + y^2 + z^2 + 2x + 4y - 6z + 11 = 0$ orthogonally.
7. Find the equation to the cone whose vertex is (1,1,0) and whose guiding curve is $y = 0, x^2 + z^2 = 4.$
8. Show that the reciprocal cone of $ax^2 + by^2 + C^2 = 0$ is the cone $\frac{x^2}{a} + \frac{y^2}{b} + \frac{z^2}{c} = 0.$

PART-II

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks. 5x10M = 50M

SECTION – A

9. Find the equations of the planes bisecting the angles between the planes 3x-6y+2z+5=0, 4x-12y+3z-3=0 also point out which the plane bisects the acute angle.
10. A variable plane is at a constant distance p from the origin and meets the axis in A,B,C show that the locus of the centroid of the tetrahedrom OABC is $x^{-2} + y^{-2} + z^{-2} = 16p^{-2}.$
11. Find the image of the line $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ in the plane x+y+z=1.
12. Find the shortest distance and equations of the line S.D between the lines 3x-9y+5z=0=x + y - z and 6x+8y+3z-10 = 0 = x+2y+z -3.
13. Find the equations of the spheres passing through the circle $x^2 + y^2 = 4, z = 0$ and is intersected by the plane $x + 2y + 2z = 0$ in a circle of radius 3.

SECTION-B

14. Show that the two circles $x^2 + y^2 + z^2 - y + 2z = 0, x - y + z = 2$ and $x^2 + y^2 + z^2 + x - 3y + z - 5 = 0, 2x - y + 4z - 1 = 0$ lie on the same sphere and find its equation.
15. If r_1, r_2 are the radii of two orthogonal spheres, then show that the radius of the circle of their intersection is $\frac{r_1 r_2}{\sqrt{(r_1^2 + r_2^2)}}$.
16. Prove that the angle between the lines of intersection of the plane x+y+z=0 with the cone ayz+bzx+cxy=0 is $\frac{\pi}{3}$ if $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$
17. Show that the equation of quadric cone which contains the three coordinate axes and the lines in which the plane x-5y-3z=0 cuts the cone $7x^2 + 5y^2 - 3z^2 = 0$ is yz+10zx+18xy=0.
18. Find the equation of the right circular cone whose vertex is the origin, axis as the line x = t, y = 2t, z = 3t and whose semi-vertical angle is 60^0.

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II B.Sc Mathematics (for 2015-2018 batch, w.e.f 2016-17)
Paper II A, Syllabus for III semester
Abstract Algebra (Group Theory)

UNIT – 1 : (10 Hrs) GROUPS(10 Marks-2, 5 Mraks-1**)**

Binary Operation – Algebraic structure – semi group-monoid – Group definition and elementary properties Finite and Infinite groups – examples – order of a group. Composition tables with examples.

UNIT – 2 : (14 Hrs) SUBGROUPS, CO-SETS AND LAGRANGE'S THEOREM
(10 Marks-2, 5 Mraks-1**)**

Complex Definition – Multiplication of two complexes Inverse of a complex-Subgroup definition – examples-criterion for a complex to be a subgroups.

Criterion for the product of two subgroups to be a subgroup-union and Intersection of subgroups.

Cosets Definition – properties of Cosets–Index of a subgroups of a finite groups–Lagrange's Theorem.

UNIT –3 : (12 Hrs) NORMAL SUBGROUPS(10 Marks-1, 5 Mraks-2**)**

Definition of normal subgroup – proper and improper normal subgroup–Hamilton group – criterion for a subgroup to be a normal subgroup – intersection of two normal subgroups – Sub group of index 2 is a normal sub group – simple group – quotient group – criteria for the existence of a quotient group.

UNIT – 4 : (10 Hrs) HOMOMORPHISM(10 Marks-2, 5 Mraks-2**)**

Definition of homomorphism – Image of homomorphism elementary properties of homomorphism – Isomorphism – automorphism definitions and elementary properties–kernel of a homomorphism – fundamental theorem on Homomorphism and applications.

UNIT – 5 : (14 Hrs) PERMUTATIONS AND CYCLIC GROUPS(10 Marks-3, 5 Mraks-2**)**

Definition of permutation – permutation multiplication – Inverse of a permutation – cyclic permutations – transposition – even and odd permutations – Cayley's theorem.

Cyclic Groups :-

Definition of cyclic group – elementary properties – classification of cyclic groups.

Prescribed Text Book: A Text Book of B.Sc Mathematics Volume-II (S.Chand & Company)
(V.Venkateswara Rao, N.Krishnamurthy, B.V.S.S.Sarma, S.Anjaneya Sastry)

Reference Books :

1. A. First course in Abstract Algebra, by J.B. Fraleigh Published by Narosa Publishinghouse.
2. Modern Algebra by M.L. Khanna.

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SEMESTER-II
BLUE PRINT

Time: 3Hrs. Max. Marks:75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Groups	: 1 question
Subgroups	: 1 question
Normal Sub groups	: 2 questions
Homomorphism	: 2 questions
Permutations and Cyclic groups	: 2 questions

PART-II(5 x 10 M= 50 M)

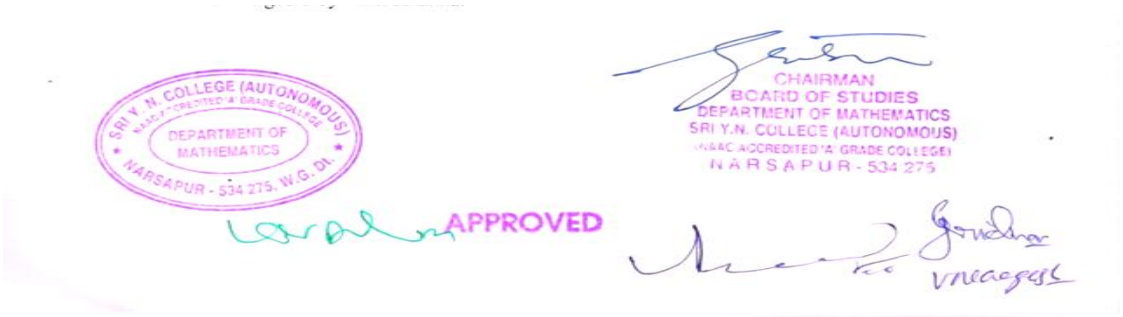
Answer any FIVE questions. Choosing atleast TWO questions from each section.
Each question carries 10 marks.

SECTION-A

Groups	: 2 questions
Subgroups	: 2 questions
Normal Subgroups	: 1 question

SECTION-B

Homomorphism and Isomorphism	: 2 questions
Permutations and Cyclic groups	: 3 questions



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Abstract Algebra(Group Theory)
Model Question Paper (for 2015-18 batch, w. e. f 2016-2017)

Time: 3Hrs Max Marks: 75

PART-I

Answer any FIVE Questions, each question carries FIVE marks. 5x5M =25M

1. Show that the set Q^+ of all positive rational numbers forms an abelian group under the composition "o" defined by $a \circ b = \frac{ab}{3} \forall a, b \in Q^+$
2. If H is any subgroup of a group G, then prove that $H^{-1}=H$.
3. If H is a subgroup of G and N is a normal sub group of G, then prove that (i) $H \cap N$ is a normal subgroup of H (ii) N is a normal subgroup of HN.
4. Prove that every sub group of an abelian group is normal.
5. Prove that every homomorphic image of an abelian group is abelian.
6. Let G be a multiplicative group and $f : G \to G$ such that for $a \in G$, $f(a)=a^{-1}$, then prove that f is one-one onto and f is homomorphism iff G is commutative.
7. Find the order of the cycle (1 4 5 7).
8. If G is a finite group of order n and if $a \in G$, then prove that $a^n=e$, where 'e' is identity in G

PART-II

Answer any FIVE questions. Choosing atleast TWO questions from each section.
Each question carries 10 marks. 5x10M = 50M

SECTION – A

9. Prove that in a group G, for a, b, x, $y \in G$ the equation ax=b and ya=b have unique solutions.
10. Define Order of an element of a group. In a group G for a, $b \in G$, O(a)=5, $b \neq e$ and $aba^{-1} = b^2$, then find O(b).
11. Prove that a non-empty finite subset of a group G which is closed under multiplication is a subgroup of G.
12. Prove that a non empty complex H of a group G is a subgroup of G iff (i) $a \in H, b \in H \Rightarrow ab \in H$ (ii) $a \in H \Rightarrow a^{-1} \in H$.
13. Prove that a subgroup H of a group G is a normal subgroup of G iff the product of two right cosets of H in G is again a right cost of H in G.

SECTION – B

14. Let G be a group and G^1 be a non empty set. If there exists a mapping f of G onto G^1 such that f(ab)=f(a)f(b) for $a,b \in G$, then prove that G^1 is a group.
15. Prove that the necessary and sufficient condition for a homomorphism f of a group G onto a group G^1 with Kernel K to be an isomorphism of G into G^1 is that K = { e }.
16. If f=(1 2 3 4 5 8 7 6), g=(4 1 5 6 7 3 2 8) are cyclic permutations, then show that $(fg)^{-1}=g^{-1}f^{-1}$.
17. Let S_n be a symmetric groups of n symbols and let A_n be the group of even permutations, then show that A_n is normal in S_n and $O(A_n)=\frac{1}{2}n!$
18. Prove that a group of prime order is cyclic.

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II B.Sc Mathematics
Syllabus and Paper pattern for mid semesters

III Semester. Total: 20 Marks.

Paper pattern

Section-A: Two questions will be given and one question has to be answered

1×10 = 10 Marks

Section-B: Four questions will be given and two questions has to be answered.

2×5 = 10 Marks.

IV Semester Total :20 Marks

Paper pattern

Section-A: Two questions will be given and one question has to be answered

1×10 = 10 Marks

Section-B: Four questions will be given and two questions has to be answered.

2×5 = 10 Marks.

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Paper II B, Syllabus for IV semester
Real Analysis

UNIT – I (12 hrs) : REAL NUMBERS

The algebraic and order properties of R, Absolute value and Real line, Completeness property of R, Applications of supreme property; intervals. (**No. Question is to be set from this portion)**

Real Sequences (10 Marks-2, 5 Mraks-2**)**

Sequences and their limits, Range and Boundedness of Sequences, Limit of a sequence and Convergent sequence.

The Cauchy's criterion, properly divergent sequences, Monotone sequences, Necessary and Sufficient condition for Convergence of Monotone Sequence, Limit Point of Sequence, Subsequences and the Bolzano-weierstrass theorem – Cauchy Sequences – Cauchy's general principle of convergence theorem.

UNIT –II (12 hrs) : INFINITIE SERIES(10 Marks-2, 5 Mraks-2**)**

Series : Introduction to series, convergence of series. Cauchy's general principle of convergence for series tests for convergence of series, Series of Non-Negative Terms.

1. P-test
2. Canchy's n^{th} root test or Root Test.
3. D-Alembert's Test or Ratio Test.
4. Alternating Series – Leibnitz Test.

Absolute convergence and conditional convergence, semi convergence.

UNIT – III (12 hrs) : CONTINUITY (10 Marks-1, 5 Mraks-1**)**

Limits : Real valued Functions, Boundedness of a function, Limits of functions. Some extensions of the limit concept, Infinite Limits. Limits at infinity. **(No. Question is to be set from this portion)**

Continuous functions : Continuous functions, Combinations of continuous functions, Continuous Functions on intervals, uniform continuity.

UNIT – IV (12 hrs) : DIFFERENTIATION & MEAN VALUE THEOREMS

(10 Marks-2, 5 Mraks-2**)**

The derivability of a function, on an interval, at a point, Derivability and continuity of a function, Graphical meaning of the Derivative, Mean value Theorems; Role's Theorem, Lagrange's Theorem, Cauchy's Mean value Theorem.

ADDITIONAL INPUT:

Generalized Mean value Theorems - Taylor's Theorem(Statement Only), Maclaurin's Theorem(Statement only), Expansion of functions with different forms of remainders, Taylor's Maclaurins Series, power series representation of functions.

UNIT – V (12 hrs) : RIEMANN INTEGRATION(10 Marks-3, 5 Mraks-1**)**

Riemann Integral, Riemann integral functions, Darboux theorem. Necessary and sufficient condition for R – integrability, Properties of integrable functions, Fundamental theorem of integral calculus, integral as the limit of a sum, Mean value Theorems.

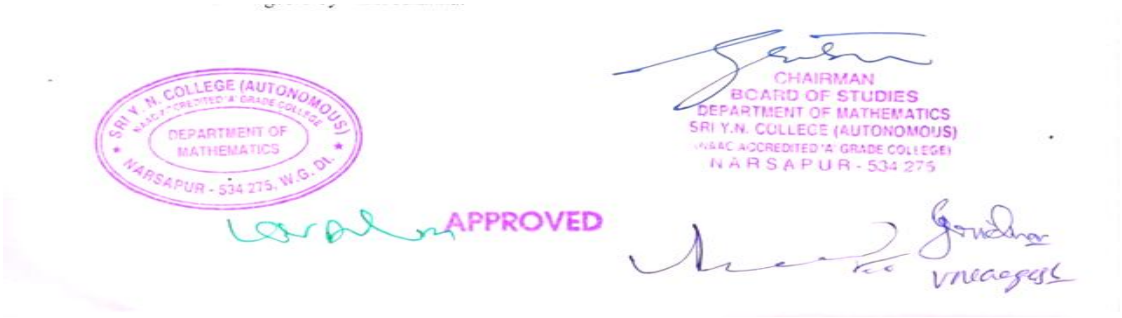
Prescribed Text Book: A Text Book of B.Sc Mathematics Volume-II (S.Chand & Company)

(V.Venkateswara Rao, N.Krishnamurthy, B.V.S.S.Sarma, S.Anjaneya Sastry)

REFERENCE TEXT BOOKS :

1."Introduction to Real Analysis" by RABERT g BARTELY and .D.R. SHERBART Published by John Wiley.

2. Elements of Real Analysis on per UGC Syllabus by Shanthi Narayan and Dr. M.D. Raisinghania Published by S. Chand & Company Pvt. Ltd., New Delhi.



SEMESTER-III
BLUE PRINT

Time: 3Hrs. Max. Marks:75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Real Sequences	: 2 questions
Infinite Series	: 2 questions
Continuity	: 1 question
Differentiation	: 2 questions
Riemann Integration	: 1 question

PART-II(5 x 10 M= 50 M)

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

SECTION-A

Real Sequences	: 2 questions
Infinite Series	: 2 questions
Continuity	: 1 question

SECTION-B

Differentiation & Generalized Mean value theorems	: 2 questions
Riemann Integration	: 3 questions

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II B.Sc. Mathematics – Paper II (B)
Real Analysis
Model Question Paper (for 2015-18 batch w. e. f 2016-2017)

Time: 3Hrs Max Marks: 75

PART-I

Answer any FIVE Questions, each question carries FIVE marks. 5x5M =25M

1. Prove that every convergent sequence is a Cauchy sequence.
2. Prove that $\lim\left[\frac{1}{(n+1)^2}+\frac{1}{(n+2)^2}+\cdots+\frac{1}{(n+n)^2}\right]=0$
3. Test for the convergence of $\sum_{n=1}^{\infty}\frac{2^n-2}{2^n+1}x^n$, x>0
4. Test for the convergence of $\sum_{n=2}^{\infty}\frac{\log n}{2n^3-1}$
5. Let f:R→R be such that $f(x)=\frac{e^{\frac{1}{x}}-e^{\frac{-1}{x}}}{e^{\frac{1}{x}}+e^{\frac{-1}{x}}}$ if x ≠ 0 and f(0)=1 discuss the continuity at x=0.
6. If f:[a,b]→R is derivable at c∈[a,b], then prove that f is continuous at c.
7. Prove that tan x > x > sin x ∀ x ∈ $(0,\frac{\pi}{2})$.
8. Prove that f(x) = sinx is integrable on $[0,\frac{\pi}{2}]$ and $\int_0^{\frac{\pi}{2}}\sin dx=1$.

PART-II

Answer any FIVE questions. Choosing atleast TWO questions from each section.
Each question carries 10 marks. 5x10M = 50M

SECTION – A

9. Prove that a monotone sequence is convergent iff it is bounded.
10. State and prove Cauchy's general principle of convergence.
11. State and prove D-Alembert's test.
12. State and prove Cauchy's n^{th} root test.
13. Examine the continuity of f defined by $f(x)=|x|+|x-1|$ at x=0,1.

SECTION-B

14. State and prove Darboux's theorem.
15. Using Lagrange's theorem, show that $x>\log(1+x)>\frac{x}{x+1}\forall x>0$.
16. If f: [a, b] → R is monotonic on [a, b], then prove that f is integrable on [a, b].
17. State and prove First mean value theorem.
18. Prove that $\frac{\pi^3}{24}\le\int_0^{\pi}\frac{x^2}{5+3\cos x}dx\le\frac{\pi^3}{6}$.

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III B.Sc Mathematics (for 2013-16 batch w.e.f 2015-2016)
Paper III A, Syllabus for V semester
Linear algebra

Unit-I : Linear algebra(15 Marks-4, 8 Marks-4 , 4 Marks- 3)

Vector spaces, General properties of vector spaces, Vector subspaces, Algebra of subspaces, linear combination of vectors, Linear span, Linear sum of two subspaces, linear independence and dependence of vectors, Basis of vector space, Finite dimensional vector spaces, Dimension of a vector space, Dimension of a subspace, Quotient Spaces, Dimension of quotient, Linear transformations, Linear operators, Range and null space of linear transformation, Rank and nullity of linear transformations, linear transformations as vectors, Product of linear transformations, Invertible linear transformations.

Rank of a matrix, Linear equations (No question is to be set from this portion)

Unit II: (15 Marks-4, 8 Marks-4 , 4 Marks-2)

The adjoint or transpose of a linear transformation, Sylvester`s Law of nullity, characteristic values and characteristic vectors , Cayley-Hamilton theorem, Diagonalizable operators. Inner product spaces, Euclidean and unitary spaces, Norm or length of a vector, Schwartz inequality, Orthogonality, Orthonormal set, Gram-Schmidt orthogonalisation process.

PRESCRIBED TEXT BOOK:

(1) A Text Book of B.Sc Mathematics Volume-III (S.Chand & Company)
(V.Venkateswara Rao, N.Krishnamurthy, B.V.S.S.Sarma, S.Anjaneya Sastry)

(2)Linear algebra by J.N.Sharma and A.R.Vasista, Krishna prakasham Mandir, Meerut-250002.

REFERENCE BOOKS:

(1)Linear algebra by Kenneth Hoffman and Ray Kunze, Pearson Education (low priced edition) New Delhi.

(2)Linear algebra by Stephen H.Friedbergetal Prentice Hall of India Pvt.Ltd. 4th edition 2007.

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SEMESTER-V
BLUE PRINT

Time: 3Hrs. Max. Marks: 120

PART-I

Answer any FOUR questions. Choosing TWO questions from each section. Each question carries 15marks. 4x15=60M

SECTION-A

Vector Spaces	: 1question
Basis and Dimension	: 1question
Linear transformations	: 2 questions

SECTION-B

The transpose of a linear transformation, Sylvester`s Law of nullity	: 1question
Characteristic values& vectors, Cayley-Hamilton theorem	
Diagonalizability	: 1question
Inner product Spaces	: 1queston
Orthogonality	: 1question

PART-II

Answer any FIVE of the following questions. Each question carries 8 Marks. 5x8 = 40M

Vector spaces	: 1question
Basis and Dimension	: 1question
Linear transformations	: 1question
Vector space isomorphism	: 1question
Characteristic values& vectors, Diagonalizability	: 2 questions
Inner product Spaces, Orthogonality	: 2 questions

PART-III

Answer the following Questions. Each question carries 4 Marks. 5x4 = 20M.

Vector spaces	: 1question
Linear transformation	: 1question
Characteristic values& vectors	: 1 question
Inner product spaces	: 2 question

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III B.Sc. Mathematics – Paper III A
Linear Algebra
Model Question Paper (for 2013-16 batch w.e.f 2015-2016)

Time: 3Hrs **PART – I** Max.Marks:120

- Answer any **FOUR** questions.
  Choosing **TWO** questions from each section. Each question carries 15marks. 4x15=60M

SECTION – A

1. Let V(F) be a vector space and S=$\{\alpha_1,\alpha_2\ldots\alpha_n\}$ be a finite subset of nonzero vectors of V(F), then show that S is linearly dependent if and only if some $\alpha_k \in S, 2 \le k \le n$, can be expressed as a linear combination of its preceeding vectors.
2. Let W be a subspace of a finite dimensional vector space V(F), then $\dim\frac{V}{W} = \dim V - \dim W$
3. Let U(F) and V(F) be a two vector spaces and T:U$\to$V be a linear transformation and U be finite dimensional, then show that $\sigma(T)+\upsilon(T) = \dim U$.
4. Describe explicitly of the linear transformation $T : \mathbf{R}^2 \to \mathbf{R}^2$ such that T(2,3)=(4,5) and
. T(1,0)=(0,0).

SECTION-B

5. State and prove Sylvester's law of nullity of a linear transformation.
6. State and prove Cayley-Hamilton theorem.
7. State and prove Bessel's inequality in an inner product space.
8. Apply Gram-Schmidt process to the vectors {(1,0,1), (1,0,-1), (0,3,4)} to obtain an orthonormal basis of $V_3(R)$ with the standard inner product.

PART-II

- Answer any **FIVE** of the following questions. Each question carries 8 Marks. 5x8 = 40M

9. Show that the union of two subspaces is a subspace iff one is contained in the other.
10. Let W_1 & W_2 be two subspaces of R^4 given by $W_1=\{(a,b,c,d) \mid b-2c+d=0\}$, $W_2=\{(a,b,c,d) \mid a=d, b=2c\}$. Find the basis and dimension of (i) W_1 (ii) W_2 (iii) $W_1 \cap W_2$ and hence find $\dim(W_1+W_2)$.
11. Let T be a linear transformation from a vector space U(F) into a vector space V(F). If U is finite dimensional, then the range of T is a finite dimensional subspace of V(F).
12. Let U(F) & V(F) be two vector spaces and T:U$\to$V be a linear transformation. Then show that T is non singular iff the set of images of a linearly independent set is linearly independent.
13. Show that the matrix $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ satisfies Cayley-Hamilton theorem.
14. Let T be a linear operator on a finite dimensional vector space V. Then show that 0 is a characteristic value of T iff T is not invertible.
15. If α, β are two linearly independent vectors in an inner product space, then show that $|<\alpha,\beta>| = \|\alpha\|\|\beta\|$
16. In an inner product space prove that any orthogonal set of non-zero vectors is linearly independent.

PART-III

➢ Answer the following Questions. Each question carries 4 Marks. 5x4 = 20M.

17. Prove that the set W of ordered triads (x,y,0) where $x,y \in F$ is a subspace of $V_3(F)$.

18. The mapping $T:V_3(R) \rightarrow V_2(R)$ is defined by $T(x,y,z)=(x-y, x-z)$, then show that T is a linear transformation.

19. Find the eigen values of the matrix $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 0 & -1 \\ 2 & -1 & 0 \end{bmatrix}$.

20. State and prove Triangle inequality.

21. If $\alpha=(4,1,8)$, $\beta=(1,0,-3)$ are two vectors in R^3 find the angle between α and β .

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Paper III B, Syllabus for VI semester
Vector Calculus

Unit-I : Multiple integrals(15 Marks-4, 8 Marks-4 , 4 Marks-2)

Introduction, The concept of a plane, curve, Line integral-sufficient condition for the existence of the integral. The area of a subset of R ,Calculation of double integrals, Jordan curve ,Area, Change of The order of integration, Double integral as a limit, Change of variable in a double integration.

Unit-II: Vector calculus(15 Marks-4, 8 Marks-4 , 4 Marks-3)

Vector differentiation: Ordinary derivatives of vectors, Space curves, continuity, differentiability, Gradient, Divergence, Curl operators, Formulae involving these operators. Vector integration, Theorems of Gauss and Stokes, Green`s theorem in plane and applications of these theorems

PRESCRIBED BOOK:

(1) A Text Book of B.Sc Mathematics Volume-III (S.Chand & Company)
(V.Venkateswara Rao, N.Krishnamurthy, B.V.S.S.Sarma, S.Anjaneya Sastry)

(2)A course of Mathematical Analysis by Santhi Narayana and P. K .Mittal, S.Chand publications.Vector Analysis by Murray .R.Spiegel, Schaum Series Publishing Company.

REFERENCE BOOKS:

1. Text of Vector Analysis by Shanthi Narayana and P.K.Mittal, S.Chand and company Ltd,New Delhi.
2. Mathematical Analysis by S.C.Mallik and Savitha Arora,Wiley Eastern Ltd.

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SEMESTER-VI
BLUE PRINT

Time: 3Hrs. Max. Marks:120

PART-I

Answer any FOUR questions. Choosing TWO questions from each section. Each question carries 15marks. 4x15=60M

SECTION-A

Line Integrals	: 2questions
Double integrals	: 2 questions

SECTION-B

Differential operators	: 2questions
Integral transformations	: 2questions

PART-II

Answer any FIVE of the following questions. Each question carries 8 Marks. 5x8 = 40M.

Line Integrals, Double integrals	: 4 questions
Differential operators	: 2questions
Integration of a vector	: 1question
Integral transformations	: 1 question

PART-III

Answer the following Questions. Each question carries 4 Marks. 5x4 = 20M.

Double integrals	: 2questions
Differential operators	: 2questions
Integral transformations	: 1questions

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III B.Sc. Mathematics – Paper III B
Multiple integrals and vector calculus
Model Question Paper (for 2013-16 batch w.e.f 2015-2016)

Time: 3Hrs **PART – I** Max.Marks:120

SECTION – A

- Answer any **FOUR** questions.
  Choosing **TWO** questions from each section. Each question carries 15marks. 4x15=60M

1. Show that the value of the integral $\int(xy^2dy - x^2ydx)$, taken in the counter clock wise sense along the cardiode r=a(1+cosθ)
2. Show that ø(h) = $\int_h^1\{\int_h^1 \frac{(x-y)}{(x+y)^3}dy\}dx$ is not continuous for h=0.
3. Evaluate $\iint_R \sqrt{4x^2 - y^2}\,dxdy$, where R is the triangle bounded by the lines y=0, y=x, x=1.
4. Change the order of integration and hence show that $\int_0^1 dx \int_0^{\sqrt{1-x^2}} \frac{dy}{(1+e^y)\sqrt{1-x^2-y^2}} = \frac{\pi}{2}\log[\frac{2e}{1+e}]$.

SECTION-B

5. Prove that Curl(A × B)=(B.∇)A - B divA - (A.∇)B+A div B.
6. If $\bar{a}$ is a constant vector, prove that $\text{curl}\ \frac{\bar{a}\times\bar{r}}{r^3} = -\frac{\bar{a}}{r^3} + \frac{3\bar{r}}{r^5}(\bar{a}.\bar{r})$.
7. Verify Gauss's divergence theorem to evaluate $\int_S (x^3 - yz)\bar{i} - 2x^2y\bar{j} + z\bar{k}) \,.\, \bar{N}\, dS$ over the surface of a cube bounded by the coordinate planes x = y = z = a.
8. State and prove Green's theorem.

PART-III

- Answer any **FIVE** of the following questions. Each question carries 8 Marks. 5x8 = 40M.

9. Show that $\int_C[(x-y)^3dx + (x-y)^3dy] = 3\pi a^4$ where C is the circle $x^2 + y^2 = a^2$ in the counter clock wise sense.
10. Evaluate $\int_C[(2a-y)dx - (a-y)dy]$, where C is given by x=a(t-sint), y=a(1-cost).
11. Sketch the region of integration and write an equivalent double integral with the order of integration reversed and evaluate $\int_0^1 \int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} 3y\,dxdy$
12. Evaluate $\iint_E e^{x^2+y^2}dydx$, where E is the semi-circular region bounded by the x-axis and the curve $y = \sqrt{1-x^2}$.
13. Find the directional derivative of the function f=xy+yz+zx in the direction of the vector $\bar{i} + 2\bar{j} + 2\bar{k}$ at the point (1,2,0).
14. Find div f and curl f where f = grad(x^3+y^3+z^3-3xyz).

15. Find $\int_C \bar{F} \cdot d\bar{r}$ where $\bar{F} = xy\bar{i} + yz\bar{j} + zx\bar{k}$ and the curve C is $\bar{r} = t\bar{i} + t^2\bar{j} + t^3\bar{k}$, t varying from -1 to 1
16. If $\bar{F} = (2x^2 - 3z)\bar{i} - 2xy\bar{j} - 4x\bar{k}$ then evaluate $\int_v div\bar{F}dV$ where V is the closed region bounded by the planes x = 0, y = 0,z = 0 and 2x+2y+z=4.

PART-III

➢ Answer the following Questions. Each question carries 4 Marks. 5x4 = 20M.

17. Evaluate $\iint \frac{y^2}{1+x^2} dxdy$ over [-1,1 ; 0,2].
18. Evaluate $\int_0^3 \int_1^2 xy(x+y)dxdy$.
19. Find the greatest value of the directional derivative of the function $f= x^2yz^3$ at (2,1,-1).
20. Prove that $div(\nabla\phi \times \nabla f)=0$.
21. Prove that $\oint_c (f\nabla f).dr = 0$.

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Syllabus and Paper pattern for mid semesters

V semester

Syllabus — Total Marks:25

Ist mid semester: Units -I and II of the prescribed syllabus.

2nd mid-semester: Units -I and II of the prescribed syllabus.

Paper pattern

Section-A: Two questions (one from unit-I and another from unit-II) will be given and one question has to be answered 1×15 = 15 Marks.

Section-B: Two questions from unit-I and Two questions from unit-II will be given and two questions have to be answered. 2×3 = 6 Marks.

Section-C: One question from unit –I and One question from Unit-II will be given and the two questions have to be answered. 2×2 = 4 Marks.

Vl Semester

Syllabus. Total 25 Marks.

Ist mid semester: Units –I and II of the prescribed syllabus.

2nd mid semester: Units –I and II of the prescribed syllabus.

Paper Pattern

Section-A: Two questions (one from unit-I and another from unit-II) will be given and one question has to be answered 1×15 = 15 Marks.

Section-B: Two questions from unit-I and Two questions from unit-II will be given and two questions have to be answered. 2×3 = 6 Marks.

Section-C: One question from unit –I and One question from Unit-II will be given and the two questions have to be answered. 2×2 = 4 Marks.

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Paper IV A, Syllabus for V semester

Unit-I: Errors Numerical Computations:(8 Marks-1, 4Marks-1**)**

Numbers and their accuracy, Errors and their computation, Absolute, Relative, Percentage errors, A general error formula, Error in a series approximation.

Solution of Algebraic and transcendental Equations: (15 Marks-4, 8 Marks-3, 4 Marks-1)

The bisection method, The iteration method, The method of false position, Newton-Raphson method, Generalized Newton -Raphson method, Ramanujan`s method, Muller`s method.

Unit-II: **Interpolation: (**15 Marks-4, 8 Marks-4, 4 Marks-3**)**

Errors in polynomial interpolation, Forward differences, Backward Differences, Central differences, Symbolic relations, Detection of errors by use difference tables, Differences of a polynomial, Newton`s formulae for interpolation formulae, Gauss`s central difference formula, Stirling`s central difference formula, Interpolation with unevenly spaced points, Lagrange`s formula, Error in Lagrange`s formula, Derivation of governing equations, End conditions, Divided differences and their properties, Newton`s general interpolation.

PRESCRIBED TEXT BOOK:

Scope as in Introductory Methods of Numerical Analysis by S. S. Sastry, Prentice Hall India (4th Edition),

REFERENCE BOOKS:

1. G. Sankar Rao, New Age International Publishers, New-Hyderabad.
2. Finite Differences and Numerical Analysis by H. C. Saxena, S. Chand and Company, New Delhi.

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SEMESTER-V
BLUE PRINT

Time: 3Hrs. Max. Marks:120

PART-I

Answer any FOUR questions. Choosing TWO questions from each section. Each question carries 15 marks. 4x15=60M

SECTION-A

Solution of Algebraic and Transcedental equations : 4questions

SECTION-B

Interpolation with equal intervals : 2questions
Interpolation with unequal intervals : 2questions

PART-II

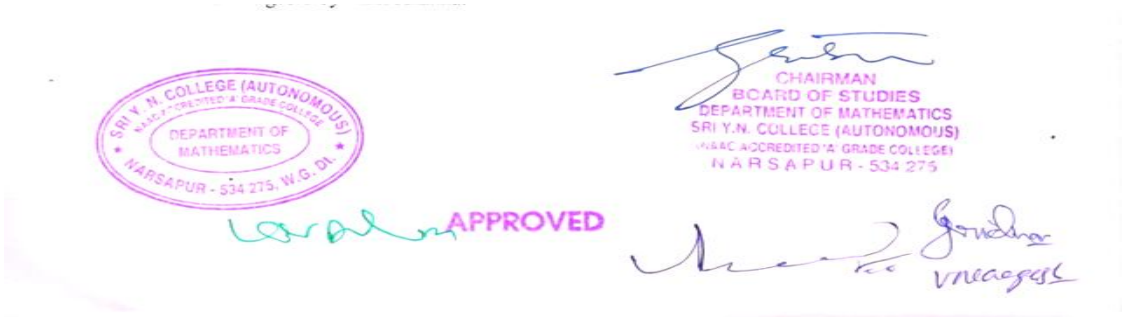
Answer any Five of the following questions. Each question carries 8 Marks. 5x8 = 40 M.

Errors Numerical Computations : 1 question
Solution of Algebraic and transcendental Equations : 3 questions
Interpolation with equal intervals : 3 question
Interpolation with unequal intervals : 1 question

PART-III

Answer all questions. Each question carries 4 Marks. 5x 4 = 20 M

Errors Numerical Computations : 1 question
Solution of Algebraic and transcendental Equations : 1 question
Interpolation with equal intervals : 2 questions
Interpolation with unequal intervals : 1 question



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III B.Sc. Mathematics – Paper IVA
(Numerical Analysis)
Model Question Paper (for 2013-16 batch w.e.f 2015-2016)

Time: 3Hrs **PART – I** Max Marks:120

SECTION – A

- Answer any **FOUR** questions.
  Choosing **TWO** questions from each section. Each question carries 15 marks. 4x15=60M

1. Solve the equation $x \log_{10} x - 1.2 = 0$, by using Regula-Falsi mehtod.
2. Find by the method of iteration a real roots of $2x - \log_x 10 = 7$.
3. Solve the equation $3x - \cos x - 1 = 0$, by using Newton Raphson method.
4. Find a root of the equation sinx=1-x , by using Ramanujan's method.

SECTION-B

5. In an experiment the number of candidates who secured marks between limits were as follows

Marks	0-19	20-39	40-59	60-79	80-99
No. of Students	41	62	65	50	17

Estimate the number of candidates getting marks less than 70.

6. State and prove Gauss's Forward formula for interpolation.
7. State and prove Lagrange's interpolation formula.
8. Using the following data find f(x) as a polynomial in powers of (x-5) by extending the table to include arguments x=5 repeated as many times as may be necessary f(0)=4, f(2)=26, f(3)=58, f(4)=112, f(7)=466, f(9)=922.

PART-II

- Answer any **FIVE** of the following questions. Each question carries 8 Marks. 5x8 = 40M.

9. Given that $u = \frac{5xy^2}{z^3}$ Δx, Δy and Δz denote the errors in x, y and z respectively such that x=y=z=1 and $\Delta x = \Delta y = \Delta z = 1$. Find relative maximum error in u.
10. Using Newton Raphson method establish the iterative formula $x_{n+1} = \frac{1}{2}\left[x_n + \frac{N}{x_n}\right]$ to calculate the Square root on N.
11. Find the root of the equation $f(x) = x^3 - 2x - 5 = 0$ which lies between 2 and 3 using Muller's method.
12. Solve the equation $x^3 - 9x + 1 = 0$ for the root lying between 2 and 3. Correct to three significant figures using bisection method.
13. Estimate the missing term in the following table.

x	0	1	2	3	4
y=f(x)	1	3	9	?	81

14. Prove that $\Delta = \frac{1}{2}\delta^2 + \delta[1 + \frac{\delta^2}{4}]^{\frac{1}{2}}$

15. Use Striling's formula to find y_{28}, $y_{20} = 49225$, $y_{25} = 48316$, $y_{30} = 47236$, $y_{35} = 45926$, $y_{40} = 44306$.

16. Using Lagrange's formula to find a polynomial which passes through the Points (3, 3), (2,12), (1,15),(-1, -21).

PART-III

➢ Answer all questions. Each question carries 4 Marks. 5x 4 = 20 M

17. Define absolute and relative error and percentage error.
18. Explain Generalized Newton's method for finding approximation of a root.
19. Show that (i)$\Delta\nabla=\Delta-\nabla$. (ii) $1+\Delta=E$
20. Compute f(1.1) from the following data.

x	1	2	3	4	5
f(x)	7	12	29	64	123

21. If $f(x) = \frac{1}{x}$ then find f (a,b).where f(a,b) is the first divided difference.

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III B.Sc Mathematics (for 2013-16 batch w.e.f 2015-2016)
Paper lV B, Syllabus for Vl semester

Unit –I :Curve Fitting (15 Marks-2, 8 Marks-2)

Least-Square`s curve fitting procedures, Fitting a straight line, Nonlinear curve fitting, curve fitting by sum of exponentials

Numerical Differentiation and Numerical Integration (15 Marks-2, 8 Marks-2, 4Marks-2)

Numerical differentiation, Errors in numerical differentiation, Maximum and minimum values of a tabulated function, Numerical integration, Trapezoidal rule, Simpson`s $1/3^{rd}$ rule Simpson`s $3/8^{th}$ rule, Boole's and Weddle`s rule.

Unit-II : Linear system of equations (15 Marks-2, 8 Marks-2)

Solution of linear systems-Direct methods, Matrix inversion method, Gaussian elimination method , Method of factorization, III- conditioned linear systems. Iterative methods: Jacobi's method, Gauss-siedal method,

Numerical solution of ordinary differential equations (15 Marks-2, 8 Marks-1, 4 Marks-2)

Introduction, solution by Taylor's Series, Picard's method of successive approximations, Euler's method, Modified Euler's method, Runge - Kutta methods, Predictor-Corrector methods, Milne's method.

Statistics: (8 Marks-1, 4 Marks-1)

Measures of Dispersion, measure of skewness and Kurtosis.

PRESCRIBED TEXT BOOK:

(1)Scope as in Introductory Methods of Numerical Analysis by S. S. Sastry, Prentice Hall India (4^{th} Edition),

(2) Statistical Methods by Dr. S. P. Guptha, S. Chand &Co.

REFERENCE BOOKS:

1. G. Sankar Rao, New Age International Publishers, New-Hyderabad.
2. Finite Differences and Numerical Analysis by H. C. Saxena, S. Chand and Company, New Delhi.

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SEMESTER-VI
BLUE PRINT

Time: 3Hrs. Max. Marks:120

PART-I

Answer any FOUR questions. Choosing TWO questions from each section. Each question carries 15 marks. 4x15=60M

SECTION-A

Curve Fitting	: 2questions
Numerical Differentiation and Numerical Integration	: 2 questions

SECTION-B

Linear system of equations	: 2questions
Numerical solution of ordinary differential equations	: 2questions

PART-II

Answer any Five of the following questions. Each question carries 8 Marks. 5x8 = 40 M.

Curve Fitting	: 2questions
Numerical Differentiation and Numerical Integration	: 2questions
Linear system of equations	: 2questions
Numerical Solution of ordinary differential equations	: 1question
Measures of Dispersion, measure of skewness and Kurtosis	: 1 question

PART-III

Answer all questions. Each question carries 4 Marks. 5x 4 = 20 M

Numerical Differentiation and Numerical Integration	: 2questions
Numerical solution of ordinary differential equations	: 2questions
Measures of Dispersion, measure of skewness and Kurtosis	: 1question

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III B.Sc. Mathematics – Paper IVB
(Numerical Analysis & Statistics)
Model Question Paper (for 2013-16 batch w.e.f 2015-2016)

Time: 3Hrs **PART – I** Max Marks:120

SECTION – A

- Answer any **FOUR** questions.
  Choosing **TWO** questions from each section. Each question carries 15marks. 4x15=60M.

1.Determine the constants a and b by the method of least squares such the $y = a(e^{bx})$ fits the following data

x	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62

2. Fit a second degree Parabola to the following data

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

3. Find the maximum and the minimum values of the function y = f(x) from the following data.

x	0	1	2	3	4	5
y	0	0.25	0	2.25	16	56.25

4. State and prove general quadrature formula and hence deduce Simpson's 1/3 rule.

SECTION-B

5. Solve the system of equations 5x+2y+z = 12, x+4y+2z = 15, x+2y+5z = 10, by using Gauss- Jocobi's method.
6. Solve the system of equations 10x+y+z = 12, 2x+10y+z = 13, 2x+2y+10z = 14, by using Gauss- Seidel method.
7. Use Picard method to approximate y when x = 0.2 given that y = 1 when x = 0 and $\frac{dy}{dx} = x - y.$
8. Use Runge Kutta method of fourth order to find an approximate value of y when x=0.1and x=0.2 given that x=0 when y=1 and $\frac{dy}{dx} = x + y$

PART-II

- Answer any **Five** of the following questions. Each question carries 8 Marks. 5x8 = 40 M.

9. Find the least square line y = a+bx for the following data

x_r	-2	-1	0	1	2
y_r	1	2	3	3	4

10. Fit a function of the form $y = ax^b$ to the following data

x	2	4	7	10	20	40	60	80
y	43	25	18	13	08	05	03	02

11. Find $f^1(1.5)$ from the following table

x	0	0.5	1	1.5	2
f(x)	0.3989	0.3521	0.2420	0.1295	0.0540

12. Find the value of $\int_1^5 \log_{10} x \, dx$ taking 8 subintervals correct to 4 decimal places, by Trapezoidal rule.
13. Solve the system of equations 2x+2y+4z = 16, x+3y+2z = 13, 3x+y+3z = 14, by using Gauss Elimination method.
14. Solve the system of equations x+y+z = 1, x+2y+3z = 6, x+3y+4z = 6, by using matrix inverse method.
15. Using the Euler's modified method, find y(0.2) for $\frac{dy}{dx} = x + |\sqrt{y}|$ with y(0)=1.
16. From the following data calculate Quartile measure of Skewness.

Class interval	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	5	10	22	28	16	9	4	1

PART-III

➢ Answer the following Questions. Each question carries 4 Marks. 5 x4 = 20M.

17. Using the following table compute $\frac{dy}{dx}$ at x=1.

x	1	2	3	4	5	6
y	1	8	27	64	125	216

18. Evaluate $\int_0^1 \frac{dx}{1+x}$ correct to 3 decimal places by Trapezoidal rule with h=0.5
19. Explain Picard's method of successive approximation.
20. Using Euler's method, compute y(0.5) for $\frac{dy}{dx} = y^2 - x^2$ with y(0)=1.
21. Compute Kurtosis for the following table.

x	2	5	8	12	13	15	16	18	20	21

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III B.Sc Mathematics
Syllabus and Paper pattern for mid semesters

V semester

Syllabus — Total Marks:25

Ist mid semester: Units -I and II of the prescribed syllabus.

2nd mid-semester: Units -I and II of the prescribed syllabus.

Paper pattern

Section-A: Two questions (one from unit-I and another from unit-II) will be given and one question has to be answered 1×15 = 15 Marks.

Section-B: Two questions from unit-I and Two questions from unit-II will be given and two questions have to be answered. 2×3 = 6 Marks.

Section-C: One question from unit –I and One question from Unit-II will be given and the two questions have to be answered. 2×2 = 4 Marks.

Vl Semester

Syllabus. Total 25 Marks.

Ist mid semester: Units –I and II of the prescribed syllabus.

2nd mid semester: Units –I and II of the prescribed syllabus.

Paper Pattern

Section-A: Two questions (one from unit-I and another from unit-II) will be given and one question has to be answered 1×15 = 15 Marks.

Section-B: Two questions from unit-I and Two questions from unit-II will be given and two questions have to be answered. 2×3 = 6 Marks.

Section-C: One question from unit –I and One question from Unit-II will be given and the two questions have to be answered. 2×2 = 4 Marks.

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Mathematics Certificate Course
Business Statistics (w.e.f.2013-14)

The objective of this paper is to impart knowledge on the application of statistical tools and techniques in business decision-making & use of MS-Excel in interpretation of statistical data.

Unit-I: Introduction to Statistics:

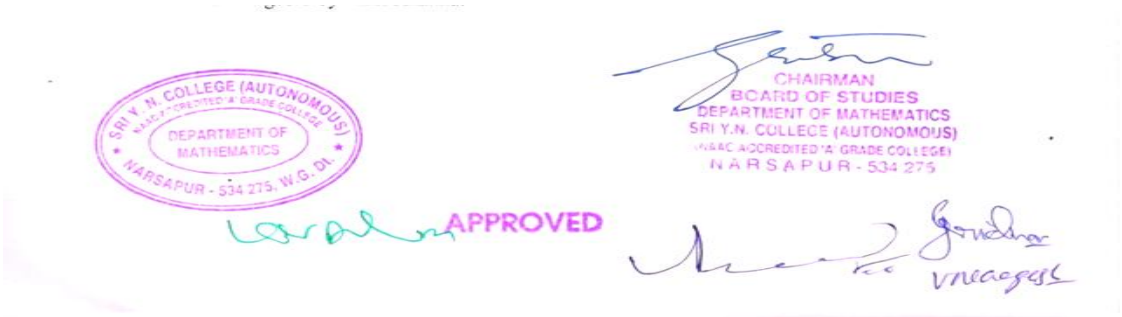
Meaning , definition, importance and limitations of statistics. Collection of data – Primary data and Secondary data – (Sampling – Random – Non Random – Census) – Schedule and questionnaire – Frequency distribution – Tabulation.

Unit-II: Measures of Central Tendency:

Definition, Objectives and Characteristics of measures of Central Tendency – Types of Averages – Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Mode, Deciles, Percentiles, properties of averages and their applications. Calculation of averages using computers.

Unit-III: Measures of Dispersion:

Meaning, Definitions, Properties of dispersion – Range – Quartile Deviation – Mean Deviation – Standard Deviation, Coefficient of Variation.



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Mathematics Certificate Course
Business Statistics Model Paper (w.e.f.2013-14)

Time: 2Hrs **SECTION-I** Total Marks:50M

Answer any **TWO** of the following questions 2 x 10 = 20M

1. Compute Standard Deviation from the following data

Classes	40-50	50-60	60-70	70-80	80-90	90-100
Frequencies	10	15	25	35	8	7

2. By using the following information show that AM>GM>HM

Classes	0-5	5-10	10-15	15-20	20-25	25-30
Frequencies	2	8	10	15	12	3

3. Calculate Mode using Mean and Median

Classes	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequencies	4	6	20	32	33	17	10

4. Find out the Geometric mean and Harmonic mean from the following data

Classes	100-120	120-140	140-160	160-180	180-200	200-220	220-240	240-260
Frequencies	2	4	6	9	8	6	4	1

SECTION-II

Answer any **FIVE** of the following questions. 5 x 4 = 20M

5. Define Statistics and give characteristic features of statistics.
6. What are the sources of the secondary data.
7. What is an Average? What are the qualities of a good average?
8. State the parts of table?
9. Find out Harmonic mean for the following values
   60, 120, 150, 240, 300, 450
10. The total two quartiles is 40 and their difference is 1. Find the quartile deviation and its Co efficient.
11. From the following data of the marks obtained by 60 students of a class, calculate the arithmetic mean

Marks	20	30	40	50	60	70
No. of students	8	12	20	10	6	4

12. Calculate mean deviation and its coefficient for the series 6, 10, 26, 28, 30, 32, 35.

SECTION-III

Answer **ALL** of the following questions. 5 x 2 = 10M

13. Define the range.
14. Define the range coefficient.
15. Write the merits of arithmetic mean.
16. Define the relation between arithmetic mean, median, mode.
17. Define the relation between arithmetic mean, geometric mean, harmonic mean.

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