



Course Outcomes:

After successful completion of this course, the student will be able to;

1. Solve linear differential equations
2. Convert non exact homogeneous equations to exact differential equations by using integrating factors.
3. Know the methods of finding solutions of differential equations of the first order but not of the first degree.
4. Solve higher-order linear differential equations, both homogeneous and non homogeneous, with constant coefficients.
5. Understand the concept and apply appropriate methods for solving differential equations.

UNIT - I: (12 Hours) Differential equations of first order and first degree (10 Marks-2, 5 Marks-2)

Bridge Course- Basics of Differential equations and Integration (No question to be given from this portion)

Additional Input: Variables Separable, Homogeneous Differential equations. Linear differential equations; Differential equations reducible to linear form; Exact differential equations; Integrating factors; Change of variables.

UNIT - II (12 Hours) Differential Equations of first order but not of the first degree : (10 Marks-2, 5 Marks- 1)

Orthogonal Trajectories, 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 (10 Marks-2, 5 Marks-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 $f(D)y=Q$, where 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 (10 Marks-2, 5 Marks-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 $Q = e^{ax}V$, where V is a function of x.

P.I. of $f(D)y = Q$ when $Q = xV$, where V is a function of x.

P.I. of $f(D)y = Q$ when $Q = x^mV$, where V is a function of x.

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, Legendre's linear equations, miscellaneous differential equations.

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.

Suggested Activities:

Seminar/ Quiz/ Assignments



APPROVED


CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275

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

APPROVED



Ch. Bal

CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
NAAC ACCREDITED A GRADE COLLEGE
NARSAPUR - 534 275



SRI Y.N.COLLEGE(Autonomous),Narsapur
Affiliated to Adikavi Nannaya University
Thrice accredited by NAAC with 'A' Grade
Recognized by UGC as 'College with potential for Excellence'
I B.Sc. Mathematics – Semester – I - Paper I
Differential Equations
Model Question Paper (for 2021-24 batch w. e. f 2020-2021)

Time: 3Hrs

Max Marks: 75

PART-I

Answer any FIVE Questions, each question carries FIVE marks.

5x5M = 25M

1. Solve $\left[y\left(1 + \frac{1}{x}\right) + \cos y\right] dx + [x + \log x - x \sin y] dy = 0$.
2. Solve $(1 - x^2) \frac{dy}{dx} + 2xy = x\sqrt{1 - x^2}$.
3. Solve $x^2(y - px) = p^2y$.
4. Solve $(D^2 - 3D + 2)y = \cos hx$.
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 $(x^2 D^2 + 2xD - 12)y = x^3(\log x)$.

PART-II

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

5x10M = 50M

SECTION - A

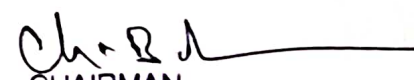
9. Solve $(2x^2y - 3y^2) dx + (2x^3 - 12xy + \log y) dy = 0$.
10. Solve $\frac{dy}{dx} + \frac{y}{x} = y^2 x \sin x, x > 0$.
11. Show that the family of confocal conics $\frac{x^2}{(a^2 + \lambda)} + \frac{y^2}{(b^2 + \lambda)} = 1$ is self orthogonal, where λ is a parameter.
12. Solve $p^2 + 2py \cot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

APPROVED




CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED A GRADE COLLEGE)
NARSAPUR - 534 275



Course Outcomes:

After successful completion of this course, the student will be able to;

1. get the knowledge of planes.
2. basic idea of lines, sphere and cones.
3. understand the properties of planes, lines, spheres and cones.
4. express the problems geometrically and then to get the solution.

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.



APPROVED


CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED A GRADE COLLEGE)
NARSAPUR - 534 275

Prescribed Text Book:

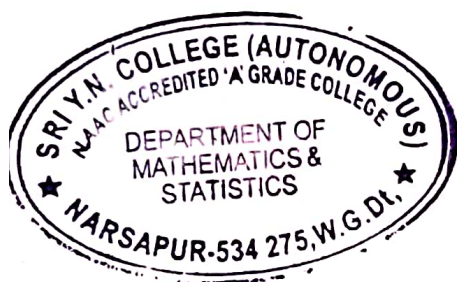
- (1) A Text Book of B.Sc Mathematics Volume-I (S.Chand & Company)
(V.Venkateswara Rao, N.Krishnamurthy, B.V.S.S.Sarma, S.Anjaneya Sastry)

Reference Books :

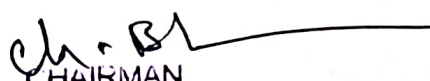
1. Analytical Solid Geometry by Shanti Narayan and P.K. Mittal, Published by S. Chand & Company Ltd. 7th Edition.
2. A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, Published by Wiley Eastern Ltd., 1999.
3. Co-ordinate Geometry of two and three dimensions by P. Balasubrahmanyam, K.Y. Subrahmanyam, G.R. Venkataraman published by Tata-MC Gran-Hill Publishers Company Ltd., New Delhi.

Suggested Activities:

Seminar/ Quiz/ Assignments



APPROVED


CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275

Time: 3Hrs.

SEMESTER-II
BLUE PRINT

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

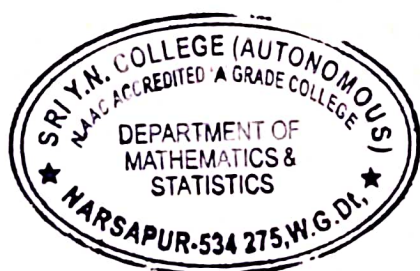
PART-II(5 x 10 M= 50 M)
Answer any FIVE questions. Choosing atleast TWO questions from each section.
Each question carries 10 marks.

SECTION-A

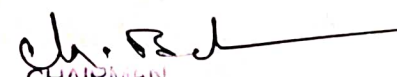
Unit-I (The Plane)	: 2 questions
Unit-II (The Line)	: 2 questions
Unit-III (The Sphere)	: 1 question

SECTION-B

Unit-IV (The Sphere & Cones) (From Sphere-2, Cone-1)	: 3 questions
Unit-V (The Cones)	: 2 questions



APPROVED


CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED A GRADE COLLEGE)
NARSAPUR - 534 275



SRI Y.N.COLLEGE(Autonomous),Narsapur
Affiliated to Adikavi Nannaya University
Thrice accredited by NAAC with 'A' Grade
Recognized by UGC as 'College with potential for Excellence'
I B.Sc. Mathematics – Semester – II - Paper II

Solid Geometry
Model Question Paper (for 2021-22 batch w. e. f 2020-2021)

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 $ax^2 + by^2 + cz^2 = 0$ 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.

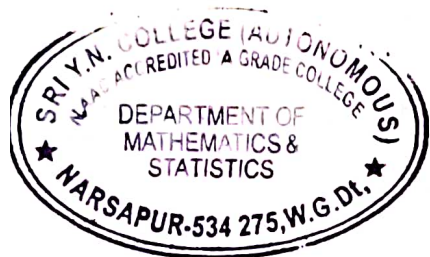
5x10M = 50M

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 tetrahedron 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° .



APPROVED

Ch. Bal

BOARD OF STUDIES

Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED A GRADE COLLEGE)
NARSAPUR - 534 275



Course Outcomes:

After successful completion of this course, the student will be able to;

1. acquire the basic knowledge and structure of groups, subgroups and cyclic groups.
2. get the significance of the notation of a normal subgroups.
3. get the behavior of permutations and operations on them.
4. study the homomorphisms and isomorphisms with applications.
5. understand the ring theory concepts with the help of knowledge in group theory and to v prove the theorems.
6. understand the applications of ring theory in various fields.

UNIT – 1 : (10 Hrs) Groups(10 Marks-2, 5 Marks-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 Marks-2)

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-2, 5 Marks-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.

Homomorphism:

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 – 4 : (10 Hrs) Permutation Group: (10 Marks-2, 5 Marks-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.

UNIT – 5 : (14 Hrs) Rings:(10 Marks-2, 5 Marks-1)

Definition of Ring and basic properties, Boolean Rings, divisors of zero and cancellation laws Rings, Integral Domains, Division Ring and Fields, The characteristic of a ring - The characteristic of an Integral Domain, The characteristic of a Field. Sub Rings, Ideals

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.

Suggested Activities:

Seminar/ Quiz/ Assignments



APPROVED


CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275

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.

Groups	: 1 question
Subgroups, Co-sets & Lagrange's theorem	: 2 question
Normal Sub groups & Homomorphism	: 2 questions
Permutations and Cyclic groups	: 2 questions
Rings	: 1 questions

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

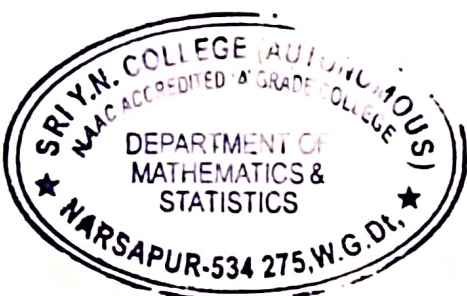
Answer any FIVE questions. Choosing atleast TWO questions from each section.
Each question carries 10 marks.

SECTION-A

Groups	: 2 questions
Subgroups, Co-sets & Lagrange's theorem	: 2 questions
Normal Subgroups	: 1 question

SECTION-B

Homomorphisms	: 1 question
Permutations and Cyclic groups	: 2 questions
Rings	: 2 questions



APPROVED

Ch. B. J.
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED A GRADE COLLEGE)
NARSAPUR - 534 275



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. Prove that any two left (right) co-sets of a subgroup are either disjoint or identical.
4. Prove that every sub group of an abelian group is normal.
5. Let G be a multiplicative group and $f: G \rightarrow G$ 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.
6. Find the order of the cycle $(1 \ 4 \ 5 \ 7)$.
7. 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.
8. Prove that every Boolean ring is abelian.

PART-II

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

5x10M = 50M

Each question carries 10 marks.

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 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 coset of H in G.
13. Prove that a subgroup H of a group G is a normal subgroup of G iff each left co-set of H in G is a right co-set 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. 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 $(fg)^{-1} = g^{-1}f^{-1}$.
16. Prove that a group of prime order is cyclic.
17. Prove that the set $Z[i] = \{a + bi \mid a, b \in Z, i^2 = -1\}$ of Gaussian integers is an integral domain w.r.t addition and multiplication of numbers. Is it a Field?
18. Prove that the characteristic of a field is either a prime or zero.



APPROVED

Ch. R.
 CHAIRMAN
 BOARD OF STUDIES
 Department of Mathematics & Statistics
 SRI Y.N. COLLEGE (AUTONOMOUS)
 (NAAC ACCREDITED 'A' GRADE COLLEGE)
 NARSAPUR - 534 275



Course Outcomes:

After successful completion of this course, the student will be able to

1. get clear idea about the real numbers and real valued functions.
2. obtain the skills of analyzing the concepts and applying appropriate methods for testing convergence of a sequence/ series.
3. test the continuity and differentiability and Riemann integration of a function.
4. know the geometrical interpretation of mean value theorems.

UNIT – I (12 hrs) : REAL NUMBERS

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

Real Sequences (10 Marks-2, 5 Marks-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) : INFINITE SERIES(10 Marks-2, 5 Marks-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 Marks-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 Marks-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 Marks-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:

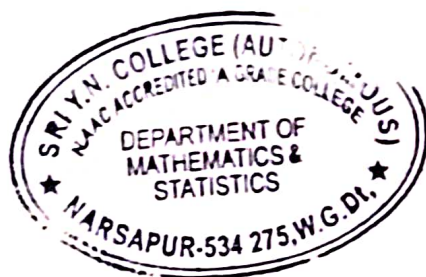
A Text Book of B.Sc Mathematics Volume-II (S.Chand & Company)
(V.Venkateswara Rao, N.Krishnamurthy, B.V.S.S.Sarma, S.Anjaneya Sastry)

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.

Suggested Activities:

Seminar/ Quiz/ Assignments

**APPROVED**

Ch. R.
CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
NAAC ACCREDITED A GRADE COLLEGE
NARSAPUR - 534 275

SEMESTER-IV
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.

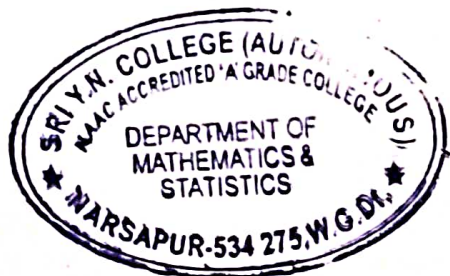
Each question carries 10 marks.

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



APPROVED


CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275



SRI Y.N.COLLEGE(Autonomous),Narsapur
Affiliated to Adikavi Nannaya University
Thrice accredited by NAAC with 'A' Grade
Recognized by UGC as 'College with potential for Excellence'
II B.Sc. Mathematics - Semester -IV - Paper IV
Real Analysis
Model Question Paper (for 2020-2023 batch, w.e.f 2021-22)

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 $\lim \left[\frac{1}{(n+1)^2} + \frac{1}{(n+2)^2} + \dots + \frac{1}{(n+n)^2} \right] = 0$
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 $\sum_{n=2}^{\infty} \frac{\log n}{2^{n^3-1}}$
5. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be such that $f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}}$ if $x \neq 0$ and $f(0) = 1$ discuss the continuity at $x=0$.
6. If $f: [a, b] \rightarrow \mathbb{R}$ is derivable at $c \in [a, b]$, then prove that f is continuous at c .
7. Prove that $\tan x > x > \sin x \forall x \in (0, \frac{\pi}{2})$.
8. Prove that $f(x) = \sin x$ is integrable on $[0, \frac{\pi}{2}]$ and $\int_0^{\frac{\pi}{2}} \sin x \, dx = 1$.

PART-II

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

5x10M = 50M

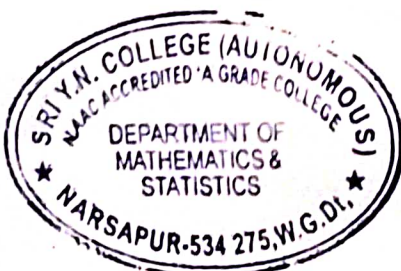
Each question carries 10 marks.

SECTION - A

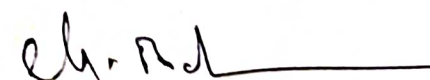
9. Prove that a monotone sequence is convergent iff it is bounded.
10. State and prove Cauchy's general principle of convergence.
11. State and prove D-Alembert's test.
12. State and prove Cauchy's n^{th} root test.
13. Examine the continuity of f defined by $f(x) = |x| + |x - 1|$ at $x=0, 1$.

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 $f: [a, b] \rightarrow \mathbb{R}$ 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 $\frac{\pi^3}{24} \leq \int_0^{\pi} \frac{x^2}{5+3\cos x} \, dx \leq \frac{\pi^3}{6}$.



APPROVED


CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275



Course Outcomes:

After successful completion of this course, the student will be able to;

1. understand the concepts of vector spaces, subspaces, basis, dimension and their properties
2. understand the concepts of linear transformations and their properties
3. apply Cayley- Hamilton theorem to problems for finding the inverse of a matrix and higher powers of matrices without using routine methods
4. learn the properties of inner product spaces and determine orthogonality in inner product spaces.

UNIT – I (12 hrs) : Vector Spaces-I(10Marks-2, 5Marks-2)

Vector Spaces, General properties of vector spaces, n-dimensional Vectors, addition and scalar multiplication of Vectors, internal and external composition, Null space, Vector subspaces, Algebra of subspaces, Linear Sum of two subspaces, linear combination of Vectors, Linear span Linear independence and Linear dependence of Vectors.

UNIT –II (12 hrs) : Vector Spaces-II(10Marks-2, 5Marks-1)

Basis of Vector space, Finite dimensional Vector spaces, basis extension, co-ordinates, Dimension of a Vector space, Dimension of a subspace, Quotient space and Dimension of Quotientspace.

UNIT –III (12 hrs) : Linear Transformations (10Marks-2, 5Marks-2)

Linear transformations, linear operators, Properties of L.T, sum and product of LTs, Algebra of Linear Operators, Range and null space of linear transformation, Rank and Nullity of linear transformations – Rank – Nullity Theorem.

UNIT –IV (12 hrs) : Matrix(10Marks-2, 5Marks-1)

Linear Equations, Characteristic Roots, Characteristic Values & Vectors of square Matrix, Cayley – Hamilton Theorem.

UNIT –V (12 hrs) : Inner product space(10Marks-2, 5Marks-2)

Inner product spaces, Euclidean and unitary spaces, Norm or length of a Vector, Schwartz inequality, Triangle in Inequality, Parallelogram law, Orthogonality, Orthonormal set, complete orthonormal set, Gram – Schmidt orthogonalisation process. Bessel's inequality and Parseval's Identity.

Prescribed Text Books:

- (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)

Reference Books :


1. Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut- 250002.
2. Matrices by Shanti Narayana, published by S.Chand Publications.
3. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition), New Delhi.
4. Linear Algebra by Stephen H. Friedberg et al published by Prentice Hall of India Pvt. Ltd. 4th Edition 2007.

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on “Applications of Linear algebra Through Computer Sciences”



APPROVED


CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275

SEMESTER-IV
BLUE PRINT

Time: 3Hrs.

Max. Marks:75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Vector Spaces-I	: 2 questions
Vector Spaces – II	: 1 question
Linear Transformations	: 2 questions
Matrix	: 1 question
Inner Product Spaces	: 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.

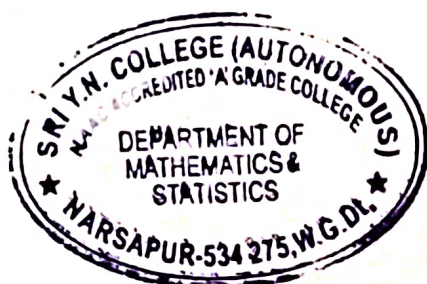
Note: Under SECTION-A (Q.NO:13) & SECTION-B (Q.NO:14) will be given from UNIT-III.

SECTION-A


Vector Spaces-I	: 2 questions
Vector Spaces-II	: 2 questions
Linear Transformations	: 1 question

SECTION-B

Linear Transformations	: 1 question
Matrix	: 2 questions
Inner Product Spaces	: 2 questions



APPROVED


CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275



Time: 3Hrs

Max Marks: 75

PART-I

Answer any FIVE Questions, each question carries FIVE marks.

5x5M = 25M

1. Prove that the intersection of any two sub spaces of vector space is also a subspace.
2. Determine whether the set of vectors $\{(1,-2,1),(2,1,-1),(7,-4,1)\}$ are L.D or L.I.
3. Show that the set $\{(1,2,1),(2,1,0),(1,-1,2)\}$ forms a basis of $V_3(F)$.
4. Show that the mapping $T:V_3(R) \rightarrow V_2(R)$ is defined by $T(x,y,z) = (x-y, x-z)$ is a linear transformation.
5. Let $U(F)$ and $V(F)$ be two vector spaces and $T : U \rightarrow V$ is a linear transformation, then prove that the null space $N(T)$ is a subspace of $U(F)$.
6. Prove that square matrices A and A^1 have the same characteristic values.
7. If α, β are two linearly dependent vectors in an inner product space, then show that $|\langle \alpha, \beta \rangle| = \|\alpha\| \|\beta\|$
8. Prove that in an inner product space any orthogonal set of non-zero vectors is linearly independent.

PART-II

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

Each question carries 10 marks.

5x10M = 50M

SECTION - A

9. Let $V(F)$ be a vector space. A non empty set $W \subseteq V$. Prove that the necessary and sufficient condition for W to be a subspace of V is $a, b \in F$ and $\alpha, \beta \in V \Rightarrow a\alpha + b\beta \in W$.
10. If W_1 and W_2 are two subspaces of a vector space $V(F)$, then prove that $L(W_1 \cup W_2) = W_1 + W_2$.
11. Let $V(F)$ be a finite dimensional vector space of a dimension n and W be the subspace of V , then prove that W is a finite dimensional vector space with $\dim W \leq n$.
12. Let W be a subspace of a finite dimensional vector space $V(F)$, then show that $\dim \frac{V}{W} = \dim V - \dim W$.
13. Let $U(F)$ and $V(F)$ be two vector spaces and $S = \{\alpha_1, \alpha_2, \dots, \alpha_n\}$ be a basis of U . Let $\{\delta_1, \delta_2, \dots, \delta_n\}$ be a set of vectors in V , then prove that there exists a unique linear transformation $T : U \rightarrow V$ such that $T(\alpha_i) = \delta_i$ for $i = 1, 2, \dots, n$.

SECTION-B

14. Describe explicitly of the linear transformation $T : R^2 \rightarrow R^2$ such that $T(2,3)=(4,5)$ and $T(1,0)=(0,0)$.
15. Solve the system $\lambda x + y + z = 0, x + \lambda y + z = 0, x + y + \lambda z = 0$ if the system has non zero solutions only.
16. Find the Eigen values and eigen vectors of the matrix $\begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$
17. State and prove Bessel's inequality.
18. 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.



APPROVED

Ch. Bal
CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275



SRI Y.N.COLLEGE(Autonomous), Narsapur
Affiliated to Adikavi Nannayya University
Thrice accredited by NAAC with 'A' Grade
Recognized by UGC as 'College with potential for Excellence'
III B.Sc Mathematics (for 2019-2022 batch, w.e.f 2017-18)
PaperV, Syllabus for V semester
RING THEORY & VECTOR CALCULUS

Course Outcomes:

After successful completion of this course, the student will be able to;

1. understand the ring theory concepts with the help of knowledge in group theory and to prove the theorems.
2. understand the applications of ring theory in various fields.
3. Scalar and vector valued functions of 2 and 3 variables and surfaces, and in turn the geometry of surfaces.
4. Gradient vector fields and constructing potentials.
5. Integral curves of vector fields and solving differential equations to find such curves.
6. The differential ideas of divergence, curl, and the Laplacian along with their physical interpretations, using differential forms or tensors to represent derivative operations.
7. The integral ideas of the functions defined including line, surface and volume integrals - both derivation and calculation in rectangular, cylindrical and spherical coordinate systems .

UNIT – 1 (12 hrs) Rings-I (10Marks-2, 5Marks-2)

Definition of Ring and basic properties, Boolean Rings, divisors of zero and cancellation laws Rings, Integral Domains, Division Ring and Fields, The characteristic of a ring - The characteristic of an Integral Domain, The characteristic of a Field. Sub Rings, Ideals

UNIT – 2 (12 hrs) Rings-II(10Marks-2, 5Marks-2)

Definition of Homomorphism – Homomorphic Image – Elementary Properties of Homomorphism – Kernel of a Homomorphism – Fundamental theorem of Homomorphism – Maximal Ideals – Prime Ideals.

UNIT –3 (12 hrs) Vector Differentiation (10Marks-2, 5Marks-2)

Vector Differentiation, Ordinary derivatives of vectors, Differentiability, Gradient, Divergence, Curl operators, Formulae Involving these operators.

UNIT – 4 (12 hrs) Vector Integration (10Marks-2, 5Marks-1)

Line Integral, Surface Integral, Volume integral with examples.

UNIT – 5 (12 hrs) Vector Integration Applications (10Marks-2, 5Marks-1)

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)

Reference Books :-


1. Abstract Algebra by J. Fraleigh, Published by Narosa Publishing house.
2. Vector Calculus by Santhi Narayana, Published by S. Chand & Company Pvt. Ltd., New Delhi.
3. Vector Calculus by R. Gupta, Published by Laxmi Publications.
4. Vector Calculus by P.C. Matthews, Published by Springer Verlag publications.
5. Rings and Linear Algebra by Pundir & Pundir, Published by Pragathi Prakashan.

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on Ring theory and its applications

APPROVED




CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y N COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275

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.

Rings – I	
Rings – II	: 2 questions
Vector Differentiation	: 2 questions
Vector Integration	: 2 questions
Vector Integration Applications	: 1 question
	: 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.

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

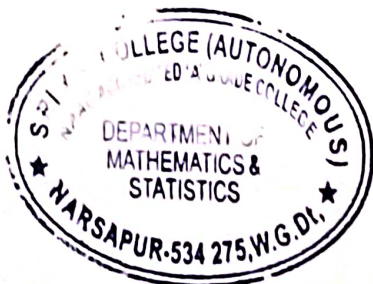
SECTION-A


Rings – I	: 2 questions
Rings – II	: 2 questions
Vector Differentiation	: 1 question

SECTION-B

Vector Differentiation	: 1 question
Vector Integration	: 2 questions
Vector Integration Applications	: 2 questions

APPROVED




CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI YN COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275



SRI Y.N.COLLEGE(Autonomous),Narsapur
 Affiliated to Adikavi Nannaya University
 Thrice accredited by NAAC with 'A' Grade
 Recognized by UGC as 'College with potential for Excellence'
 III B.Sc. Mathematics – Semester – V - Paper V
 RING THEORY AND VECTOR CALCULUS
 Model Question Paper (for 2019-2022 batch w. e. f 2017-2018)

Time: 3Hrs

Max Marks: 75

PART-I

Answer any FIVE Questions, each question carries FIVE marks.

5x5M = 25M

1. If R is a Boolean ring, then prove that (i) $a + a = 0 \forall a \in R$, (ii) $a + b = 0 \Rightarrow a = b$ and (iii) R is commutative under multiplication.
2. Prove that the intersection of two sub rings of a ring R is a sub ring of R .
3. If f is a homomorphism of a ring R into a ring R^1 , then prove that $\text{Ker } f$ is an ideal of R .
4. Prove that in the ring Z of integers the ideal generated by prime integer is a maximal ideal.
5. Find the directional derivative of the function $xy^2 + yz^2 + zx^2$ along the tangent to the curve $x = t, y = t^2, z = t^3$ at the point $(1,1,1)$.
6. Find $\text{div } \vec{f}$ and $\text{curl } \vec{f}$ where $\vec{f} = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$
7. If $\vec{F} = (x^2 + y^2)\vec{i} - 2xy\vec{j}$, evaluate $\oint_C \vec{F} \cdot d\vec{r}$, where the curve C is the rectangle in the xy -plane bounded by $y = 0, y = b, x = 0, x = a$.
8. Evaluate $\oint_C (\cos x \sin y - xy)dx + \sin x \cos y dy$, by Green's theorem where C is the circle $x^2 + y^2 = 1$.

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 the set $Z[i] = \{a + ib \mid a, b \in Z, i^2 = -1\}$ of Gaussian integers is an integral domain w.r.t addition and multiplication of numbers.
10. If U_1 and U_2 are two ideals of a ring R , then prove that $U_1 \cup U_2$ is an ideal of R iff $U_1 \subset U_2$ or $U_2 \subset U_1$.
11. Prove that every quotient ring of a ring is a homomorphic image of the ring.
12. Prove that every maximal ideal of a commutative ring R with unity is a prime ideal.
13. If \vec{a} is a constant vector, then prove that $\text{curl } \frac{\vec{a} \times \vec{r}}{r^3} = -\frac{\vec{a}}{r^3} + \frac{3\vec{r}}{r^5} (\vec{a} \cdot \vec{r})$

SECTION-B

14. If f and g are two scalar point functions, then prove that $\text{div}(f\nabla g) = f\nabla^2 g + \nabla f \cdot \nabla g$
15. If $\vec{F} = 4xz\vec{i} - y^2\vec{j} + yz\vec{k}$, evaluate $\int \vec{F} \cdot \vec{N} dS$ where S is the surface of the cube bounded by $x = 0, x = a, y = 0, y = a, z = 0, z = a$.
16. If $\vec{F} = 2xz\vec{i} - x\vec{j} + y^2\vec{k}$ evaluate $\int_V \vec{F} \cdot d\vec{V}$ where V is the region bounded by the surfaces $x = 0, x = 2, y = 0, y = 6, z = x^2, z = 4$.
17. Verify Gauss's divergence theorem to evaluate $\int_S ((x^3 - yz)\vec{i} - 2x^2y\vec{j} + z\vec{k}) \cdot \vec{N} dS$ over the surface of a cube bounded by the co ordinate planes $x = y = z = a$.
18. State and prove Stokes theorem.

APPROVED

Ch. R.

**CHAIRMAN
BOARD OF STUDIES**

Department of Mathematics & Statistics
 SRI Y.N. COLLEGE (AUTONOMOUS)
 (NAAC ACCREDITED 'A' GRADE COLLEGE)
 NARSAPUR - 534 275





SRI Y.N.COLLEGE(Autonomous), Narsapur
Affiliated to Adikavi Nannayya University
Thrice accredited by NAAC with 'A' Grade with CGPA of 3.41
Recognized by UGC as 'College with potential for Excellence'
III B.Sc Mathematics (for 2019-2022 batch, w.e.f 2017-18)
Paper VI, Syllabus for V semester
LINEAR ALGEBRA

Course Outcomes:

After successful completion of this course, the student will be able to;

1. understand the concepts of vector spaces, subspaces, bases, dimension and their properties
2. understand the concepts of linear transformations and their properties
3. apply Cayley- Hamilton theorem to problems for finding the inverse of a matrix and higher powers of matrices without using routine methods
4. learn the properties of inner product spaces and determine orthogonality in inner product spaces.

UNIT – I (12 hrs) : Vector Spaces-I(10Marks-2, 5Marks-2)

Vector Spaces, General properties of vector spaces, n-dimensional Vectors, addition and scalar multiplication of Vectors, internal and external composition, Null space, Vector subspaces, Algebra of subspaces, Linear Sum of two subspaces, linear combination of Vectors, Linear span Linear independence and Linear dependence of Vectors.

UNIT –II (12 hrs) : Vector Spaces-II(10Marks-2, 5Marks-1)

Basis of Vector space, Finite dimensional Vector spaces, basis extension, co-ordinates, Dimension of a Vector space, Dimension of a subspace, Quotient space and Dimension of Quotient space.

UNIT –III (12 hrs) : Linear Transformations (10Marks-2, 5Marks-2)

Linear transformations, linear operators, Properties of L.T, sum and product of LTs, Algebra of Linear Operators, Range and null space of linear transformation, Rank and Nullity of linear transformations – Rank – Nullity Theorem.

UNIT –IV (12 hrs) : Matrix(10Marks-2, 5Marks-1)

Linear Equations, Characteristic Roots, Characteristic Values & Vectors of square Matrix, Cayley – Hamilton Theorem.

UNIT –V (12 hrs) : Inner product space(10Marks-2, 5Marks-2)

Inner product spaces, Euclidean and unitary spaces, Norm or length of a Vector, Schwartz inequality, Triangle in Inequality, Parallelogram law, Orthogonality, Orthonormal set, complete orthonormal set, Gram – Schmidt orthogonalisation process. Bessel's inequality and Parseval's Identity.

Prescribed Text Books:

- (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)

Reference Books :

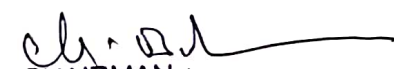
1. Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut- 250002.
2. Matrices by Shanti Narayana, published by S.Chand Publications.
3. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition), New Delhi.
4. Linear Algebra by Stephen H. Friedberg et al published by Prentice Hall of India Pvt. Ltd. 4th Edition 2007.

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on “Applications of Linear algebra Through Computer Sciences”

APPROVED




CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275

SEMESTER-V
BLUE PRINT

Time: 3Hrs.

Max. Marks:75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Vector Spaces-I	: 2 questions
Vector Spaces – II	: 1 question
Linear Transformations	: 2 questions
Matrix	: 1 question
Inner Product Spaces	: 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.

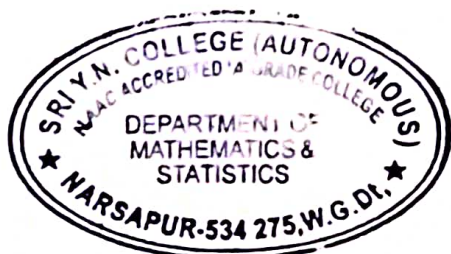
SECTION-A


Vector Spaces-I	: 2 questions
Vector Spaces-II	: 2 questions
Linear Transformations	: 1 question

SECTION-B

Linear Transformations	: 1 question
Matrix	: 2 questions
Inner Product Spaces	: 2 questions

APPROVED




CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275



SRI Y.N.COLLEGE(Autonomous),Narsapur
Affiliated to Adikavi Nannaya University
Thrice accredited by NAAC with 'A' Grade with CGPA of 3.41
Recognized by UGC as 'College with potential for Excellence'
III B.Sc. Mathematics – Semester – V - Paper VI

Linear Algebra

Model Question Paper (for 2019-2022 batch w. e. f 2017-2018)

Time: 3Hrs

Max Marks: 75

PART-I

Answer any FIVE Questions, each question carries FIVE marks.

5x5M = 25M

1. Prove that the intersection of any two sub spaces of vector space is also a subspace.
2. Determine whether the set of vectors $\{(1,-2,1),(2,1,-1),(7,-4,1)\}$ are L.D or L.I.
3. Show that the set $\{(1,2,1),(2,1,0),(1,-1,2)\}$ forms a basis of $V_3(F)$.
4. Show that the mapping $T:V_3(R) \rightarrow V_2(R)$ is defined by $T(x,y,z) = (x-y, x-z)$ is a linear transformation.
5. Let $U(F)$ and $V(F)$ be two vector spaces and $T:U \rightarrow V$ is a linear transformation, then prove that the null space $N(T)$ is a subspace of $U(F)$.
6. Prove that square matrices A and A^T have the same characteristic values.
7. If α, β are two linearly dependent vectors in an inner product space, then show that $|\langle \alpha, \beta \rangle| = \|\alpha\| \|\beta\|$
8. Prove that in an inner product space any orthogonal set of non-zero vectors is linearly independent.

PART-II

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

5x10M = 50M

SECTION - A

9. Let $V(F)$ be a vector space. A non empty set $W \subseteq V$. Prove that the necessary and sufficient condition for W to be a subspace of V is $a, b \in F$ and $\alpha, \beta \in V \Rightarrow a\alpha + b\beta \in W$.
10. If W_1 and W_2 are two subspaces of a vector space $V(F)$, then prove that $L(W_1 \cup W_2) = W_1 + W_2$.
11. Let $V(F)$ be a finite dimensional vector space of a dimension n and W be the subspace of V , then prove that W is a finite dimensional vector space with $\dim W \leq n$.
12. Let W be a subspace of a finite dimensional vector space $V(F)$, then show that $\dim \frac{V}{W} = \dim V - \dim W$.
13. Let $U(F)$ and $V(F)$ be two vector spaces and $S = \{\alpha_1, \alpha_2, \dots, \alpha_n\}$ be a basis of U . Let $\{\delta_1, \delta_2, \dots, \delta_n\}$ be a set of vectors in V , then prove that there exists a unique linear transformation $T:U \rightarrow V$ such that $T(\alpha_i) = \delta_i$ for $i = 1, 2, \dots, n$.

SECTION-B

14. Describe explicitly of the linear transformation $T:R^2 \rightarrow R^2$ such that $T(2,3) = (4,5)$ and $T(1,0) = (0,0)$.
15. Solve the system $\lambda x + y + z = 0, x + \lambda y + z = 0, x + y + \lambda z = 0$ if the system has non zero solutions only.
16. Find the Eigen values and eigen vectors of the matrix $\begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$
17. State and prove Bessel's inequality.
18. 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.

APPROVED



Ch. Bel

CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED A GRADE COLLEGE)
NARSAPUR - 534 275



SRI Y.N.COLLEGE(Autonomous),Narsapur
Affiliated to Adikavi Nannaya University
Thrice accredited by NAAC with 'A' Grade
Recognized by UGC as 'College with potential for Excellence'
III B.Sc Mathematics (for 2019-2022 batch w.e.f 2017-2018)
Paper VII , Syllabus for VI semester
ELECTIVE - VII- NUMERICAL ANALYSIS

Course Outcomes:

Upon completion of the course students will be able to

1. Derive numerical methods for approximating the solution of problems of continuous mathematics.
2. Analyze the error incumbent in any such numerical approximation.
3. Implement a variety of numerical algorithms using appropriate technology.
4. Compare the viability of different approaches to the numerical solution of problems arising in roots of solution of non-linear equations, interpolation and approximation, numerical differentiation and integration, solution of linear systems.

UNIT- I: (10 hours)(5 Marks -2)

Errors in Numerical computations : Errors and their Accuracy, Mathematical Preliminaries, Errors and their Analysis, Absolute, Relative and Percentage Errors, A general error formula, Error in a series approximation.

UNIT – II: (12 hours)(5 Marks-1, 10Marks-3)

Solution of Algebraic and Transcendental Equations: The bisection method, The iteration method, The method of false position, Newton Raphson method, Generalized Newton Raphson method. Muller's Method

UNIT – III: (12 hours) Interpolation – I(5 Marks-1 10Marks-1)

Interpolation : Errors in polynomial interpolation, Finite Differences, Forward differences, Backward differences, Central Differences, Symbolic relations, Detection of errors by use of Differences Tables, Differences of a polynomial

UNIT – IV: (12 hours) Interpolation – II(5 Marks-2, 10 Marks - 3)

Newton's formulae for interpolation. Central Difference Interpolation Formulae, Gauss's central difference formulae, Stirling's central difference formula, Bessel's Formula, Everett's Formula.

UNIT – V : (14 hours) Interpolation – III(5 Marks-2, 10 Marks - 3)

Interpolation with unevenly spaced points, Lagrange's formula, Error in Lagrange's formula, Divided differences and their properties, Relation between divided differences and forward differences, Relation between divided differences and backward differences Relation between divided differences and central differences, Newton's general interpolation Formula, Inverse interpolation.

PRESCRIBED TEXT BOOK:

Numerical Analysis by Dr. A Anjaneyulu, published by Deepti Publications.

Reference Books :

1. Numerical Analysis by S.S.Sastry, published by Prentice Hall of India Pvt. Ltd., New Delhi. (Latest Edition)
2. Numerical Analysis by G. Sankar Rao published by New Age International Publishers, New – Hyderabad.
3. Finite Differences and Numerical Analysis by H.C Saxena published by S. Chand and Company, Pvt. Ltd., New Delhi.
4. Numerical methods for scientific and engineering computation by M.K.Jain, S.R.K.Iyengar, R.K. Jain.

APPROVED



Ch. R. 29/10/2024
CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275

SEMESTER-VI
BLUE PRINT

Time: 3Hrs.

Max. Marks:75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Errors in Numerical computations	: 2 questions
Solution of Algebraic and Transcendental Equations	: 1 question
Interpolation – I	: 1 question
Interpolation – II	: 2 questions
Interpolation – 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:14,15) will be given from UNIT-IV.

SECTION-A

Solution of Algebraic and Transcendental Equations	: 3 questions
Interpolation-I	: 1 question
Interpolation-II (Newton's formulae for interpolation)	: 1 question

SECTION-B

Interpolation-II (Central Difference Interpolation formulae)	: 2 questions
Interpolation-III	: 3 questions



Chairman
CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275

29/10/2021



SRI Y.N.COLLEGE(Autonomous),Narsapur
Affiliated to Adikavi Nannaya University
Thrice accredited by NAAC with 'A' Grade
Recognized by UGC as 'College with potential for Excellence'
III B.Sc. Mathematics – Semester VI - ELECTIVE Paper VII
Numerical Analysis
Model Question Paper (for 2019-2022 batch w.e.f 2017-2018)

Time: 3Hrs

Max Marks:75

PART-I

Answer any FIVE Questions, each question carries FIVE marks.

5x5M =25M

- 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.
- If $5/6$ be represented approximately by 0.8333 find a) Relative error and b) percentage error.
- 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.
- Estimate the missing term in the following table.

x	0	1	2	3	4
y=f(x)	1	3	9	?	81
- Prove that $\Delta = \frac{1}{2} \delta^2 + \delta \left[1 + \frac{\delta^2}{4} \right]^{\frac{1}{2}}$
- Compute $f(1.1)$ from the following data.

x	1	2	3	4	5
f(x)	7	12	29	64	123
- If $f(x) = \frac{1}{x}$ then find $f(a,b)$. where $f(a,b)$ is the first divided difference.
- Using Lagrange's formula to find a polynomial which passes through the points (3, 3), (2,12), (1,15), (-1, -21).

PART-II

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

Each question carries 10 marks.

5x10M = 50M

SECTION - A

- Solve the equation $x \log_{10} x - 1.2 = 0$, by using Regula-Falsi method.
- Find by the method of iteration a real roots of $2x - \log_x 10 = 7$.
- Solve the equation $3x - \cos x - 1 = 0$, by using Newton Raphson method.
- State and Prove that fundamental theorem of difference calculus on finite differences.
- State and prove Newton's forward interpolation formula.

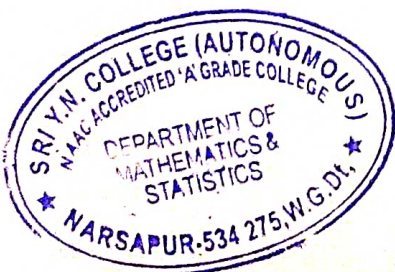
SECTION-B

- State and prove Gauss backward interpolation formula.
- Use Stirling's formula to find y_{28} , $y_{20} = 49225$, $y_{25} = 48316$, $y_{30} = 47236$, $y_{35} = 45926$, $y_{40} = 44306$.
- 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 $f(0) = 4$, $f(2) = 26$, $f(3) = 58$, $f(4) = 112$, $f(7) = 466$, $f(9) = 922$.
- By Lagrange's interpolation formula find the value of y at $x = 5$. Given that

x	1	3	4	8	10
y	8	15	19	32	40

- Using Newton's divided difference formula, prove that

$$f(x) = f(0) + x\Delta f(-1) + \frac{(x+1)x}{2!} \Delta^2 f(-1) + \frac{(x+1)x(x-1)}{3!} \Delta^3 f(-2) + \dots$$



APPROVED

Chairman 29/10/2021

CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275



SRI Y.N.COLLEGE(Autonomous),Narsapur
Affiliated to Adikavi Nannaya University
Thrice accredited by NAAC with 'A' Grade
Recognized by UGC as 'College with potential for Excellence'
III B.Sc Mathematics (for 2019-2022 batch w.e.f 2017-2018)
Paper VIII-A, Syllabus for VI semester
CLUSTER ELECTIVE - VIII-A – ADVANCED NUMERICAL ANALYSIS

Course Outcomes:

Upon completion of the course students will be able to

1. Understand and apply basic numerical methods and the theory behind them, related to numerical differentiation, numerical integration, and solving numerical solutions of first order ordinary differential equations.
2. Understand the Least Squares Method to curve fit data using several types of curves(straight line, second degree parabola, power curve, exponential curve).
3. To solve the selected class of differential equations using Taylor, Picards, Euler's, Runge Kutta, Adams and Milne's.

Unit – I (10 Hours)(5 Marks-1, 10 Marks-2)

Curve Fitting: Least – Squares curve fitting procedures, fitting a straight line, nonlinear curve fitting, Curve fitting by a sum of exponentials.

UNIT- II : (12 hours) (5 Marks-2, 10 Marks-1)

Numerical Differentiation: Derivatives using Newton's forward difference formula, Newton's backward difference formula, Derivatives using central difference formula, stirling's interpolation formula, Newton's divided difference formula, Maximum and minimum values of a tabulated function.

UNIT- III : (12 hours) (5 Marks-2, 10 Marks-2)

Numerical Integration: General quadrature formula on errors, Trapezoidal rule, Simpson's $1/3$ – rule, Simpson's $3/8$ – rule, and Weddle's rules, Euler – Maclaurin Formula of summation and quadrature, The Euler transformation.

UNIT – IV: (14 hours) (5 Marks-2, 10 Marks-2)

Solutions of simultaneous Linear Systems of Equations: Solution of linear systems – Direct methods, Matrix inversion method, Gaussian elimination methods, Gauss-Jordan Method, Method of factorization, Solution of Tridiagonal Systems,. Iterative methods. Jacobi's method, Gauss-siedal method.

UNIT – V (12 Hours) (5 Marks-1, 10 Marks-3)

Numerical solution of ordinary differential equations: Introduction, Solution by Taylor's Series, Picard's method of successive approximations, Euler's method, Modified Euler's method, Runge – Kutta methods.

PRESCRIBED TEXT BOOK:

Numerical Analysis by Dr. A Anjaneyulu, published by Deepti Publications.

Reference Books :

1. Numerical Analysis by S.S.Sastry, published by Prentice Hall India (Latest Edition).
2. Numerical Analysis by G. Sankar Rao, published by New Age International Publishers, New – Hyderabad.
3. Finite Differences and Numerical Analysis by H.C Saxena published by S. Chand and Company, Pvt.Ltd., New Delhi.
4. Numerical methods for scientific and engineering computation by M.K.Jain, S.R.K.Iyengar, R.K. Jain.

Suggested Activities:

Seminar/ Quiz/ Assignments

APPROVED



Ch. B. 29/10/2021
CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275

SEMESTER-VI
BLUE PRINT

Time: 3Hrs.

Max. Marks:75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Curve fitting	: 1 question
Numerical Differentiation	: 2 questions
Numerical Integration	: 2 questions
Solutions of Simultaneous Linear system of equations	: 2 questions
Numerical Solution of Ordinary Differential equation	: 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.

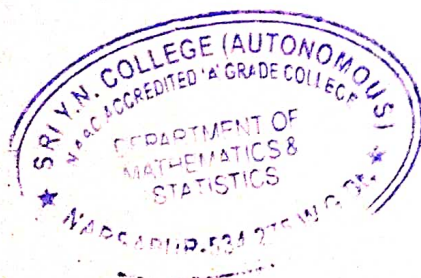
SECTION-A

Curve fitting	: 2 questions
Numerical Differentiation	: 1 question
Numerical Integration	: 2 questions

SECTION-B

Solutions of Simultaneous Linear system of equations	: 2 questions
Numerical Solution of Ordinary Differential equation	: 3 questions

APPROVED



Ch. M 29/10/2021
CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
'NAAC ACCREDITED 'A' GRADE COLLEGE'
NARSAPUR - 531 275



SRI Y.N.COLLEGE(Autonomous),Narsapur
Affiliated to Adikavi Nannaya University
Thrice accredited by NAAC with 'A' Grade
Recognised by UGC as 'College with potential for Excellence'
III B.Sc. Mathematics – Semester – VI - Paper VIII A
CLUSTER ELECTIVE - VIII-A- ADVANCED NUMERICAL ANALYSIS
Model Question Paper (for 2019-2022 batch w.e.f 2017-2018)

Time: 3Hrs

Max Marks:75

PART-I

Answer any FIVE Questions, each question carries FIVE marks.

5x5M =25M

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

x_i	-2	-1	0	1	2
y_i	1	2	3	3	4

2. 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

3. Find $f'(1.5)$ from the following table

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

4. Find the value of $\int_1^5 \log_{10} x \, dx$ taking 8 subintervals correct to 4 decimal places, by Trapezoidal rule.

5. Evaluate $\int_0^1 \frac{1}{1+x} dx$, by Boole's rule.

6. Solve the system of equations $2x+2y+4z = 16$, $x+3y+2z = 13$, $3x+y+3z = 14$, by using Gauss Elimination method.

7. Solve the system of equations $x+y+z = 1$, $x+2y+3z = 6$, $x+3y+4z = 6$, by using matrix inverse method.

8. Using Taylor's series expansion to find a solution of the differential equation $\frac{dy}{dx} = (0.1)(x^3 + y^3)$ with $y(0) = 1$ correct to 4 decimal places.

PART-II

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

5x10M = 50M

SECTION - A

9. 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

10. 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

11. 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

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

13. Evaluate $I = \int_0^{\frac{\pi}{2}} \sin x \, dx$, using Euler-Maclaurin's formula.

SECTION-B

14. Solve the system of equations $5x+2y+z = 12$, $x+4y+2z = 15$, $x+2y+5z = 10$, by using method of factorization.

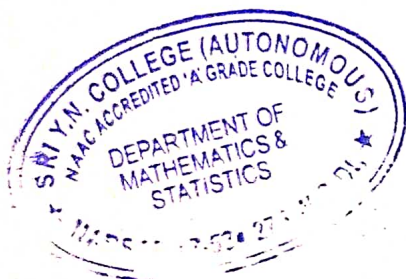
15. Solve the system of equations $10x+y+z = 12$, $2x+10y+z = 13$, $2x+2y+10z = 14$, by using Gauss-Seidel method.

16. Use Picard method to approximate y when $x = 0.2$ given that $y = 1$ when $x = 0$ and $\frac{dy}{dx} = x - y$.

17. Use Runge Kutta method of fourth order to find an approximate value of y when $x=0.1$ and $x=0.2$ given that $x=0$ when $y=1$ and $\frac{dy}{dx} = x + y$

18. Using the Euler's modified method, find $y(0.2)$ for $\frac{dy}{dx} = x + |\sqrt{y}|$ with $y(0)=1$.

APPROVED



Ch. M.
CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275
29/10/2021



SRI Y.N.COLLEGE(Autonomous),Narsapur
Affiliated to Adikavi Nannaya University
Thrice accredited by NAAC with 'A' Grade
Recognized by UGC as 'College with potential for Excellence'
III B.Sc Mathematics (for 2019-2022 batch w.e.f 2017-2018)
Paper VIII B , Syllabus for VI semester
CLUSTER ELECTIVE - VIII-B- SPECIAL FUNCTIONS

Course Outcomes:

Upon completion of the course students will be able to

1. Understand integral calculus and special functions of various problem and to know the application of some basic mathematical methods via all these special functions.
2. Classify and explain the functions of different types of differential equations.
3. Understand purpose and functions of the gamma and beta functions.
4. Use the gamma function, beta function and special functions to evaluate different types of integral calculus problems

UNIT-I:(10 Marks-2)(5 Marks-2)

Hermite Polynomial: Hermite Differential Equations, Solution of Hermite Equation, Hermite's Polynomials, Generating function, other forms for Hermite Polynomial, To find first few Hermite Polynomials, Orthogonal properties of Hermite Polynomials, Recurrence formulae for Hermite Polynomials.

UNIT-II:(10 Marks-2)(5 Marks -2)

Laguerre Polynomials- I : Laguerre's Differential equation, Solution of Laguerre's equation, Laguerre Polynomials, Generating function, Other forms for the Laguerre Polynomials, To find first few Laguerre Polynomials, Orthogonal property of the Laguerre Polynomials, Recurrence formula for Laguerre Polynomials, Associated Laguerre Equation.

UNIT-III: (10Marks - 2)(5 Marks -1)

Legendre's equation : Definition, Solution of Legendre's equation, definition of $P_n(x)$ and $Q_n(x)$, General solution of Legendre's Equation (deviations not required) To show that $P_n(x)$ is the coefficient of h^n in the expansion of $(1 - 2xh + h^2)^{-\frac{1}{2}}$, Orthogonal properties of Legendre's Equation, Recurrence formula, Rodrigues formula.

UNIT-IV : (10Marks -2)(5 Marks -1)

Bessel's equation : Definition, Solution of Bessel's General Differential Equations, General Solution of Bessel's Equation, Integration of Bessel's equation in series for $n = 0$, Definition of $J_n(x)$, Recurrence formulae for $J_n(x)$, Generating function for $J_n(x)$.

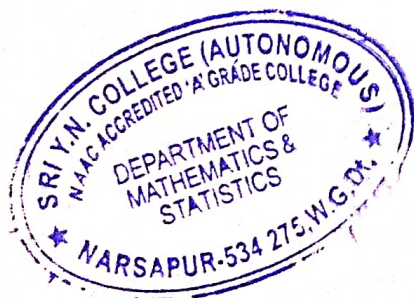
UNIT-V: (10 Marks -2)(5 Marks -2)

Beta and Gamma functions: Euler's Integrals – Beta and Gamma functions, Elementary properties of Gamma Functions, Transformation of Gamma Functions, Another form of Beta Function, Relation between Beta and Gamma Functions, Other Transformation.

PRESCRIBED TEXT BOOK:

Special Functions by J.N.Sharma and Dr.R.K.Gupta.

APPROVED



Chairman 29/10/2021
CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
NAAC ACCREDITED 'A' GRADE COLLEGE
NARSAPUR - 534 275

SEMESTER-VI
BLUE PRINT

Time: 3Hrs.

Max. Marks:75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Hermite Polynomial	: 2 questions
Laguerre Polynomial	: 2 questions
Legendre's Equation	: 1 question
Bessel's Equation	: 1 question
Beta and Gamma functions	: 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.

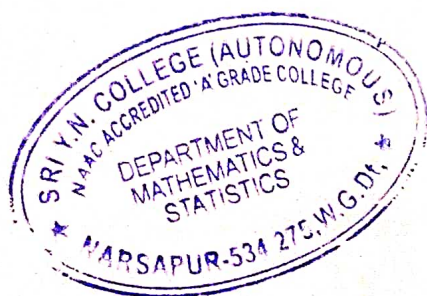
Note: Under SECTION-A (Q.NO:13) & SECTION-B (Q.NO:14) will be given from
UNIT-III.

SECTION-A

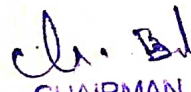
Hermite Polynomial	: 2 questions
Laguerre Polynomial	: 2 questions
Legendre's equation	: 1 question

SECTION-B

Legendre's equation	: 1 question
Bessel's equation	: 2 questions
Beta and Gamma functions	: 2 questions



APPROVED


CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275
29/10/2021



SRI Y.N.COLLEGE(Auononomous),Narsapur
 Affiliated to Adikavi Nannaya University
 Thrice accredited by NAAC with 'A' Grade
 Recognised by UGC as 'College with potential for Excellence'
 III B.Sc. Mathematics – Semester - Paper VIII B
 CLUSTER ELECTIVE - VIII-B- SPECIAL FUNCTIONS
 Model Question Paper (for 2019-2022 batch w.e.f 2017-2018)

Time: 3Hrs

Max Marks:75

PART-I

Answer any FIVE Questions, each question carries FIVE marks.

5x5M =25M

1. Prove that $H_n''(x) = 4n(n-1)H_{n-2}(x)$
2. Prove that if $m < n$, $\frac{d^m}{dx^m} \{H_n(x)\} = \frac{2^m n!}{(n-m)!} H_{n-m}(x)$
3. Prove that $L_n'(x) = -\sum_{r=0}^{n-1} L_r(x)$
4. Prove that $L_n^\alpha(x) = \frac{e^x x^{-\alpha}}{n!} \cdot \frac{d^n}{dx^n} (e^{-x} \cdot x^{n+\alpha})$
5. Prove that $(2n+1)xP_n = (n+1)P_{n+1} + nP_{n-1}$
6. Show that $J_{-\frac{1}{2}}(x) = \sqrt{\left(\frac{2}{\pi x}\right)} \cos x$
7. Compute $\Gamma\left(-\frac{1}{2}\right)$
8. Evaluate $\int_0^2 \frac{x^2 dx}{\sqrt{(2-x)}}$

PART-II

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

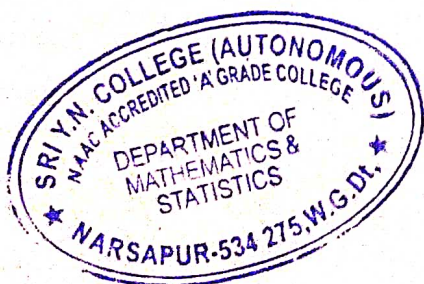
5x10M = 50M

SECTION - A

9. Prove that $\int_{-\infty}^{\infty} e^{-x^2} H_n(x) H_m(x) dx = \begin{cases} 0 & \text{if } m \neq n \\ 2^n \sqrt{\pi} n! & \text{if } m = n \end{cases}$
10. Show that $\sum_{r=0}^n \frac{H_k(x) H_k(z)}{2^k k!} = \frac{H_{n+1}(y) H_n(x) - H_{n+1}(x) H_n(y)}{2^{n+1} n! (y-x)}$
11. Prove that $L_n(x) = \frac{e^x}{n!} \frac{d^n}{dx^n} (x^n e^{-x})$
12. Prove that $L_{n-1}^\alpha(x) + L_n^{\alpha-1}(x) = L_n^\alpha(x)$
13. Prove that $P_n(x) = \frac{1}{n! 2^n} \frac{d^n}{dx^n} (x^2 - 1)^n$

SECTION-B

14. Prove that (i) $\int_{-1}^1 P_m(x) P_n(x) dx = 0$ if $m \neq n$ (ii) $\int_{-1}^1 [P_n(x)]^2 dx = \frac{2}{2n+1}$ if $m = n$
15. Prove that $J_n'(x) = nJ_n(x) - xJ_{n+1}(x)$
16. Prove that $\frac{d}{dx} [J_n^2 + J_{n+1}^2] = 2 \left(\frac{n}{x} + J_n^2 - \frac{n+1}{x} J_{n+1}^2 \right)$
17. Prove that $\beta(l, m) = \frac{\Gamma(l)\Gamma(m)}{\Gamma(l+m)}$
18. Show that $2^n \Gamma\left(n + \frac{1}{2}\right) = 1.3.5 \dots (2n-1) \sqrt{\pi}$



Ch. S. S.
 CHAIRMAN
 BOARD OF STUDIES
 Department of Mathematics & Statistics
 SRI Y.N. COLLEGE (AUTONOMOUS)
 (NAAC ACCREDITED 'A' GRADE COLLEGE)
 NARSAPUR - 534 275



SRI Y.N.COLLEGE(Autonomous), Narsapur
Affiliated to Adikavi Nannayya University
Thrice accredited by NAAC with 'A' Grade
Recognized by UGC as 'College with potential for Excellence'
LIFE SKILL COURSE - ANALYTICAL SKILLS
Syllabus, For all Degree Programmes.

Semester – III (for 2020 -23 admitted batch, w.e.f. 2021-22)

(Total 30 Hrs)

Course Objective: Intended to inculcate quantitative analytical skills and reasoning as an inherent ability in students.

Course Outcomes:

After successful completion of this course, the student will be able to;

- 1) Understand the basic concepts of arithmetic ability, quantitative ability, logical reasoning, business computations and data interpretation and obtain the associated skills.
- 2) Acquire competency in the use of verbal reasoning.
- 3) Apply the skills and competencies acquired in the related areas
- 4) Solve problems pertaining to quantitative ability, logical reasoning and verbal ability inside and outside the campus.

UNIT – I :

Arithmetic ability: (10 Questions)

Algebraic operations BODMAS, Fractions, Divisibility rules, LCM & GCD (HCF).

Verbal Reasoning : (10 Questions)

Number Series, Coding & Decoding, Blood relationship, Clocks, Calendars.

UNIT – II :

Quantitative aptitude (10 Questions)

Averages, Ratio and proportion, Problems on ages, Time-distance – speed.

Business computations (10 Questions)

Percentages, Profit & loss, Partnership, simple compound interest.

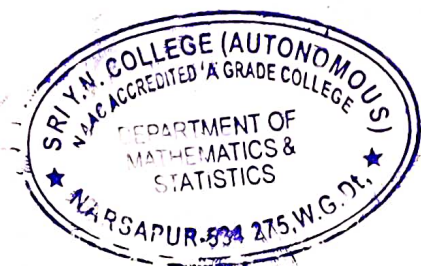
UNIT – 3:

Data Interpretation: (2 Questions)

Tabulation, Bar Graphs, Pie Charts, Line Graphs, Venn diagram.

Reference Books:

1. Quantitative Aptitude for Competitive Examination by R S Agrawal, S.Chand publications.
2. Quantitative Aptitude and Reasoning by R V Praveen, PHI publishers.
3. Quantitative Aptitude : Numerical Ability (Fully Solved) Objective Questions, Kiran Prakashan, Pratogitaprakasan, Kic X, Kiran Prakashan publishers
4. Quantitative Aptitude for Competitive Examination by Abhijit Guha, Tata Mc Graw hill publications.
5. Old question Paper of the exams conducted by (Wipro, TCS, Infosys, Etc) at their recruitment process, source-Internet.



APPROVED

Ch. Bal 29/10/2021
CHAIRMAN
BOARD OF STUDIES
Department of Mathematics & Statistics
SRI Y.N. COLLEGE (AUTONOMOUS)
(NAAC ACCREDITED 'A' GRADE COLLEGE)
NARSAPUR - 534 275



SRI Y.N.COLLEGE(Autonomous),Narsapur
Affiliated to Adikavi Nannaya University
Thrice accredited by NAAC with 'A' Grade
Recognized by UGC as 'College with potential for Excellence'

II B.Sc, B.A, B.Com
LIFE SKILL COURSE – ANALYTICAL SKILLS
Model Question Paper (for 2020-23 batch w. e. f 2021-2022)

Time: 2Hrs

Max Marks: 50

Answer ALL the questions. Each question carries ONE mark.

50 x 1 = 50M

SECTION-A(Unit-I & II)

- Solve $5172.49 + 378.352 + x = 9318.678$
(a) 7637.683 (b) 7367.368 (c) 3767.836 (d) 7763.638
- Solve $0.014 \times 0.014 = ?$
(a) 0.000196 (b) 0.00196 (c) 19.6 (d) 196
- Find the value of $2 - [2 - \{2 - 2(2 + 2)\}]$
(a) -4 (b) 4 (c) 6 (d) None of these
- Evaluate $\frac{8 - [5 - (-3 + 2)] \div 2}{|5 - 3| - |5 - 8| \div 3}$
(a) 2 (b) 3 (c) 4 (d) 5
- $\frac{4335}{4(?)24} \div 1\frac{7}{8} = \frac{289}{528}$ Find the missing digit in place of '?'
(a) 1 (b) 2 (c) 8 (d) None of these
- Which of the following has fractions in ascending order?
(a) $\frac{2}{3}, \frac{3}{5}, \frac{7}{9}, \frac{9}{11}, \frac{8}{9}$ (b) $\frac{3}{5}, \frac{2}{3}, \frac{9}{11}, \frac{7}{9}, \frac{8}{9}$ (c) $\frac{3}{5}, \frac{2}{3}, \frac{7}{9}, \frac{9}{11}, \frac{8}{9}$ (d) $\frac{8}{9}, \frac{9}{11}, \frac{7}{9}, \frac{2}{3}, \frac{3}{5}$
- The sum of all two digit numbers divisible by 5 is
(a) 1035 (b) 1245 (c) 1230 (d) 945
- The largest 4 digit number exactly divisible by 88 is
(a) 9944 (b) 9768 (c) 9988 (d) 8888
- Find the L.C.M of 16, 24, 36 and 54
(a) 433 (b) 432 (c) 324 (d) 234
- The L.C.M. of $\frac{1}{3}, \frac{5}{6}, \frac{2}{9}, \frac{4}{27}$ is :
(a) $\frac{1}{54}$ (b) $\frac{10}{27}$ (c) $\frac{20}{3}$ (d) None of these
- 1, 9, 25, 49, ?, 121
(a) 64 (b) 81 (c) 91 (d) 100
- 589654237, 89654237, 8965423, 965423, ?
(a) 58965 (b) 65423 (c) 89654 (d) 96542
- CIRCLE is related to RICELC in the same way as SQUARE is related to
(a) QSUERA (b) QUSERA (c) UQSAER (d) UQSERA
- In a certain code, BRAIN is written as * % ÷ # × and TIER is written as \$ # + %. How is RENT written in that code?
(a) % × # \$ (b) % # × \$ (c) % + × \$ (d) + × % \$
- B is the husband of P. Q is the only grandson of E, who is wife of D and mother-in-law of P. How is B related to D?
(a) Nephew (b) Cousin (c) Son-in-law (d) Son
- E is the son of A. D is the son of B. E is married to C. C is B's daughter. How is D related to E?
(a) Brother (b) Uncle (c) Father-in-law (d) Brother-in-law (e) None of these
- How many times do the hands of a clock coincide in a day?
(a) 20 (b) 21 (c) 22 (d) 24

18. How many times in a day, are the hands of a clock in straight line but opposite in direction?
 (a) 20 (b) 22 (c) 24 (d) 48
19. What was the day of the week on 16th July, 1776?
 (a) Monday (b) Wednesday (c) Tuesday (d) Saturday
20. On 6th March, 2005 Monday falls. What was the day of the week on 6th March, 2004.
 (a) Sunday (b) Saturday (c) Tuesday (d) Wednesday
21. Find the average of all prime numbers between 30 and 50
 (a) 40 (b) 41 (c) 55.5 (d) 39.8
22. A batsman makes a score of 87 runs in the 17th innings and thus increases his average by 3. Find his average after 17th inning.
 (a) 38 (b) 40 (c) 45 (d) 39
23. If $A : B = \frac{1}{2} : \frac{1}{8}$, $B : C = \frac{1}{3} : \frac{5}{9}$ and $C : D = \frac{5}{6} : \frac{3}{4}$, then the ratio $A : B : C : D$ is:
 (a) 4 : 6 : 8 : 10 (b) 6 : 4 : 8 : 10 (c) 6 : 8 : 9 : 10 (d) 8 : 6 : 10 : 9
24. If $0.75 : x :: 5 : 8$, then x is equal to
 (a) 1.12 (b) 1.20 (c) 1.25 (d) 1.30
25. Present ages of Sammer and Anand are in the ratio of 5: 4 respectively. Three years hence, the ratio of their ages will become 11 : 9 respectively. What is Anand's present age in years?
 (a) 24 (b) 27 (c) 40 (d) Cannot be determined (e) None of these
26. Sachin is younger than Rahul by 4 years. If their ages are in the respective ratio of 7 : 9, how old is Sachin?
 (a) 16 years (b) 18 years (c) 28 years
 (d) cant be determined (e) None of these
27. A cyclist covers a distance of 750m in 2 min 30 sec. What is the speed in km/hr of the cyclist?
 (a) 18 km /hr (b) 20 km /hr (c) 22 km /hr (d) 25 km
28. A train covers a distance of 10 km in 12 minutes. If its speed is decreased by 5 km / hr the time taken by it to cover the same distance will be :
 (a) 10 min (b) 11 min 20 sec (c) 13 min (d) 13 min 20 sec
29. A thief steals a car at 2.30 p.m. and drives it at 60kmph. The theft is discovered at 3 p.m. and the owner sets off in another car at 75kmph. When will he overtake the thief?
 (a) 4.30 p.m. (b) 4.45 p.m. (c) 5 p.m. (d) 5.15p.m.
30. A man's speed with the current is 15kmph and the speed of the current is 2.5kmph. The man's speed against the current is
 (a) 8.5kmph (b) 9kmph (c) 10kmph (d) 12.5kmph
31. What is 15% of Rs.34?
 (a) Rs. 3.40 (b) Rs.3.75 (c) Rs.4.50 (d) Rs.5.10
32. 65 % of ? = 20% of 422.50
 (a) 84.5 (b) 130 (c) 139.425 (d) 200
33. If on selling 12 notebooks, a seller makes a profit equal to the selling price of 4 note books, what is his percent profit?
 (a) $16\frac{2}{3}$ (b) 25 (c) 50 (d) Data inadequate (e) None of these
34. A, B and C enter into a partnership with a capital in which A's contribution is Rs.10,000. If out of a total profit of Rs.1000, A gets Rs.500 and B gets Rs.300, then C's capital is :
 (a) Rs.4000 (b) Rs.5000 (c) Rs.6000 (d) Rs.9000

35. P and Q started a business investing Rs.85,000 and Rs.15,000 respectively. In what ratio the profit earned after 2 years be divided between P and Q respectively?
 (a) 3 : 4 (b) 3 : 5 (c) 15 : 23 (d) 17 : 23 (e) None of these
36. Reena and Shaloo are partners in a business. Reena invests Rs. 35,000 for 8 months and Shaloo invests Rs.42,000 for 10 months. Out of a profit of Rs.31,750, Reena's share is :
 (a) Rs.9471 (b) Rs.12,628 (c) Rs.18,040 (d) Rs.18,942
37. A sum of Rs.12,500 amounts to Rs.15,500 in 4 years at the rate of simple interest. What is the rate of interest?
 (a) 3% (b) 4% (c) 5% (d) 6% (e) None of these
38. The differences between the simple interest received from two different sources on Rs.1500 for 3 years is Rs.13.50. The difference between their rates of interest is :
 (a) 0.1 % (b) 0.2% (c) 0.3% (d) 0.4% (e) None of these
39. Find the compound interest on Rs.10,000 in 2 years at 4% per annum, the interest being compounded half-yearly.
 (a) Rs.852.23 (b) Rs.824.32 (c) Rs.258.94 (d) Rs.843.16
40. Rs.800 becomes Rs.956 in 3 years at a certain rate of simple interest. If the rate of interest is increased by 4%, what amount will Rs.800 become in 3 years?
 (a) Rs.1020.80 (b) Rs.1025 (c) Rs.1052
 (d) Data inadequate (e) None of these

SECTION – B (Unit – III)

(Q.No 41 – 45)

Study the following table carefully and answer the questions given below.

Classification of 100 students based on the marks obtained by them in Physics and Chemistry in an Examination

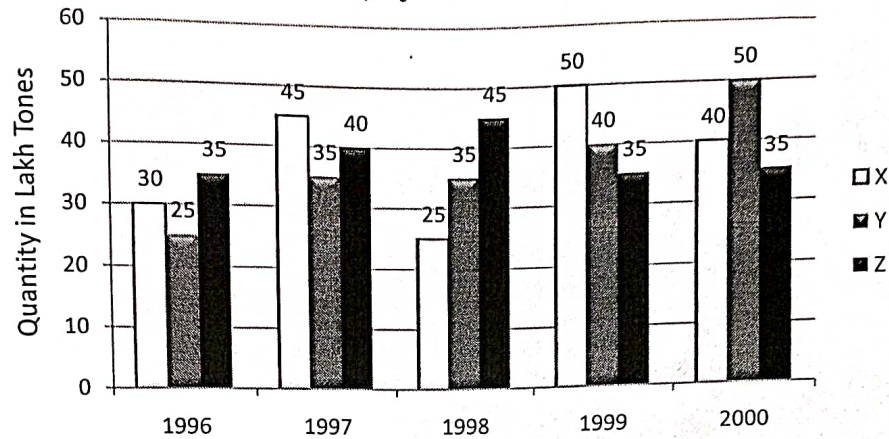
Marks out of 50 Subject	40 and Above	30 and Above	20 and Above	10 and Above	0 and Above
Physics	9	32	80	92	100
Chemistry	4	21	66	81	100
Average	7	27	73	87	100

41. The number of students scoring less than 40% marks in aggregate is:
 (a) 13 (b) 19 (c) 20 (d) 27 (e) 34
42. If at least 60% marks in Physics are required for pursuing higher studies in Physics, how many students will be eligible to pursue higher studies in Physics?
 (a) 27 (b) 32 (c) 34 (d) 41 (e) 68
43. What is the difference between the number of students passed with 30 as cut-off marks in Chemistry and those passed with 30 as cut-off marks in aggregate?
 (a) 3 (b) 4 (c) 5 (d) 6 (e) 7
44. The percentage of the number of students getting at least 60% marks in Chemistry over those getting at least 40% marks in aggregate, is approximately:
 (a) 21% (b) 27% (c) 29% (d) 31% (e) 34%
45. If it is known that at least 23 students were eligible for a symposium on Chemistry, the minimum qualifying marks in Chemistry for eligibility to Symposium would lie in the range :
 (a) 40 -50 (b) 30-40 (c) 20-30 (d) Below 20 (e) Cannot be determined

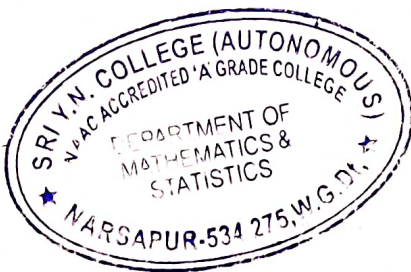
(Q.No 46 – 50)

The bar graph provided below gives the data of the production of paper (in lakh tones) by three different companies X, Y and Z over the years. Study the graph and answer the questions that follow.

Production of Paper (in lakh tones) by three companies X, Y and Z over the years



46. What is the difference between the production of Company Z in 1998 and Company Y in 1996?
 (a) 2,00,000 tons (b) 20,00,000 tons (c) 20,000 tons (d) 2,00,00,000 tons
 (e) None of these
47. What is the ratio of the average production of Company X in the period 1998-2000 to the average production of Company Y in the same period?
 (a) 1 : 1 (b) 15 : 17 (c) 23 : 25 (d) 27 : 29 (e) None of these
48. What is the percentage increase in the production of Company Y from 1996 to 1999?
 (a) 30% (b) 45% (c) 50% (d) 60% (e) 75%
49. The average production for five years was maximum for which company?
 (a) X (b) Y (c) Z (d) X and Y both (e) X and Z both
50. In which year was the percentage of production of Company Z to the production of Company Y the maximum?
 (a) 1996 (b) 1997 (c) 1998 (d) 1999 (e) 2000



APPROVED

Ch. R. 29/10/2021
CHAIRMAN
BOARD OF STUDIES
 Department of Mathematics & Statistics
 SRI Y.N. COLLEGE (AUTONOMOUS)
 (NAAC ACCREDITED A GRADE COLLEGE)
 NARSAPUR - 534 275