



Dr.V.S.KRISHNA GOVERNMENT DEGREE COLLEGE
Affiliated to Andhra University
NAAC Reaccredited with "A" Grade Institution.
VISAKHAPATNAM 530 013. A.P.INDIA

DEPARTMENT OF MATHEMATICS.

**Dr. V. S. Krishna Govt. Degree College(A)
Visakhapatnam**

DEPARTMENT OF MATHEMATICS

PROPOSED SYLLABUS FOR MATHEMATICS

IN UNDERGRADUATE DEGREE PROGRAMME

UNDER AUTONOMY

(With effect from 2020-21)

SYLLABUS DEVELOPMENT COMMITTEE FOR MATHEMATICS IN UNDERGRADUATE DEGREE PROGRAMMES

Convener

Ms. Triveni Domada
Lecturer

Head of the Dept. of Mathematics

Members:

I & II Semesters

Ms. Triveni Domada, Lecturer

Dr. S.Lakshmana Rao, Contract lecturer

III & IV Semester

Ms. Triveni Domada, Lecturer

Dr. S.Lakshmana Rao, Contract lecturer

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Dr. V. S. KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

DEPARTMENT OF MATHEMATICS

BOARD OF STUDIES RESOLUTIONS 2020 – 2021

(MINUTES OF THE MEETING)

BOS RESOLUTIONS ADOPTED

The Board of Studies of the Department of MATHEMATICS met on **28.01.2021 at 11.00AM** under the Chairmanship of Dr. V. Chandra Sekhar and resolved the following:

- 1) To adopt Choice Based Credit System as per the Staff Councils proceedings commencing from the academic year 2020 – 2021 for the admitted 1st Year Degree students' batch of 2020 – 2021.
- 2) To approve and introduce the newly framed syllabus (modified and approved by the BOS) for the 1st Year B.Sc. Degree course in Mathematics. The newly framed syllabus is oriented in such a fashion that it caters to the needs of the students and to meet the present-day job employability and to develop professionalism in the field of Mathematics.
- 3) To approve and ratify the 1st and 2nd Year Mathematics syllabus for the batch admitted in 2020 -2021.
- 4) To ratify and introduce the semester mode pattern of examinations for the 1st Year students (M.P.C., M.P.Cs, M.C.I.C & M.St.Cs. groups). Further it is approved and ratified the model question papers submitted by the concerned faculty members for 1st, 2nd, 3rd, 4th semesters. Out of 100 marks in each semester, 75 marks are for theory external examination and 25 marks for internal assessment of which 20 marks are provided for evaluation of conducting and taking average of two mid semester examinations and 5 marks are fixed for assignments/ Viva-Voce. Practical examinations will be conducted by the external examiners, at the end of each academic year for 100 marks.
- 5) To approve and ratify the life skill courses for the First and Second year students (B.A/B.com/B.Sc) and Mathematics minors for Physics (Hons) and Chemistry (Hons).
- 6) To conduct seminars, workshops, symposia, field visits and organising exhibitions etc., to inculcate and create new ideology among the students.
- 7) To encourage students to take up independent research projects at their level by providing facilities.
- 8) To adopt NAAC norms by introducing quality circles among student community.
- 9) To develop infrastructure facilities in the department and implement guidelines of the Academic Council.
- 10) To take up innovative teaching (ICT mode of teaching) and evolve techniques that are easily understanding by the students and conduct remedial coaching to the below average students.
- 11) It is also resolved to establish a well-maintained laboratory for the practical purpose.
- 12) To encourage students to join JKC to equip with communication skills and improve their personality development.

13) To encourage students to participate in the community development activities such as Haritha Krishna Eco Club, NCC and NSS.

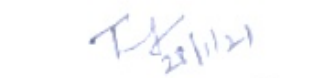
14) To reflect the changes in syllabus, blue print and question paper pattern if any.

Signed and approved by

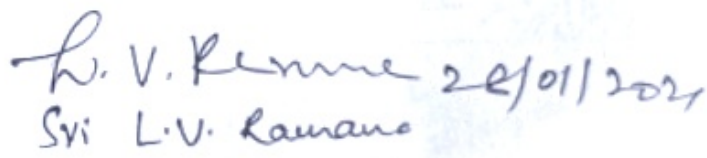

Prof. G.V.R. Babu 28/1/21
Subject Expert
(University Nominee)


Dr. V. Chandra Sekhar
Chairperson/Principal


Dr. D. Sravan Kumar
Academic Coordinator


Ms. Triveni Domada
Head of the Department
Dept. of Mathematics


Smt. P. Surekha 28/01/2021
(Subject Expert)


Sri L.V. Ramana 28/01/2021
(Subject Expert)

Dr.V.S.Krishna Govt. Degree College (Autonomous), Visakhapatnam
Resolutions/Minutes of the 6th Board of Studies 28th January- 2021

Subject: Mathematics /Life Skill Courses/ Mathematics Minor for Phy (Hons) & Chem (Hons)

Department: Mathematics

In pursuance of conferment of Autonomous status to Dr.V.S.Krishna Govt. Degree College(A), Visakhapatnam by the UGC vide letter No.F22-1/2011(AC) dated 20.07.2011 from Dr. Manju Singh, Joint Secretary, UGC, New Delhi and Proceedings No. C-II (CDC) /Dr.VSK.Govt.College/BOS/2020 dt.19.03.2020 of The Vice-Chancellor, Andhra University, Visakhapatnam, the **6th Board of Studies in Mathematics** Subject is conducted on 28/01/2021 at 10:00 AM with the following members. The Changes will be implemented from 2020-21 academic year onwards.

MEMBER	NAME& DESIGNATION	SIGNATURE
Head of the Department (Chairman)	Ms. Triveni Domada	T. J. 28/1/21
Faculty Members	Ms. Triveni Domada	
	Dr. S.Lakshmana Rao	S. L. Rao 28/01/2021
Subject Expert (University Nominee)	Prof. G.V.R.Babu, Dept of Mathematics, Andhra University.	G.V.R. Babu 28/1/21
Subject Experts (from outside the parent university)	Ms. P. Surekha, Lecturer in Mathematics, G.D.C, Narasannapeta.	P. Surekha 28/01/2021
	Sri. L.V. Ramana, Lecturer in Mathematics, G.D.C (M), Srikakulam.	L.V. Ramana 28/01/2021
Representative Member From Industry / Corporate / Allied Area relating to placement		
Member from Alumni	Dr.CH.V.M.K.Hari	CH.V.M.K.Hari
Coordinator, Academic Council	Dr.D.Sravan Kumar, Academic Coordinator	D. Sravan Kumar
Chairperson, Academic Council	Dr.V.Chandra Sekhar Principal	V. Chandra Sekhar

Dr.V.S.KRISHNA GOVT.DEGREE COLLEGE (A), VISAKHAPATNAM.
B.A./B.Sc. MATHEMATICS

REVISED SYLLABUS FOR CORE COURSES

CBCS/ SEMESTER SYSTEM
(w.e.f. 2020-21 Admitted Batch)

CORE COURSES STRUCTURE
(Sem-I to Sem-IV)

Semester	Course	Subject	Hrs.	Credits	IA	ES	Total
I	Course –I	Differential Equations & Differential Equations Problem Solving Sessions	6	5	25	75	100
II	Course –II	Three dimensional analytical Solid geometry & Three dimensional analytical Solid Geometry Problem Solving Sessions	6	5	25	75	100
III	Course –III	Abstract Algebra & Abstract Algebra Problem Solving Sessions	6	5	25	75	100
IV	Course –IV	Real Analysis & Real Analysis Problem Solving Sessions	6	5	25	75	100
	Course –V	Linear Algebra & Linear Algebra Problem Solving Sessions	6	5	25	75	100

Dr.V.S.KRISHNA GOVT.DEGREE COLLEGE (A), VISAKHAPATNAM.
COURSE-I

CBCS/ SEMESTER SYSTEM

B.A./B.Sc. MATHEMATICS (w.e.f. 2020-21 Admitted Batch)

DIFFERENTIAL EQUATIONS

SYLLABUS (75 Hours)

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.

Course Syllabus:

UNIT – I (12 Hours)

Differential Equations of first order and first degree:

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:

Equations solvable for p ; Equations solvable for y ; Equations solvable for x ; Equations that do not contain x (or y); Equations homogeneous in x and y ; Equations of the first degree in x and y – Clairaut's Equation.

UNIT – III (12 Hours)

Higher order linear differential equations-I:

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 is $b \cdot \sin ax$ or $b \cdot \cos ax$.

UNIT – IV (12 Hours)

Higher order linear differential equations-II:

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 $Q = x^m V$, where V is a function of x .

UNIT – V (12 Hours)

Higher order linear differential equations-III :

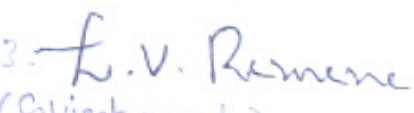
Method of variation of parameters; Linear differential Equations with non-constant coefficients; The Cauchy-Euler Equation, Legendre's linear equations, miscellaneous differential equations.

Co-Curricular Activities(15 Hours)

Seminar/ Quiz/ Assignments/ Applications of Differential Equations to Real life Problem /Problem Solving.

1. 
(University Nominee)

2. 
(Subject expert)

3. 
(Subject expert)
28/01/2021

Text Book :

Differential Equations and Their Applications by Zafar Ahsan, published by Prentice-Hall of India Pvt. Ltd, New Delhi-Second edition

Reference Books :

1. A text book of Mathematics for B.A/B.Sc. Vol I, by N. Krishna Murthy & others, published by S.Chand & Company, New Delhi
2. Ordinary and Partial Differential Equations by Dr. M.D. Raisinghania, published by S. Chand & Company, New Delhi.
3. Differential Equations with applications and programs – S. Balachandra Rao & H.R. Anuradha-Universities Press.
4. Differential Equations -Srinivas Vangala & Madhu Rajesh, published by Spectrum University Press.

1. 
(University Nominee)

2. 
(Subject Expert)

3. 
(Subject expert)
28/01/2021

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.

Course Syllabus:

UNIT – I (12 Hours)

The Plane :

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 :

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)

The Sphere :

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)

The Sphere and Cones :

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.

Definitions of a cone; vertex; guiding curve; generators; Equation of the cone with a given vertex and guiding curve; equations of cones with vertex at origin are homogenous; Condition that the general equation of the second degree should represent a cone;

UNIT – V (12 hrs)

Cones:

Enveloping cone of a sphere; right circular cone; equation of the right circular cone with a given vertex, axis and semi vertical angle; Condition that a cone may have three mutually perpendicular generators; 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.

Co-Curricular Activities(15 Hours)

Seminar/ Quiz/ Assignments/Three dimensional analytical Solid geometry and its applications/ Problem Solving.

1.

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3. L. V. Ramana
28/01/2021

Text Book :

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

Reference Books :

1. A text book of Mathematics for B.A B.Sc Vol I, by V Krishna Murthy & Others, published by S. Chand & Company, New Delhi.
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.
4. Solid Geometry by B.Rama Bhupal Reddy, published by Spectrum University Press.

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L.V. Ramana
28/01/2021

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 prove the theorems.
6. Understand the applications of ring theory in various fields.

Course Syllabus:

UNIT – I (12 Hours)

GROUPS :

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 – II (12 Hours)

SUBGROUPS :

Complex Definition – Multiplication of two complexes Inverse of a complex-Subgroup definition- examples-criterion for a complex to be a subgroup. Criterion for the product of two subgroups to be a subgroup-Union and Intersection of subgroups.

Cosets and Lagrange's Theorem :

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

UNIT –III (12 Hours)

NORMAL SUBGROUPS :

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 –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 – IV (12 Hours)

PERMUTATIONS AND CYCLIC GROUPS :

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 – V (12 Hours)

RINGS :

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.

Co-Curricular Activities(15 Hours)

Seminar/ Quiz/ Assignments/ Group theory and its applications / Problem Solving.

1. 

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3. H. V. Kumar
28/01/2021

Text Book :

A text book of Mathematics for B.A. / B.Sc. by B.V.S.S. SARMA and others, published by S.Chand & Company, New Delhi.

Reference Books :

1. Abstract Algebra by J.B. Fraleigh, Published by Narosa publishinghouse.
2. Modern Algebra by M.L. Khanna.
3. Rings and Linear Algebra by Pundir & Pundir, published by PragathiPrakashan.

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COURSE-IV

CBCS/ SEMESTER SYSTEM

(w.e.f. 2020-21 Admitted Batch)

B.A./B.Sc. MATHEMATICS

REAL ANALYSIS

SYLLABUS (75 Hours)

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.

Course Syllabus:

UNIT – I (12 Hours)

REAL NUMBERS :

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

Real Sequences:

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 Hours)

INFINITE SERIES :

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. Cauchy's n^{th} root test or Root Test.

3. D'Alemberts' Test or Ratio Test.

4. Alternating Series – Leibnitz Test.

Absolute convergence and conditional convergence

UNIT – III (12 Hours)

CONTINUITY :

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 Hours)

DIFFERENTIATION AND MEAN VALUE THEORMS :

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; Rolle's Theorem, Lagrange's Theorem, Cauchy's Mean value Theorem

UNIT – V (12 Hours)

RIEMANN INTEGRATION :

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.

Co-Curricular Activities(15 Hours)

Seminar/ Quiz/ Assignments/ Real Analysis and its applications / Problem Solving.

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Text Book:

Introduction to Real Analysis by Robert G Bartle and Donlad R. Sherbert, published by John Wiley.

Reference Books:

1. A Text Book of B.Sc Mathematics by B.V.S.S. Sarma and others, published by S. Chand & Company Pvt. Ltd., New Delhi.
2. Elements of Real Analysis as per UGC Syllabus by Shanthi Narayan and Dr. M.D.Raisinghania, published by S. Chand & Company Pvt. Ltd., New Delhi.

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Dr.V.S.KRISHNA GOVT.DEGREE COLLEGE (A), VISAKHAPATNAM.
COURSE-V
CBCS/ SEMESTER SYSTEM
(w.e.f. 2020-21 Admitted Batch)
B.A./B.Sc. MATHEMATICS
LINEAR ALGEBRA
SYLLABUS (75 Hours)

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.

Course Syllabus:

UNIT – I (12 Hours)

Vector Spaces-I:

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 Hours)

Vector Spaces-II:

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 Hours)

Linear Transformations:

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 Hours)

Matrix :

Matrices, Elementary Properties of Matrices, Inverse Matrices, Rank of Matrix, Linear Equations, Characteristic equations, Characteristic Values & Vectors of square matrix, Cayley – Hamilton Theorem.

UNIT –V (12 Hours)

Inner product space :

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

Co-Curricular Activities(15 Hours)

Seminar/ Quiz/ Assignments/ Linear algebra and its applications / Problem Solving.

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TextBook:

Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut- 250002.

Reference Books :

1. Matrices by Shanti Narayana, published by S.Chand Publications.
2. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition), New Delhi.
3. Linear Algebra by Stephen H. Friedberg et. al, published by Prentice Hall of India Pvt.Ltd, 4th Edition, 2007.

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Recommended Question Paper Patterns and Models
BLUE PRINT FOR QUESTION PAPER PATTERN
COURSE-I, DIFFERENTIAL EQUATIONS

Unit	TOPIC	S.A.Q(including choice)	E.Q(including choice)	Total Marks
I	Differential Equations of 1 st order and 1 st degree	2	2	30
II	Orthogonal Trajectories, Differential Equations of 1 st order but not of 1 st degree	2	2	30
III	Higher Order Linear Differential Equations (with constant coefficients) – I	1	2	25
IV	Higher Order Linear Differential Equations (with constant coefficients) – II	2	2	30
V	Higher Order Linear Differential Equations (with non constant coefficients)	1	2	25
TOTAL		8	10	140

S.A.Q. = Short answer questions (5 marks)

E.Q. = Essay questions (10 marks)

Short answer questions : 5 X 5 M = 25M

Essay questions : 5 X 10 M = 50M

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Total Marks = 75M

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Dr.V.S.KRISHNA GOVT.DEGREE COLLEGE (A), VISAKHAPATNAM,
CBCS/ SEMESTER SYSTEM

(W.e.f 2020-21 Admitted Batch)

B.A./B.Sc. MATHEMATICS

COURSE-I, DIFFERENTIAL EQUATIONS

MATHEMATICS MODEL PAPER

Time: 3Hrs

Max.Marks:75M

SECTION - A

Answer any FIVE questions. Each question carries FIVE marks 5 X 5 M=25 M

1. Solve $(1 + e^{x/y}) dx + e^{x/y} \left(1 - \frac{x}{y}\right) dy = 0$.
2. Solve $(y - e^{\sin^{-1} x}) \frac{dx}{dy} + \sqrt{1 - x^2} = 0$
3. Solve $y + px = p^2 x^4$.
4. Solve $(px - y)(py + x) = 2p$
5. Solve $(D^2 - 3D + 2) = \cosh x$
6. Solve $(D^2 - 4D + 3)y = \sin 3x \cos 2x$.
7. Solve $\frac{d^2 y}{dx^2} - 6 \frac{dy}{dx} + 13y = 8e^{3x} \sin 2x$.
8. Solve $x^2 y'' - 2x(1+x)y' + 2(1+x)y = x^3$

SECTION - B

Answer ALL the questions. Each question carries TEN marks. 5 X 10 M = 50 M

9 a) Solve $x \frac{dy}{dx} + y = y^2 \log x$.

(Or)

9 b) Solve $\left(y + \frac{1}{3}y^3 + \frac{1}{2}x^2\right) dx + \frac{1}{4}(x + xy^2) dy = 0$.

10 a) Solve $p^2 + 2p \cot x = y^2$.

(Or)

10 b) Find the orthogonal trajectories of the family of curves

$x^{2/3} + y^{2/3} = a^{2/3}$ where 'a' is the parameter.

11 a) Solve $(D^3 + D^2 - D - 1)y = \cos 2x$.

(Or)

11 b) Solve $(D^2 - 3D + 2)y = \sin e^{-x}$.

12 a) Solve $(D^2 - 2D + 4)y = 8(x^2 + e^{2x} + \sin 2x)$.

(Or)

12 b) $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = xe^x \sin x$.

13 a) Solve $(D^2 - 2D)y = e^x \sin x$ by the method of variation of parameters.

(Or)

13 b) Solve $3x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = x$

BLUE PRINT FOR QUESTION PAPER PATTERN
COURSE-II, THREE DIMENSIONAL ANALYTICAL SOLID GEOMETRY

Unit	TOPIC	S.A.Q(including choice)	E.Q(including choice)	Total Marks
I	The Plane	2	2	30
II	The Right Line	2	2	30
III	The Sphere	2	2	30
IV	The Sphere & The Cone	1	2	25
V	The Cone	1	2	25
TOTAL		8	10	140

S.A.Q. = Short answer questions (5 marks)

E.Q. = Essay questions (10 marks)

Short answer questions : 5 X 5 M = 25M

Essay questions : 5 X 10 M = 50M

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Total Marks = 75M
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1.  2.  3. L. V. Ranne
28/01/2021

Dr.V.S.KRISHNA GOVT.DEGREE COLLEGE (A), VISAKHAPATNAM.
CBCS/ SEMESTER SYSTEM

(w.e.f. 2020-21 Admitted Batch)

B.A./B.Sc. MATHEMATICS

COURSE-II, THREE DIMENSIONAL ANALYTICAL SOLID GEOMETRY

Time:3Hrs

Max.Marks:75 M

SECTION - A

Answer any FIVE questions. Each question carries FIVE marks $5 \times 5 \text{ M} = 25 \text{ M}$

1. Find the equation of the plane through the point $(-1,3,2)$ and perpendicular to the planes $x+2y+2z=5$ and $3x+3y+2z=8$.
2. Find the bisecting plane of the acute angle between the planes $3x-2y-6z+2=0$, $-2x+y-2z-2=0$.
3. Find the image of the point $(2,-1,3)$ in the plane $3x-2y+z=9$.
4. Show that the lines $2x+y-4=0 = y+2z$ and $x+3z-4=0$, $2x+5z-8=0$ are coplanar.
5. A variable plane passes through a fixed point (a, b, c) . It meets the axes in A,B, C. Show that the center of the sphere OABC lies on $ax^{-1}+by^{-1}+cz^{-1}=2$.
6. Show that the plane $2x-2y+z+12=0$ touches the sphere $x^2+y^2+z^2-2x-4y+2z-3=0$ and find the point of contact.
7. Find the equation to the cone which passes through the three coordinate axes and the lines $\frac{x}{1} = \frac{y}{-2} = \frac{z}{3}$ and $\frac{x}{2} = \frac{y}{1} = \frac{z}{1}$.
8. Find the equation of the enveloping cone of the sphere $x^2 + y^2 + z^2 + 2x - 2y = 2$ with its vertex at $(1, 1, 1)$.

SECTION - B

Answer ALL the questions. Each question carries TEN marks. $5 \times 10 \text{ M} = 50 \text{ M}$

9(a) A plane meets the coordinate axes in A, B, C. If the centroid of $\triangle ABC$ is

(a,b,c) , show that the equation of the plane is $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 3$.

(OR)

(b) A variable plane is at a constant distance p from the origin and meets the axes in A,B,C. Show that the locus of the centroid of the tetrahedron OABC is $x^2+y^2+z^2=16p^2$.

10(a) Find the shortest distance between the lines

$$\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-5}{1}; \quad \frac{x+3}{-3} = \frac{y+1}{2} = \frac{z-6}{4}$$

(OR)

(b) Prove that the lines $\frac{x-1}{2} = \frac{y-4}{3} = \frac{z-5}{4}$; $\frac{x-4}{3} = \frac{y-5}{4} = \frac{z-6}{5}$ are coplanar. Also find their point of intersection and the plane containing the lines.

11 (a) Show that the two circles $x^2+y^2+z^2-y+2z=0$, $x-y+z=2$;
 $x^2+y^2+z^2+x-3y+z-5=0$, $2x-y+4z-1=0$ lie on the same sphere and find its equation.

(OR)

(b) Find the equation of the sphere which touches the plane $3x+2y-z+2=0$ at $(1,-2,1)$ and cuts orthogonally the sphere $x^2+y^2+z^2-4x+6y+4=0$.

12 (a) Find the limiting points of the coaxial system of spheres
 $x^2+y^2+z^2-8x+2y-2z+32=0$, $x^2+y^2+z^2-7x+z+23=0$.

(OR)

(b) Find the equation to the cone with vertex is the origin and whose base curve is $x^2+y^2+z^2+2ux+d=0$.

13 (a) Prove that the equation $\sqrt{fx} \pm \sqrt{gy} \pm \sqrt{hz} = 0$ represents a cone that touches the coordinate planes and find its reciprocal cone.

(OR)

(b) Find the equation of the sphere $x^2+y^2+z^2-2x+4y-1=0$ having its generators parallel to the line $x=y=z$.

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BLUE PRINT FOR QUESTION PAPER PATTERN
COURSE-III, ABSTRACT ALGEBRA

Unit	TOPIC	S.A.Q(including choice)	E.Q(including choice)	Total Marks
I	Groups	2	2	30
II	Subgroups, Cosets & Lagrange's theorem	1	2	25
III	Normal Subgroups and Homomorphism	1	2	25
IV	Permutations and Cyclic groups	2	2	30
V	Rings	2	2	30
Total		8	10	140

S.A.Q. = Shortanswerquestions (5 marks)

E.Q. = Essayquestions (10marks)

Shortanswerquestions : 5 X 5 M = 25M

Essayquestions : 5 X 10 M = 50M

TotalMarks = 75M

1.  2.

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Dr.V.S.KRISHNA GOVT.DEGREE COLLEGE (A), VISAKHAPATNAM.
CBCS/ SEMESTER SYSTEM
(w.e.f. 2020-21 Admitted Batch)
B.A./B.Sc. MATHEMATICS
COURSE-III, ABSTRACT ALGEBRA

Time:3Hrs

Max.Marks:75M

SECTION - A

Answer any FIVE questions. Each question carries FIVE marks 5 X 5 M=25 M

1. Show that the set $G = \{x / x = 2^a 3^b \text{ and } a, b \in \mathbb{Z}\}$ is a group under multiplication
2. Define order of an element. In a group G , prove that if $a \in G$ then $O(a) = O(a)^{-1}$.
3. If H and K are two subgroups of a group G , then prove that HK is a subgroup $\iff HK=KH$
4. If G is a group and H is a subgroup of index 2 in G then prove that H is a normal subgroup.
5. Examine whether the following permutations are even or odd

i) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 6 & 1 & 4 & 3 & 2 & 5 & 7 & 8 & 9 \end{pmatrix}$

ii) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ 2 & 3 & 4 & 5 & 6 & 7 & 1 \end{pmatrix}$

6. Prove that a group of prime order is cyclic.
7. Prove that the characteristic of an integral domain is either prime or zero.
8. If F is a field then prove that $\{0\}$ and F are the only ideals of F .

SECTION - B

Answer ALL the questions. Each question carries TEN marks. 5 X 10 M = 50 M

- 9 a) Show that the set of n^{th} roots of unity forms an abelian group under multiplication.

(Or)

- 9 b) In a group G , for $a, b \in G$, $O(a)=5$, $b \neq e$ and $aba^{-1} = b^2$. Find $O(b)$.

- 10 a) The Union of two subgroups is also a subgroup $\iff$ one is contained in the other.

(Or)

b) State and prove Lagrange's theorem.

11 a) 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 .

(Or)

11 b) State and prove fundamental theorem of homomorphisms of groups.

12 a) Let S_n be the symmetric group on n symbols and let A_n be the group of even permutations. Then show that A_n is normal in S_n and $O(A_n) = \frac{1}{2}(n!)$

(Or)

12 b) Prove that every subgroup of cyclic group is cyclic.

13 a) Prove that every finite integral domain is a field.

(Or)

13 b) Define principal ideal. Prove that every ideal of $\mathbb{Z}$ is a principal ideal.

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BLUE PRINT FOR QUESTION PAPER PATTERN
COURSE-IV, REAL ANALYSIS

Unit	TOPIC	S.A.Q(including choice)	E.Q(including choice)	Total Marks
I	Real Number System and Real Sequence	2	2	30
II	Infinite Series	1	2	25
III	Limits and Continuity	1	2	25
IV	Differentiation and Mean Value Theorem	2	2	30
V	Riemann Integration	2	2	30
	TOTAL	8	10	140

S.A.Q. = Short answer questions (5 marks)

E.Q. = Essay questions (10 marks)

Short answer questions : 5 X 5 M = 25M

Essay questions : 5 X 10 M = 50M

Total Marks = 75M

Dr.V.S.KRISHNA GOVT.DEGREE COLLEGE (A), VISAKHAPATNAM.
CBCS/ SEMESTER SYSTEM
 (w.e.f. 2020-21 Admitted Batch)
B.A./B.Sc. MATHEMATICS
COURSE-IV, REAL ANALYSIS

Time:3Hrs

Max.Marks:75M

SECTION - A

Answer any **FIVE** questions. Each question carries **FIVE** marks 5 X 5 M=25 M

1. Prove that every convergent sequence is bounded.
2. Show that $\lim \left(\frac{1}{(n+1)^2} + \frac{1}{(n+2)^2} + \dots + \frac{1}{(n+n)^2} \right) = 0$.
3. Test the convergence of the series $\sum_{n=1}^{\infty} (\sqrt[3]{n^3 + 1} - n)$.
4. Examine for continuity of the function f defined by $f(x) = |x| + |x - 1|$ at $x=0$ and 1 .
5. Show that $f(x) = x \sin \frac{1}{x}$, $x \neq 0$; $f(x) = 0$, $x = 0$ is continuous but not derivable at $x=0$.
6. Verify Rolle's theorem for the function $f(x) = x^3 - 6x^2 + 11x - 6$ on $[1, 3]$.
7. If $f(x) = x^2 \forall x \in [0, 1]$ and $p = \{0, \frac{1}{4}, \frac{2}{4}, \frac{3}{4}, 1\}$ then find $L(p, f)$ and $U(p, f)$.
8. Prove that iff: $[a, b] \rightarrow \mathbb{R}$ is continuous on $[a, b]$ then f is $\mathbb{R}$ -integrable on $[a, b]$.

SECTION -B

Answer **ALL** the questions. Each question carries **TEN** marks. 5 X 10 M = 50 M

- 9.(a) If $S_n = 1 + \frac{1}{2!} + \frac{1}{3!} + \dots + \frac{1}{n!}$ then show that $\{S_n\}$ converges.

(OR)

- (b) State and Prove Cauchy's general principle of convergence.

- 10.(a) State and Prove Cauchy's nth root test.

(OR)

(b) Test the convergence of $\sum \frac{x^n}{x^n + a^n}$ ($x > 0, a > 0$).

11.(a) Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be such that

$$f(x) = \frac{\sin(a+1)x + \sin x}{x} \text{ for } x < 0$$

$$= c \text{ for } x = 0$$

$$= \frac{(x+bx^2)^{1/2} - x^{1/2}}{bx^{3/2}} \text{ for } x > 0$$

Determine the values of a, b, c for which the function f is continuous at $x=0$.

(OR)

(b) Define Uniform continuity, If a function f is continuous on $[a, b]$ then f is Uniformly continuous on $[a, b]$

12.(a) Using Lagrange's theorem, show that $x > \log(1+x) > \frac{x}{(1+x)} \forall x > 0$.

(OR)

(b) State and Prove Cauchy's mean value theorem.

13.(a) State and prove Riemann's necessary and sufficient condition for R- integrability.

(OR)

(b) Prove that $\frac{\pi^3}{24} \leq \int_0^\pi \frac{x^2}{5+3\cos x} dx \leq \frac{\pi^3}{6}$.

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BLUE PRINT FOR QUESTION PAPER PATTERN
COURSE-V, LINEAR ALGEBRA

Unit	TOPIC	S.A.Q (including choice)	E.Q (including choice)	Marks Allotted
I	Vector spaces - I	2	2	30
II	Vector spaces - II	1	2	25
III	Linear Transformation	2	2	30
IV	Char. values and char. vectors	1	2	25
V	Inner product spaces	2	2	30
Total		8	10	140

S.A.Q. = Short answer questions (5marks)

E.Q. = Essay questions (10marks)

Short answer questions : 5 X 5 M = 25M

Essay questions : 5 X 10 M = 50M

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 Total Marks = 75M

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Dr.V.S.KRISHNA GOVT.DEGREE COLLEGE (A), VISAKHAPATNAM.
CBCS/ SEMESTER SYSTEM
(w.e.f. 2020-21 Admitted Batch)
B.A./B.Sc. MATHEMATICS
COURSE-V, LINEAR ALGEBRA

Time:3Hrs

Max.Marks:75M

SECTION - A

Answer any FIVE questions. Each question carries FIVE marks 5 X 5 M=25 M

1. Let p, q, r be fixed elements of a field F . Show that the set W of all triads (x, y, z) of elements of F , such that $px+qy+rz=0$ is a vector subspace of $V_3(R)$.
2. Define linearly independent & linearly dependent vectors in a vector space. If α, β, γ are linearly independent vectors of $V(R)$ then show that $\alpha + \beta, \beta + \gamma, \gamma + \alpha$ are also linearly independent.
3. Prove that every set of $(n + 1)$ or more vectors in an n dimensional vector space is linearly dependent.
4. The mapping $T: V_3(R) \rightarrow V_3(R)$ is defined by $T(x, y, z) = (x-y, x-z)$. Show that T is a linear transformation.
5. Let $T: R^3 \rightarrow R^2$ and $H: R^3 \rightarrow R^2$ be defined by $T(x, y, z) = (3x, y+z)$ and $H(x, y, z) = (2x-z, y)$. Compute i) $T+H$ ii) $4T-5H$ iii) TH iv) HT .
6. If the matrix A is non-singular, show that the eigen values of A^{-1} are the reciprocals of the eigen values of A .
7. State and Prove parallelogram law in an inner product space $V(F)$.
8. Prove that the set $S = \left\{ \left(\frac{1}{3}, \frac{-2}{3}, \frac{-2}{3} \right), \left(\frac{2}{3}, \frac{-1}{3}, \frac{2}{3} \right), \left(\frac{2}{3}, \frac{2}{3}, \frac{-1}{3} \right) \right\}$ is an orthonormal set in the inner product space $R^3(R)$ with the standard inner product.

SECTION - B

Answer ALL the questions. Each question carries TEN marks. 5 X 10 M = 50 M

- 9(a). Define vector space. Let $V(F)$ be a vector space. Let W be a non empty sub set of V . Prove that the necessary and sufficient condition for W to be a subspace of V is $a, b \in F$ and $\alpha, \beta \in V \Rightarrow a\alpha + b\beta \in W$.

(OR)

- (b) Prove that the four vectors $(1,0,0)$, $(0,1,0)$, $(0,0,1)$ and $(1,1,1)$ of $V_3(C)$ form linearly dependent set, but any three of them are linearly independent.

- 10(a). Define Dimension of a finite dimensional vector space. If W is a subspace of a finite dimensional vector space $V(F)$ then prove that W is finite dimensional and $\dim W \leq n$.

(OR)

- (b) If W be a subspace of a finite dimensional vector space $V(F)$ then Prove that $\dim V/W = \dim V - \dim W$.

- 11(a). Find $T(x, y, z)$ where $T: \mathbb{R}^3 \rightarrow \mathbb{R}$ is defined by $T(1, 1, 1) = 3$, $T(0, 1, -2) = 1$, $T(0, 0, 1) = -2$

(OR)

- (b) State and Prove Rank Nullity theorem.

- 12(a) Find the eigen values and the corresponding eigen vectors of the matrix

$$A = \begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}.$$

(OR)

- (b) State and Prove Cayley-Hamilton theorem.

- 13(a) State and Prove Schwarz's inequality in an Inner product space $V(F)$.

(OR)

- (b) Given $\{(2,1,3), (1,2,3), (1,1,1)\}$ is a basis of $\mathbb{R}^3(\mathbb{R})$. Construct an orthonormal basis using Gram-Schmidt orthogonalisation process.

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Dr.V.S.KRISHNA GOVERNMENT DEGREE COLLEGE
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VISAKHAPATNAM 530 013. A.P.INDIA



DEPARTMENT OF MATHEMATICS.

**Dr. V. S. Krishna Govt. Degree
College(A)
Visakhapatnam**

DEPARTMENT OF MATHEMATICS

PROPOSED SYLLABUS FOR LIFE SKILL COURSES

IN UNDERGRADUATE DEGREE PROGRAMME

UNDER AUTONOMY

(With effect from 2020-21)

SYLLABUS OF
ELEMENTARY STATISTICS & ANALYTICAL SKILLS

AS PART OF
LIFE SKILLS COURSES
UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-21

PROGRAMME: THREE-YEAR UG PROGRAMME

Dr.V.S.KRISHNA GOVT.DEGREE COLLEGE (A), VISAKHAPATNAM.
CBCS/ SEMESTER SYSTEM

(w.e.f. 2020-21 Admitted Batch)

Arts/Science/Commerce., LIST OF LIFE SKILLS COURSES

ProgramName: Foundation Course. – SEMESTER- I / II / III

(Sem-I to Sem-III)

1. Table-1: Main Features of the Courses in the Revised CurricularFramework.

Subject/Course	Hours / Week Theory	Hours / Week Practicals	Total Hours	Credits	Max Marks Internal Assessment	Max Marks University Exam	Total
Life Skills Course	02	-	02	02	-0-	50	50
Skill Development Course	02	-	02	02	-0-	50	50
Language Subject	04	-	04	03	25	75	100
Domain Arts/Commerce Subject	05	-	05	04	25	75	100
Domain Science Subject	04	02	05	05 (4+1)	25	75	100
Mathematics	06	-	06	05	25	75	100

2. The four courses of LSCs, SDCs and three courses of Languages (as they exist now) will be offered in the first three semesters as shown in the table below. The detailed structure is shown in Tabel-2 below.

<i>Courses of</i>	<i>Sem-I</i>	<i>Sem-II</i>	<i>Sem-III</i>	<i>Sem-IV</i>	<i>Sem-V</i>
Life Skills	1 (02)	1 (02)	2 (04)		
Skill Development	1 (02)	2 (04)	1 (02)		
Language – 1	C-1 (04)	C-2 (04)	C-3 (04)		
Language – 2	C-1 (04)	C-2 (04)	C-3 (04)		
Domain Sub -1	C-1 (06)	C-2 (06)	C-3 (06)	C-4 (06)	SEC-1(06)

				C-5 (06)	SEC-2 (06)
Domain Sub -2	C-1 (06)	C-2 (06)	C-3 (06)	C-4(06) C-5(06)	SEC-1(06) SEC-2 (06)
Domain Sub -3	C-1 (06)	C-2 (06)	C-3 (06)	C-4(06) C-5(06)	SEC-1(06) SEC-2 (06)
Total Hours/Week	30	32	32	36	36

* Figures in parenthesis are hours per week of Core Courses of Science. In respect of Arts and Commerce Courses, the hours per week for Core Courses will be 5.

** SEC1 and SEC-2 in Sem-V are C-6 and C-7 respectively.

LIST OF LIFE SKILL COURSES

Semester	No. of Courses	Choices	Preferred Teaching Dept.
I	01	Computer Applications	Computers
		Human Values and Professional Ethics	English/Telugu/Any Dept
		Entrepreneurship	Commerce
II	01	Information and Communication Technology	Computers
		Indian Culture and Science	History/Telugu
		Elementary Statistics	Statistics/Maths/Economics/Commerce
III	02	Health and Hygiene	Zoology/Botany
		Personality Development and Leadership	English/ Any Dept
		Analytical Skills	Maths/Statistics
		Environmental Education	Botany/Zoology/Environmental Sciences/Any Dept.

**Dr.V.S.KRISHNA GOVERNMENT DEGREE COLLEGE (A),
VISA KHAPATNAM.**

VISA KHAPATNAM.

SYLLABUS OF

ELEMENTARY STATISTICS

**AS A PART OF LIFE SKILLS COURSES
UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-21**

**Dr.V.S.KRISHNA GOVERNMENT DEGREE COLLEGE (A),
VISAKHAPATNAM.**

**COURSE –I
CBCS/ SEMESTER SYSTEM**

(w.e.f. 2020-21 Admitted Batch)

Arts/Science/Commerce., LIFE SKILLS COURSES

Foundation Course – SEMESTER-II

Elementary Statistics

Objective: To provide basic understanding of general statistical tools and their elementary applications and to create awareness on Indian Statistical System.

Learning outcomes

- To understand the concept of Statistics and its merits and demerits. Distinguishing primary and secondary data. Classification, Tabulation and Pictorial representation of data.
- To understand the basic nature of data and how a single value describes the entire data set. Measuring the degree of departure of a distribution from symmetry and reveals the direction of scatteredness of the items.
- To understand the spread of the data and to draw conclusions from the comparison of averages. To understand the concept of correlation and regression and to learn the degree of association between two variables and establishing relationship between the variables.

SYLLABUS

Unit I: (8hrs)

Meaning, scope and limitations of Statistics

Collection of data: Primary and Secondary, Classification and Tabulation, Construction of frequency distribution.

Graphical Representation: Histogram, Bar, Pie and Frequency polygon.

Unit II: (8hrs)

Measures of Central Tendency: Features of good average, Arithmetic Mean, Median, Mode. Empirical relationship between Mean Median and Mode and skewness based on central values.

Unit III: (8hrs)

Measures of Dispersion: Range, Quartile Deviation(QD), Mean Deviation(MD), Variance, Standard Deviation(SD), relationship between QD, MD and SD. Familiarization of the concepts relating to Correlation and Linear Regression line.

Books for Study:

1. Statistics (Theory, Methods, Application) D C Sancheti, V K Kapoor, Sultan Chand and Sons, NewDelhi
2. Statistical Methods, S.P. Gupta, Sultan Chand and Sons, NewDelhi
3. Statistics (Theory and Practice) B.N Gupta, SahityaBhavan,Agra

Web sites for free download books for Statistics

<https://www.pdfdrive.com/introduction-to-statistics-books.html>

<http://www.freebookcentre.net/SpecialCat/Free-Statistics-Books-Download.html>

<https://bookboon.com/en/statistics-ebooks>

http://onlinestatbook.com/Online_Statistics_Education.pdf

Degree	:Arts/Science/Commerce
ProgramName	:Foundation Course
CourseName	:ElementaryStatistics
Semester	:I/II/III
Hrs/Week	2
Credits	2

Co-curricular activities:

Objective is to apply the theoretical concept to real life data which enhances the learning and interpretation ability to the current environment.

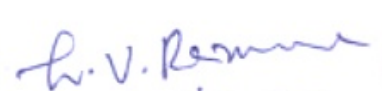
CoCA I: (i) Collect primary or secondary data and establish frequency distribution.
(ii) Suitable pictorial/ Graphical representation to the established frequency distribution

CoCA II: (i) Select the data and then calculate AM,Median and Mode and interpret the result.
(ii) Calculate the skewness based on central values and interpret the degree of departure of a distribution from symmetry and the direction of scatterdness of the items.

CoCA III: (i) Calculate the dispersion values of a data for a single or double data sets and to draw conclusions from the comparison of averages.

(ii) Select the bivariate data (for example, select marks of any two subjects of your course) and calculate the degree of association and establish the linear relationship and find the forecasting value.

CoCA IV: If there is an internet facility at your college/home, go through the Ministry of Statistics and Program Implementationsite www.mospi.gov.in to know about the Indian Statistical System and <https://desap.cgg.gov.in> or www.apdes.in to know about the Andhra Pradesh Directorate of Economics and Statistics(APDES) and its activities.

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28/01/2021

Dr.V.S.KRISHNA GOVT.DEGREE COLLEGE (A), VISAKHAPATNAM.

CBCS/ SEMESTER SYSTEM

Arts/Science/Commerce:LIFE SKILLS COURSES

SEMESTER-II, PAPER- ELEMENTARY STATISTICS

MODEL QUESTION PAPER FORMAT

Time: 90 minutes

Max.Marks: 50

PART – A

I. Answer any **four** questions. Each answer carries **5 marks**

4*5=20 Marks

(Total 8 questions, at least 1 question should be given from each unit)

1. "The arithmetic mean is the best among all averages" give reasons for the statement.

2. What are the merits and limitations of Median?
3. State the importance of Statistics to industry and commerce
4. Explain the differences between primary data and secondary data.
5. Explain about histogram.
6. What is skewness? How does it differ from dispersion?
7. Define quartile deviation, mean deviation and standard deviation,
8. Write a brief note on correlation and regression.

PART –B

II. Answer any **three** questions. Each answer carries **10 marks**

3*10=30 Marks

(Total 5 questions, at least 1 question should be given from each unit)

1. What are the rules which have to be followed while drawing a diagram.

2. calculate AM, Median and Mode for the following data.

Classes	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	3	5	12	10	6	4

2. Calculate the Mode using Mean and Median following data.

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

3. Compute Standard Deviation from the following data.

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

5. Calculate the Mean and Quartile deviations for the following data.

Wages	10	20	30	40	50	60	70	80
No. of persons dying	15	30	53	75	100	110	115	125

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1. *[Signature]*

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[Signature]

3. *L.V. Ramme*
22/01/2021

DE V. S. KRISHNA & GOVERNMENT DEGREE COLLEGE (A.)
VISHAKHAPATNAM

Syllabus of

ANALYTICAL SKILLS

AS A PART OF LIFE SKILLS COURSES

UNDER CBCS PROGRAMME WITH EFFECT FROM 2018-21

**Dr.V.S.KRISHNA GOVERNMENT DEGREE COLLEGE (A),
VISAKHAPATNAM.**

CBCS/ SEMESTER SYSTEM

(w.e.f 2020-21)

Arts/Science/Commerce: LIFE SKILLS COURSES

SEMESTER-III.

ANALYTICAL SKILLS

Syllabus

Total 30Hrs

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;

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

UNIT – I: (10Hours)

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

Verbal Reasoning: Number Series, Coding & Decoding, Blood relationship, Clocks, Calendars.

UNIT – II: (10Hours)

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

Business computations: Percentages, Profit & loss, Partnership, simple compound interest.

UNIT – III: (07 Hours)

Data Interpretation: Tabulation, Bar Graphs, Pie Charts, line Graphs. Venn diagrams.

Recommended Co-Curricular Activities (03 hrs)

Surprise tests / Viva-Voice / Problem solving/Group discussion.

Text Book:

Quantitative Aptitude for Competitive Examination by R. S. Agrawal,
S.ChandPublications.

Reference Books:

1. Analytical skills by Showick Thorpe, published by S Chand And Company Limited, Ramnagar, New Delhi-110055.
2. Quantitative Aptitude and Reasoning by R V Praveen, PHI publishers.
3. Quantitative Aptitude for Competitive Examination by Abhijit Guha, Tata McGraw Hill Publications.

1. Guha 2. Praveen 3. R.V. Praveen
28/01/202

Dr.V.S.KRISHNA GOVT.DEGREE COLLEGE (A), VISAKHAPATNAM.

CBCS/ SEMESTER SYSTEM

(w.e.f. 2020-21)

Arts/Science/Commerce:LIFE SKILLS COURSES

SEMESTER-III., PAPER- ANALYTICAL SKILLS

MODEL QUESTION PAPER FORMAT

Time: 90 minutes

Max. Marks: 50

PART – A

I. Answer any **four** questions. Each answer carries **5 marks**

4*5=20 Marks

(Total 8 questions, at least 1 question should be given from each unit)

1. If H.C.F., L.C.M of two numbers are 16 and 240 respectively and one number is 40; find the other number ?
2. Explain "Pie Charts" ?
3. If $A : B = 2 : 3$ and $B : C = 4 : 5$ Then $A : B : C = ?$
4. Divide Rs. 672 in 5 : 3 ratio ?
5. A train travelled 450 Kms in 7 hours and 740 kms in 10 hours. Find the average speed of the train ?
6. October 30, 2020 was a Friday. What day of the week lies on October 30, 2021?
7. If A is a brother of B ; B is the sister of C ; and C is the father of D, how D is related to A.?
8. Find the value of $78 - [5 + 3 \text{ of } (25 - 2 * 10)] = ?$

PART - B

II. Answer any **three** questions. Each answer carries **10 marks**

3*10=30 Marks

(Total 5 questions, at least 1 question should be given from each unit)

9. (a) Find the angle between the hour hand and the minute hand of a clock when the time is 4 : 10
(b) How many natural numbers between 17 and 80 are divisible by 6?

10. Find the missing terms in the following sequences with suitable explanations.

- (i) 22, 21, 23, 22, 24, 23,
- (ii) 6, 11, 21, 36, 56,?
- (iii) 2:8 :: 4 : ?
- (iv) Manager : Assistant :: Doctor :
- (v) SCD, TEF, UGH ----- WKL

11. Sachin is younger than Rahul by 4 years. If their ages are in the respective ratio of 7:9, find their present ages?

12. A man travelled from the village to the post office at the rate of 25kmph and walked back at the rate of 4kmph. If the whole journey took 5 hours 48 minutes, find the distance of post office from the village.?

13. Study the following table and answer the questions based on it.

Expenditure of a company (in pesetas) per annum over the given years

Year	Item of expenditure				
	Salary	Fuel and Transport	Bonus	Interest on Loans	Taxes
1998	288	98	3.00	23.4	83
1999	342	112	2.52	32.5	108
2000	324	101	3.84	41.6	94
2001	336	133	3.68	36.4	88
2002	420	142	3.96	49.4	98

(i). What is the average amount of interest per year which the company had to pay during this period?

- a) 32.43 b) 33.72 c) 34.18 d) 36.66 []

(ii). The total amount of bonus paid by the company during the given period is approximately what percent of the total amount of salary paid during this period.

- (a) 0.1% b) 0.5% c) 1.0% d) 1.25% []

(iii). Total expenditure on all these items in 1998 was approximately what percent of the total expenditure in 2002?

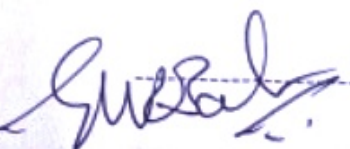
- a) 0.62% b) 0.66% c) 0.69% d) 0.71% []

(iv). The total expenditure of the company over these items during the year 2000 is?

- a) 544.44 b) 501.11 c) 446.46 d) 478.87 []

(v). The ratio between the total expenditure and taxes for all the years and the total expenditure on Fuel and Transport for all the years respectively is approximately?

- a) 4:7 b) 10:13 c) 15:18 d) 5:8 []

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Dr.V.S.KRISHNA GOVERNMENT DEGREE COLLEGE



Affiliated to Andhra University

NAAC Reaccredited with "A" Grade Institution.

VISAKHAPATNAM 530 013, A.P.INDIA

Department of Mathematics

PROPOSED SYLLABUS FOR MATHEMATICS MINORS I & II

Physics (Hons) & Chemistry (Hons)

IN UNDERGRADUATE DEGREE PROGRAMME

UNDER AUTONOMY.

(With effect from 2020-21)

Dr. V. S. KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM.

MATHEMATICS MINOR I

CBCS / SEMESTER SYSTEM

B.Sc. CHEMISTRY(HONS) & PHYSICS (HONS)

(w.e.f. 2020-21 Admitted Batch)

SYLLABUS (75 Hours)

Course Outcomes:

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

- Draw different types of charts and solve equations numerically.
- Understand various types of distributions, regression.
- Know the methods differentiation.
- Know the methods integration and numerical integration.
- Solve matrix equations using determinants and matrices.

Course Syllabus:

UNIT – I (12 Hours)

Fundamentals of mathematics I:

Mathematical functions, polynomial expressions, logarithms, exponential function, units of a measurement, inter conversion of units, constants and variables, equation of a straight line, plotting graphs, data representation, pie charts and histogram. Algebraic operations on real scalar variables, roots of quadratic equations Analytically and iteratively. Numerical method of finding roots (Newton-Raphson, binary-bisection).

UNIT – II (12 Hours)

Fundamentals of mathematics II:

Uncertainties in measurement: types of uncertainties, combining. Use of statistical tools, data reduction and the propagation of errors, binomial Poisson and Gaussian distribution, graphical and numerical data reduction. Numerical curve fitting : the method of least squares (regression)

UNIT - III (12 Hours)

Differential calculus:

Limits and Continuity

The tangent line and the derivatives of a function, differentiation, differentials of higher order derivatives, discontinuities, stationary points, points of inflexion, min-max problems, limiting values, L'Hospital rule, combining limits.

Calculus of several variables: functions, change of variables, total differential, chain rule, partial differentiation.

UNIT - IV (12 Hours)

Integral calculus:

Integration, odd-even functions, indefinite integrals, standard integrals, methods of integration (by parts, substitution, partial fractions and others), trigonometric functions.

Numerical integration: Trapezoidal, Simpson's rules (applications in Chemistry and Physics need to be emphasized throughout).

UNIT - V (12 Hours)

Determinants and Matrices:

Determinant, matrix algebra, Simultaneous equations: method of substitution and elimination constancy and independence. Homogeneous linear equations. Simultaneous equations with more than two unknowns, Cramer's rule, matrix inversion methods. Orthogonal, unitary matrices and diagonalisation of a matrix

Co-Curricular Activities (15 Hours)

Seminar/ Quiz/ Assignments/ Applications of mathematics to Real life Problem /Problem Solving.

Text Reference Books:

1. Maths for chemists, vols I & II M.C.R. Cockett G.Dogget, Royal society of Chemistry
2. Numerical methods, schand & company
3. Intermediate Mathematics vols IA, IB, IIA & IIB.

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Recommended Question Paper Patterns and Models
BLUE PRINT FOR QUESTION PAPER PATTERN

COURSE-MATHEMATICS MINOR I

Unit	TOPIC	S.A.Q(including choice)	E.Q(including choice)	Total Marks
I	Fundamentals of mathematics I	2	2	30
II	Fundamentals of mathematics II	2	2	30
III	Differential calculus	1	2	25
IV	Integral calculus	2	2	30
V	Determinants and matrices	1	2	25
TOTAL		8	10	140

S.A. Q = Short answer questions (5 marks)

E.Q. = Essay questions (10 marks)

Short answer questions : 5 X 5 M = 25 M

Essay questions : 5 X 10 M = 50 M

Total Marks = 75 M

Dr.V.S.KRISHNA GOVT.DEGREE COLLEGE (A), VISAKHAPATNAM.

CBCS/ SEMESTER SYSTEM

(W.e.f 2020-21 Admitted Batch)

B.Sc. PHYSICS(HONS), CHEMISTRY (HONS)

MATHEMATICS MINOR I

MODEL QUESTION PAPER

Time: 3Hrs

Max.Marks:75M

I. Answer any FIVE of the following:

5x5=25

1. With an example each explain Pie chart and histogram.
2. Write a note on data representation.
3. Explain about Binomial, Poisson and Gaussian distributions.
4. Explain about data reduction & propagation of errors.

5. If $y = \cot^{-1} \sqrt{\frac{1-\sin x}{1+\sin x}}$ find $\frac{dy}{dx}$ *Add question from limits and Continuity*

6. Evaluate (i) $\int \frac{xe^x}{(1+x)^2} dx$ (ii) $\int \frac{1}{\sqrt{2x-x^2}} dx$

7. Find the value of $\int (x^2 - 1)(4 + 3x) dx$

8. Diagonalize the matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

II. Answer any FIVE of the following:

5x10=50

(one question from each unit)

9.(a) Apply Newton-Raphson method to find an approximate root of the equation which is correct to three decimal places to the equation $x^3 - 3x - 5 = 0$ which lies near 2.

OR

(b) Find an approximate value of the real root of $x^3 - x - 1 = 0$ by Bisection method.

10.(a) Using the method of least squares find the equation of straight line that fits best for the following data.

X	1	2	3	4	5
Y	14	27	40	55	68

OR

(b) Find the values of a, b, c so that $y = a + bx + cx^2$ is the best fit for the data.

X	0	1	2	3	4
Y	1	0	3	10	21

11.(a) Find two positive numbers whose sum is 15 so that the SUM of their squares is minimum.

OR

(b) If $x = a(t - \sin t)$, $y = a(1 + \cos t)$ find $\frac{d^2y}{dx^2}$.

12.(a) The following table gives the velocity v of a particle at time t. Find the distance moved by the particle in 12 seconds also the acceleration at $t=2$.

T(sec)	0	2	4	6	8	10	12
V(m/sec)	4	6	16	34	60	94	136

OR

(b) Find the value of $\int \frac{x^2 + 1}{x^2 - 5x + 6} dx$

13.(a) Solve the following using matrix inversion method.

$$2x_2 + 4x_3 = 2, 2x_1 + 4x_2 + 2x_3 = 3, 3x_1 + 3x_2 + x_3 = 1$$

OR

(b) Using the properties of determinants show that

$$\begin{vmatrix} a^2+1 & ab & ac \\ ab & b^2+1 & bc \\ ca & cb & c^2+1 \end{vmatrix} = 1 + a^2 + b^2 + c^2$$

Soln :

Prp :

H.V. Kumar
28/01/2021

Dr. V. S. KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM.

MATHEMATICS MINOR II

CBCS / SEMESTER SYSTEM

B.Sc. CHEMISTRY(HONS) & PHYSICS (HONS)

(w.e.f. 2020-21 Admitted Batch)

SYLLABUS (75 Hours)

Course Outcomes:

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

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

Course Syllabus:

UNIT – I (12 Hours)

Differential Equations of first order and first degree:

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:

Equations solvable for p ; Equations solvable for y ; Equations solvable for x ; Equations that do not contain x (or y); Equations homogeneous in x and y ; Equations of the first degree in x and y – Clairaut's equation.

UNIT – III (12 Hours)

Higher order linear differential equations-I:

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 $f(D)y=0$.

1

General Solution of $f(D)y=Q$ when Q is a function of x , _____ is expressed as partial fractions.

$f(D)$

P.I. of $f(D)y = Q$ when $Q = be^{ax}$

P.I. of $f(D)y = Q$ when Q is $b \cdot \sin ax$ or $b \cdot \cos ax$.

UNIT – IV (12 Hours)

Higher order linear differential equations-II:

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 $Q = e^{Vx}$, 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 $Q = x^m V$, where V is a function of x .

UNIT –V (12 Hours)

Higher order linear differential equations-III :

Method of variation of parameters; Linear differential Equations with non-constant coefficients; The Cauchy-Euler Equation, Legendre's linear equations, miscellaneous differential equations.

Co-Curricular Activities(15 Hours)

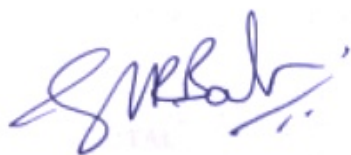
Seminar/ Quiz/ Assignments/ Applications of Differential Equations to Real life Problem /Problem Solving.

Text Book:

Differential Equations and Their Applications by Zafar Ahsan, published by Prentice-Hall of India Pvt. Ltd, New Delhi-Second edition.

Reference Books:

4. A text book of Mathematics for B.A / B. Sc, Volume 1 by N. Krishna Murthy & others, published S.Chand & Company, New Delhi.
5. Ordinary and Partial Differential Equations by Dr. M.D,Raisinghania, published by S. Chand & Company, New Delhi.
6. Differential Equations with applications and programs – S. Balachandra Rao & HR Anuradha-Universities Press.
7. Differential Equations -Srinivas Vangala & Madhu Rajesh, published by Spectrum University Press.

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2. 

3. H.V. Ramu
28/01/2021

Recommended Question Paper Patterns and Models
BLUE PRINT FOR QUESTION PAPER PATTERN
COURSE MATHEMATICS MINOR II

Unit	TOPIC	S.A.Q(including choice)	E.Q(including choice)	Total Marks
I	Differential equations of first order and first degree	2	2	30
II	Differential equations of first order but not of first degree	2	2	30
III	Higher order differential equations I	1	2	25
IV	Higher order differential equations II	2	2	30
V	Higher order differential equations III	1	2	25
TOTAL		8	10	140

S.A. Q = Short answer questions (5 marks)

E.Q. = Essay questions (10 marks)

Short answer questions : 5 X 5 M = 25 M

Essay questions : 5 X 10 M = 50 M

Total Marks = 75 M

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2.

3. H. V. K. Kumar
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CBCS/ SEMESTER SYSTEM

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B.Sc. PHYSICS(HONS), CHEMISTRY (HONS)

COURSE MATHEMATICS MINOR II

MODEL QUESTION PAPER

Time: 3Hrs

Max.Marks:75M

I. Answer any FIVE of the following:

5x5=25

1. Solve $y \frac{dy}{dx} = x e^{x^2+y^2}$

2. Solve $\frac{dy}{dx} + \frac{y}{x} = y^2 x \sin x$

3. Solve $x + yp^2 = (1 + xy)p$

4. Solve $x x^2 (y - px) = p^2 y$

5. Solve $(D^2 - 5D + 6)y = e^{4x}$

6. Solve $(D^2 - 3D + 2)y = 2x^2$

7. Solve $(D^2 + 4)y = x \sin x$

8. Solve $(x \sin x + \cos x) \frac{d^2 y}{dx^2} - x \cos x \frac{dy}{dx} + y \cos x = 0$

II. Answer any FIVE of the following:

5x10=50

(one question from each unit)

9.(a). Solve $y(xy + 2x^2 y^2) dx + x(xy - x^2 y^2) dy = 0$

OR

(b) Solve $(x+1) \frac{dy}{dx} + 1 = e^{x-y}$ also find the solution for which $y(0)=0$

10.(a) Solve $p^2 + 2py \cot x = y^2$

OR

(b) Solve $y = 2xp + x^2 p^4$

11.(a) Solve $(D^2 - 3D + 2)y = \cosh x$

OR

(b) Solve $\frac{d^2 y}{dx^2} + 4y = e^x + \sin 2x + \cos 2x$

12.(a) Solve $(D^2 - 2D + 4)y = x^2 + e^{2x} + \sin 2x$

OR

(b) Solve $(D^4 + 2D^2 + 1)y = x^2 \cos x$

13.(a) Solve $\frac{d^2 y}{dx^2} + 4y = 4 \tan 2x$ using the method of variation of parameters

OR

(b) Solve $x^2 \frac{d^2 y}{dx^2} - 3x \frac{dy}{dx} + 5y = x^2 \sin(\log x)$

1. Surbat

2. B.K.

3. H.V. Kumar
26/01/2021