



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



**MATHEMATICS – SYLLABUS & QUESTION
PAPERS WITH EFFECT FROM 2019-2020
CHOICE BASED CREDIT SYSTEM**

**DEPARTMENT OF
MATHEMATICS.**

Dr. V. S. Krishna Government Degree College (A), Visakhapatnam
CBCS B.A./B.Sc. Mathematics Course Structure
w.e.f. 2019-20 (Revised in October, 2018).

Year	Semester	Paper	Subject	Hrs.	Credits	IA	EA	Total
1	I	I	Differential Equations & Differential Equations Problem Solving Sessions	6	5	40	60	100
	II	II	Solid Geometry & Solid Geometry Problem Solving Sessions	6	5	40	60	100
2	III	III	Abstract Algebra & Abstract Algebra Problem Solving Sessions	6	5	40	60	100
	IV	IV	Real Analysis & Real Analysis Problem Solving Sessions	6	5	40	60	100
3	V	V	Ring Theory & Vector Calculus & Ring Theory & Vector Calculus Problem Solving Sessions	5	5	40	60	100
		VI	Linear Algebra & Linear Algebra Problem Solving Sessions	5	5	40	60	100
	VI	VII	Electives: (any one) VII-(A): Numerical Analysis VII-(B): Laplace Transforms VII-(C): Number Theory & Elective Problem Solving Sessions	5	5	40	60	100
		VIII	Cluster Electives: VIII-A-1: Advanced Numerical Analysis	5	5	40	60	100
			VIII-A-2: Graph theory VIII-A-3: <i>Project work</i> or VIII-B-1: Principles of Mechanics	5	5	40	60	100
			VIII-B-2: Integral Transformations VIII-B-3: <i>Project work</i> or VIII-C-1: Applied Graph Theory	5	5	40	60	100
			VIII-C-2: Fluid Mechanics VIII-C-3: <i>Project work</i>					

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Dr.v.s Krishna Government Degree College (A), Visakhapatnam
w.e.f. 2019-20 (Revised in October, 2018)
B.A./B.Sc. FIRST YEAR MATHEMATICS SYLLABUS
SEMESTER -I, PAPER - 1
DIFFERENTIAL EQUATIONS

60 Hrs

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

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 $Q = e^{ax} V$

P.I. of $f(D)y = Q$ when $Q = xV$

P.I. of $f(D)y = Q$ when $Q = x^m V$

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.

Reference Books :

1. Differential Equations and Their Applications by Zafar Ahsan, published by Prentice-Hall of India Learning Pvt. Ltd. New Delhi-Second edition.
2. A text book of mathematics for BA/BSc Vol 1 by N. Krishna Murthy & others, published by S. Chand & Company, New Delhi.
3. Ordinary and Partial Differential Equations Raisinghanian, published by S. Chand & Company, New Delhi.
4. Differential Equations with applications and programs – S. Balachandra Rao & HR Anuradha-universities press.

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on Application of Differential Equations in Real life

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w.e.f. 2019-20 (Revised in October, 2018)
B.A./B.Sc. FIRST YEAR MATHEMATICS SYLLABUS
SEMESTER - II, PAPER - 2
SOLID GEOMETRY

60 Hrs

UNIT - I (12 hrs) : 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) : 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) : Sphere & 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; 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 & Cylinders :

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.

Definition of a cylinder; Equation to the cylinder whose generators intersect a given conic and are parallel to a given line; Enveloping cylinder of a sphere; The right circular cylinder; Equation of the right circular cylinder with a given axis and radius.

Reference Books :

1. Analytical Solid Geometry by Shanti Narayan and P.K. Mittal, Published by S. Chand & Company Ltd. 4th Edition.
2. A text book of Mathematics for BA/B.Sc Vol 1, by V Krishna Murthy & Others, Published by S. Chand & Company, New Delhi.
3. A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, Published by Wiley Eastern Ltd., 1999.
4. 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/ Project on Application of Solid Geometry in Engineering

1. Kms

2. V. Krishna Murthy

3. P. K. Jain

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w.e.f. 2019-20 (Revised in October, 2018)
B.A./B.Sc. SECOND YEAR MATHEMATICS SYLLABUS
SEMESTER - III, PAPER - 3
ABSTRACT ALGEBRA

60 Hrs

UNIT - 1 : (10 Hrs) 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 - 2 : (14 Hrs) SUBGROUPS :-

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.

Co-sets and Lagrange's Theorem :-

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

UNIT - 3 : (12 Hrs) 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 – simple group – quotient group – criteria for the existence of a quotient group.

UNIT - 4 : (10 Hrs) 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 - 5 : (14 Hrs) 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.

Reference Books :

1. Abstract Algebra, by J.B. Fraleigh, Published by Narosa Publishing house.
2. 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.
3. Modern Algebra by M.L. Khanna.

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on Group theory and its applications in Graphics and Medical image Analysis

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B.A./B.Sc. SECOND YEAR MATHEMATICS SYLLABUS
SEMESTER – IV, PAPER- 4
REAL ANALYSIS

60 Hrs

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: 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 :

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'Alembert's Test or Ratio Test.
4. Alternating Series – Leibnitz Test.

Absolute convergence and conditional convergence, semi convergence.

UNIT – III (12 hrs) : 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 hrs) : DIFFERENTIATION AND MEAN VALUE THEOREMS :

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 hrs) : RIEMANN INTEGRATION :

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

Reference Books :

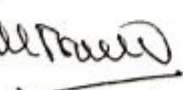
Real Analysis by Robert & Bartely and D.R. Sherbart, Published by John Wiley.

A Text Book of B.Sc Mathematics by B.V.S.S. Sarma and others, Published by S. Chand & Company Pvt. Ltd., New Delhi.

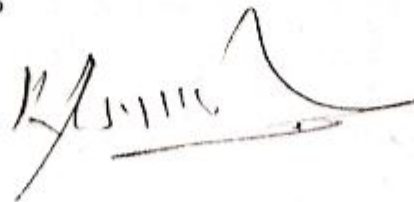
Elements of Real Analysis as per UGC Syllabus by Shanthi Narayan and Dr. M.D. Raisingania published by S. Chand & Company Pvt. Ltd., New Delhi.

Suggested Activities:

seminar/ Quiz/ Assignments/ Project on Real Analysis and its applications

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B.A./B.Sc. THIRD YEAR MATHEMATICS SYLLABUS
SEMESTER - V, PAPER -5
RING THEORY & VECTOR CALCULUS

60 Hrs

UNIT - 1 (12 hrs) RINGS-I :-

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 :-

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 :-

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

UNIT - 4 (12 hrs) VECTOR INTEGRATION :-

Line Integral, Surface Integral, Volume integral with examples.

UNIT - 5 (12 hrs) VECTOR INTEGRATION APPLICATIONS :-

Theorems of Gauss and Stokes, Green's theorem in plane and applications of these theorems.

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. A text Book of B.Sc., Mathematics by B.V.S.S.Sarma and others, published by S. Chand & Company Pvt. Ltd., New Delhi.
4. Vector Calculus by R. Gupta, Published by Laxmi Publications.
5. Vector Calculus by P.C. Matthews, Published by Springer Verlag publications.
6. Rings and Linear Algebra by Pundir & Pundir, Published by Pragathi Prakashan.

Suggested Activities:

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

1. KKM Sarma

2. V. Ramesh

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B.A./B.Sc. THIRD YEAR MATHEMATICS SYLLABUS
SEMESTER - V, PAPER - 6
LINEAR ALGEBRA

60 Hrs

UNIT - I (12 hrs) : 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 hrs) : 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 Quotientspace.

UNIT - III (12 hrs) : 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 hrs) : Matrices :

Matrices, Elementary Properties of Matrices, Inverse Matrices, Rank of Matrix, Linear Equations, Characteristic Roots, Characteristic Values & Vectors of square Matrix, Cayley - Hamilton Theorem.

UNIT - V (12 hrs) : Inner product space :

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.

Reference Books :

1. Linear Algebra by I.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut-220002.
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 1997.

Suggested Activities :

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

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B.A./B.Sc. THIRD YEAR MATHEMATICS SYLLABUS
SEMESTER – VI, PAPER – VII-(A)
ELECTIVE-VII-(A); NUMERICAL ANALYSIS

60 Hrs

UNIT- I: (10 hours)

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)

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

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

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

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.

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.

Suggested Activities:

Seminar/ Quiz/ Assignments

1. K.M. Sastry

2. W. R. R. R. R.

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B.A./B.Sc. THIRD YEAR MATHEMATICS SYLLABUS
SEMESTER – VI, PAPER – VII-(B)
ELECTIVE-VII(B); LAPLACE TRANSFORMS

60 Hrs

UNIT – 1 (12 hrs) Laplace Transform I :-

Definition of - Integral Transform- Laplace Transform Linearity, Property, Piecewise continuous Functions, Existence of Laplace Transform, Functions of Exponential order, and of Class A.

UNIT – 2 (12 hrs) Laplace Transform II :-

First Shifting Theorem, Second Shifting Theorem, Change of Scale Property, Laplace Transform of the derivative of $f(t)$, Initial Value theorem and Final Value theorem.

UNIT – 3 (12 hrs) Laplace Transform III :-

Laplace Transform of Integrals – Multiplication by t , Multiplication by t^n – Division by t : Laplace transform of Bessel Function, Laplace Transform of Error Function, Laplace Transform of Sine and cosine integrals.

UNIT – 4 (12 hrs) Inverse Laplace Transform I :-

Definition of Inverse Laplace Transform. Linearity, Property, First Shifting Theorem, Second Shifting Theorem, Change of Scale property, use of partial fractions, Examples.

UNIT – 5 (12 hrs) Inverse Laplace Transform II :-

Inverse Laplace transforms of Derivatives-Inverse Laplace Transforms of Integrals – Multiplication by Powers of 'P'– Division by powers of 'P'– Convolution Definition – Convolution Theorem – proof and Applications – Heaviside's Expansion theorem and its Applications.

Reference Books :-

1. Laplace Transforms by A.R. Vasistha and Dr. R.K. Gupta Published by Krishna Prakashan Media Pvt. Ltd. Meerut.
2. Fourier Series and Integral Transforms by Dr. S. Sreenadh Published by S.Chand and Co., Pvt. Ltd., New Delhi.
3. Laplace and Fourier Transforms by Dr. J.K. Goyal and K.P. Gupta, Published by Pragathi Prakashan, Meerut.
4. Integral Transforms by M.D. Raising hania, - H.C. Saxsena and H.K. Dass Published by S. Chand and Co., Pvt.Ltd., New Delhi.

Suggested Activities:

Seminar/ Quiz/ Assignments

1. LKMSadhya 2. WDHanua 3.

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SEMESTER – VI, PAPER – VII-(C)
ELECTIVE– VII-(C) : NUMBER THEORY

60 Hrs

UNIT-I (12 hours)

Divisibility – Greatest Common Divisor – Euclidean Algorithm – The Fundamental Theorem of Arithmetic

UNIT-II (12 hours)

Congruences – Special Divisibility Tests - Chinese Remainder Theorem- Fermat's Little Theorem – Wilson's Theorem – Residue Classes and Reduced Residue Classes – Solutions of Congruences

UNIT-III (12 hours)

Number Theory from an Algebraic Viewpoint – Multiplicative Groups, Rings and Fields

UNIT-IV (12 hours)

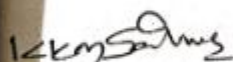
Quadratic Residues - Quadratic Reciprocity – The Jacobi Symbol

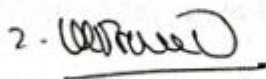
UNIT-V (12 hours)

Greatest Integer Function – Arithmetic Functions – The Moebius Inversion Formula

Reference Books:

1. "Introduction to the Theory of Numbers" by Niven, Zuckerman & Montgomery (John Wiley & Sons)
2. "Elementary Number Theory" by David M. Burton.
3. Elementary Number Theory, by David, M. Burton published by 2nd Edition (UBS Publishers).
4. Introduction to Theory of Numbers, by Davenport H., Higher Arithmetic published by 5th Edition (John Wiley & Sons) Niven, Zuckerman & Montgomery. (Camb, Univ, Press)
5. Number Theory by Hardy & Wright published by Oxford Univ, Press.
6. Elements of the Theory of Numbers by Dence, J. B & Dence T.P published by Academic Press.

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B.A./B.Sc. THIRD YEAR MATHEMATICS SYLLABUS

SEMESTER – VI: CLUSTER-A, PAPER – VIII-A-1

ELECTIVE – VIII-A-1: ADVANCED NUMERICAL ANALYSIS

60 Hrs

Unit – I (10 Hours)

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)

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)

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)

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-Seidel method.

UNIT – V (12 Hours)

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.

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

1. KKM Sastry 2. (M. K. Jain) 3.



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SEMESTER - VI, CLUSTER-A, PAPER - VIII-A-2
Cluster Elective-VIII-A-2: GRAPH THEORY

60 Hrs

UNIT - I (12 hrs) Graphs and Sub Graphs :

Graphs , Simple graph, graph isomorphism, the incidence and adjacency matrices, sub graphs, vertex degree, Hand shaking theorem, paths and connection, cycles.

UNIT - II (12 hrs)

Applications, the shortest path problem, Sperner's lemma.

Trees :

Trees, cut edges and Bonds, cut vertices, Cayley's formula.

UNIT - III (12 hrs) :

Applications of Trees - the connector problem.

Connectivity

Connectivity, Blocks and Applications, construction of reliable communication Networks,

UNIT - IV (12 hrs):

Euler tours and Hamilton cycles

Euler tours, Euler Trail, Hamilton path, Hamilton cycles , dodecahedron graph, Petersen graph, hamiltonian graph, closure of a graph.

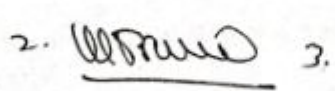
UNIT - V (12 hrs)

Applications of Eulerian graphs, the Chinese postman problem, Fleury's algorithm - the travelling salesman problem.

Reference Books :

1. Graph theory with Applications by J.A. Bondy and U.S.R. Murthy published by Mac. Millan Press
2. Introduction to Graph theory by S. Arumugham and S. Ramachandran, published by scitech Publications, Chennai-17.
3. A Text Book of Discrete Mathamatics by Dr. Swapan Kumar Sankar, published by S.Chand & Co. Publishers, New Delhi.
4. Graph theory and combinations by H.S. Govinda Rao published by Galgotia Publications.

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B.A./B.Sc. THIRD YEAR MATHEMATICS SYLLABUS
SEMESTER – VI, CLUSTER-B, PAPER – VIII-B-1
Cluster Elective – VIII-B-1 : PRINCIPLES OF MECHANICS

60 Hrs

Unit – I: (10 hours)

D'Alembert's Principle and Lagrange's Equations : some definitions – Lagrange's equations for a Holonomic system – Lagrange's Equations of motion for conservative, nonholonomic system.

Unit – II: (10 hours)

Variational Principle and Lagrange's Equations: Variational Principle – Hamilton's Principle – Derivation of Hamilton's Principle from Lagrange's Equations – Derivation of Lagrange's Equations from Hamilton's Principle – Extension of Hamilton's Principle – Hamilton's Principle for Non-conservative, Non-holonomic system – Generalised Force in Dynamic System – Hamilton's Principle for Conservative, Non-holonomic system – Lagrange's Equations for Non-conservative, Holonomic system - Cyclic or Ignorable Coordinates.

Unit – III: (15 hours)

Conservation Theorem, Conservation of Linear Momentum in Lagrangian Formulation – Conservation of angular Momentum – conservation of Energy in Lagrangian formulation.

Unit – IV: (15 hours)

Hamilton's Equations of Motion: Derivation of Hamilton's Equations of motion – Routh's procedure – equations of motion – Derivation of Hamilton's equations from Hamilton's Principle – Principle of Least Action – Distinction between Hamilton's Principle and Principle of Least Action.

Unit – V: (10 hours)

Canonical Transformation: Canonical coordinates and canonical transformations – The necessary and sufficient condition for a transformation to be canonical – examples of canonical transformations – properties of canonical transformation – Lagrange's bracket is canonical invariant – poisson's bracket is canonical invariant - poisson's bracket is invariant under canonical transformation – Hamilton's Equations of motion in poisson's bracket – Jacobi's identity for poisson's brackets.

Reference Text Books :

1. Classical Mechanics by C.R.Mondal Published by Prentice Hall of India, New Delhi.
2. A Text Book of Fluid Dynamics by F. Charlton Published by CBS Publications, New Delhi.
3. Classical Mechanics by Herbert Goldstein, published by Narosa Publications, New Delhi.
4. Fluid Mechanics by T. Allen and I.L. Ditsworth Published by (McGraw Hill, 1972)
5. Fundamentals of Mechanics of fluids by I.G. Currie Published by (CRC, 2002)
6. Fluid Mechanics : An Introduction to the theory, by Chia-shun Yeh Published by (McGraw Hill, 1974)
7. Introduction to Fluid Mechanics by R.W Fox, A.T Mc Donald and P.J. Pritchard Published by (John Wiley and Sons Pvt. Ltd., 2003)

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Dr.v.s Krishna Government Degree College (A), Visakhapatnam
w.e.f. 2019-20 (Revised in October, 2018)

**B.A./B.Sc. THIRD YEAR MATHEMATICS SYLLABUS,
SEMESTER – VI, CLUSTER – A, PAPER – VIII-B-2
Cluster Elective- VIII-B-2: INTEGRAL TRANSFORMS**

60 Hrs

UNIT – 1 (12 hrs) Application of Laplace Transform to solutions of Differential Equations :-

- Solutions of ordinary Differential Equations.
- Solutions of Differential Equations with constants co-efficient
- Solutions of Differential Equations with Variable co-efficient

UNIT – 2 (12 hrs) Application of Laplace Transform :-

- Solution of simultaneous ordinary Differential Equations.
- Solutions of partial Differential Equations.

UNIT – 3 (12 hrs) Application of Laplace Transforms to Integral Equations :-

Definitions : Integral Equations-Abel's, Integral Equation-Integral Equation of Convolution Type, Integro Differential Equations.Application of L.T. to Integral Equations.

UNIT – 4 (12 hrs) Fourier Transforms-I :-

Definition of Fourier Transform – Fourier's in Transform – Fourier cosine Transform – Linear Property of Fourier Transform – Change of Scale Property for Fourier Transform – sine Transform and cosine transform shifting property – modulation theorem.

UNIT – 5 (12 hrs) Fourier Transform-II :-

Convolution Definition – Convolution Theorem for Fourier transform – parseval's Indentify – Relationship between Fourier and Laplace transforms – problems related to Integral Equations.

Finte Fourier Transforms :-

Finte Fourier Sine Transform – Finte Fourier Cosine Transform – Inversion formula for sine and cosine Transforms only statement and related problems.

Reference Books :-

1. Integral Transforms by A.R. Vasistha and Dr. R.K. Gupta Published by Krishna Prakashan Media Pvt. Ltd. Meerut.
2. A Course of Mathematical Analysis by Shanthi Narayana and P.K. Mittal, Published by S. Chand and Company pvt. Ltd., New Delhi.
3. Fourier Series and Integral Transforms by Dr. S. Sreenadh Published by S.Chand and Company Pvt. Ltd., New Delhi.
4. Lapalce and Fourier Transforms by Dr. J.K. Goyal and K.P. Gupta, Published by Pragathi Prakashan, Meerut.
5. Integral Transforms by M.D. Raising hania, - H.C. Saxsena and H.K. Dass Published by S.Chand and Company pvt. Ltd., New Delhi.

Suggested Activities:

Seminar/ Quiz/ Assignments

Dr.v.s Krishna Government Degree College (A), Visakhapatnam
w.e.f. 2019-20 (Revised in October, 2018)
B.A./B.Sc. THIRD YEAR MATHEMATICS SYLLABUS
SEMESTER – VI, CLUSTER-C, PAPER – VIII-C-1
Cluster Elective -VIII-C-1: APPLIED GRAPH THEORY

60 Hrs

UNIT – I (12 hrs) :

Matchings

Matchings – Alternating Path, Augmenting Path - Matchings and coverings in Bipartite graphs, Marriage Theorem, Minimum Coverings.

UNIT –II (12 hrs) :

Perfect matchings, Tutte's Theorem, Applications, The personal Assignment problem -The optimal Assignment problem, Kuhn-Munkres Theorem.

UNIT –III (12 hrs) :

Edge Colorings

Edge Chromatic Number, Edge Coloring in Bipartite Graphs - Vizing's theorem.

UNIT –IV (12 hrs) :

Applications of Matchings, The timetabling problem.

Independent sets and Cliques

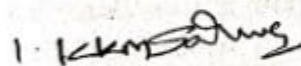
Independent sets, Covering number , Edge Independence Number, Edge Covering Number - Ramsey's theorem.

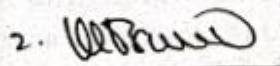
UNIT –V (12 hrs) :

Determination of Ramsey's Numbers – Erdos Theorem, Turan's theorem and Applications, Schur's theorem. A Geometry problem.

Reference Books :-

1. Graph theory with Applications by J.A. Bondy and U.S.R. Murthy, published by Mac. Millan Press.
2. Introduction to graph theory by S. Arumugham and S. Ramachandran published by SciTech publications, Chennai-17.
3. A text book of Discrete Mathematics by Dr. Swapan Kumar Sarkar, published by S. Chand Publishers.
4. Graph theory and combinations by H.S. Govinda Rao, published by Galgotia Publications.

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Dr.v.s Krishna Government Degree College (A), Visakhapatnam
w.e.f. 2019-20 (Revised in October, 2018)
B.A./B.Sc. THIRD YEAR MATHEMATICS SYLLABUS
SEMESTER – VI, CLUSTER-C, PAPER – VIII-C-2
Cluster Elective–VIII-C-2 : FLUID MECHANICS

60 Hrs

Unit – I : (10 hours)

Kinematics of Fluids in Motion

Real fluids and Ideal fluids – Velocity of a Fluid at a point – Streamlines and pthlines – steady and Unsteady flows – the velocity potential – The Vorticity vector – Local and Particle Rates of Change – The equation of Continuity – Acceleration of a fluid – Conditions at a rigid boundary – General Analysis of fluid motion.

Unit – II : (10 hours)

Equations of motion of a fluid- Pressure at a point in fluid at rest – Pressure at a point in a moving fluid – Conditions at a boundary of two inviscid immiscible fluids – Euler's equations of motion – Bernoulli's equation – Worked examples.

Unit – III : (10 hours)

Discussion of the case of steady motion under conservative body forces - Some flows involving axial symmetry – Some special two-dimensional flows – Impulsive motion – Some further aspects of vortex motion.

Unit – IV : (15 hours)

Some Two – dimensional Flows, Meaning of two-dimensional flow – Use of Cylindrical polar coordinates – The stream function – The complex potential for two-dimensional, Irrotational, Incompressible flow – Uniform Stream – The Milne-Thomson Circle theorem – the theorem of Blasius.

Unit – V : (15 hours)

Viscous flow, Stress components in a real fluid – Relations between Cartesian components of stress – Translational motion of fluid element – The rate of strain quadric and principal stresses – Some further properties of the rate of strain quadric – Stress analysis in fluid motion – Relations between stress and rate of strain – the coefficient of viscosity and laminar flow - The Navier-Stokes equations of motion of a viscous fluid.

Reference Text Books :

1. A Text Book of Fluid Dynamics by F. Charlton Published by CBS Publications, New Delhi.
2. Classical Mechanics by Herbert Goldstein, published by Narosa Publications, New Delhi.
3. Fluid Mechanics by T. Allen and I.L. Ditsworth published by (McGraw Hill, 1972)
4. Fundamentals of Mechanics of fluids by I.G. Currie published by (CRC, 2002)
5. Fluid Mechanics, An Introduction to the theory by Chia-shun Yeh published by (McGraw Hill, 1974)
6. Fluids Mechanics by F.M White published by (McGraw Hill, 2003)
7. Introduction to Fluid Mechanics by R.W Fox, A.T Mc Donald and P.J. Pritchard published by (John Wiley and Sons Pvt. Ltd., 2003)

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SEMESTER-I PAPER-1

Differential Equations

QUESTION PAPER PATTERN AND SCHEME(BLUE PRINT)

EASSY ANSWER TYPE

5X8=40MARKS

(5 QUESTIONS OUT OF 10 QUESTION
WITH INTERNAL CHOICE)

SHORT ANSWER TYPE

5X4=20MARKS

(5 QUESTIONS OUT OF 8 QUESTION)

60MARKS

ALLOTTED: 3HOUR

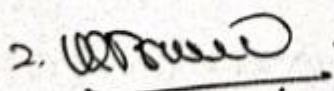
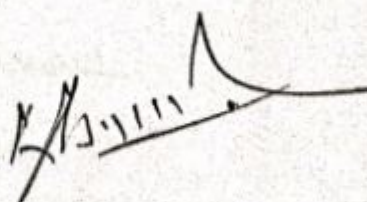
TOPIC	E.Q	S A Q	MARKS ALLOTTED TO THE UNIT
I	2	2	24
II	2	1	20
III	2	2	24
IV	2	2	24
V	2	1	20

Total marks including choice : 112marks

INTERNAL ASSIGNMENT :40MARKS

GUIDELINES TO THE PAPER SETTER :

PAPER SETTER IS REQUESTED TO COVER ALL THE UNITS AND ALSO REQUESTED TO GIVE QUESTION BASED ON REMEMBRANCE UNDERSTANDING (80%) APPLICATION OR CREATIVITY (20%).

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DR.V.S. KRISHNA GOVERNMENT DEGREE COLLEGE (A), VISAKHAPATNAM
SEMESTER – I, END EXAMINATION
IBSC., MATHEMATICS, PAPER – I (CBCS)
DIFFERENTIAL EQUATIONS.
w.e.f 2019-2020 (Revised October, 2018)

TIME : 3 HRS
MARKS

MAX MARKS : 60

SECTION – A

Answer all questions, each question carries 8 marks

5 x 8 = 40M

1 a) solve : $(4x+3y+1)dx+(3x+2y+1)dy=0$ ను సాధించండి.

Or

b) solve $(y^4 + 2y)dx + (xy^3 + 2y^4 - 4x)dy = 0$ ను సాధించండి.

2 a) solve $p^2 + 2py \cot x = y^2$ ను సాధించండి.

Or

b) 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.

λ పరమితిగా వున్న పకనాభీయ శాంకవాల కుటుంబం $\frac{x^2}{a^2+\lambda} + \frac{y^2}{b^2+\lambda} = 1$ స్వలంబకోణీయ వక్రాల కుటుంబం అని చూపండి.

3. a) solve $(D^2 + a^2)y = \sec ax$ ను సాధించండి.

Or

b) solve $\frac{dy^2}{dx^2} - 6\frac{dy}{dx} + 13y = 8e^{3x}\sin 2x$ ను సాధించండి.

4. a) solve $x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + 4y = 2x^2$ ను సాధించండి.

Or

b) solve $(D^2 - 4D + 4)y = 8x^2e^{2x}\sin 2x$ ను సాధించండి.

5. a) solve $(D^2 + a^2)y = \tan ax$ by the method of variation of parameters.

పరిమితుల మార్పు పద్ధతిని ఉపయోగించి $(D^2 + a^2)y = \tan ax$ ను సాధించండి.

Or

b) solve $x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + 4y = 2x^2$ ను సాధించండి.

SECTION - B

Answer any five questions , each carries 4 marks.

5 x 4 = 20 M

6. solve $y \frac{dy}{dx} = xe^{x^2+y^2}$ అవకలన సమీకరణాన్ని సాధించండి.

7. solve $xdy - ydx = xy^2dx$ అవకలన సమీకరణాన్ని సాధించండి.

8. solve $(D^4 - 4D^3 + 6D^2 - 4D + 1)y = 0$ ను సాధించండి.

9. solve $y = 2xp + x^2p^4$ ను సాధించండి.

10. solve $(D^2 - 2D + 1)y = x^2e^{3x}$ ను సాధించండి.

11. solve $(D^2 + 4)y = x \sin x$ ను సాధించండి.

12. solve $(D^2 + 9)y = \cos^3 x$ ను సాధించండి.

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

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SEMESTER-II PAPER-2

Solid Geometry

QUESTION PAPER PATTERN AND SCHEME(BLUE PRINT)

SECTION:A

EASSY ANSWER TYPE

5X8=40MARKS

(5 QUESTIONS OUT OF 10 QUESTION
WITH INTERNAL CHOICE)

SECTION:B

SHORT ANSWER TYPE

5X4=20MARKS

(5 QUESTIONS OUT OF 8 QUESTION)

60MARKS

TIME ALLOTTED: 3HOUR

TOPIC	E.Q	SAQ	MARKS ALLOTTED TO THE UNIT
UNIT-I	2	1	20
UNIT-II	2	2	24
UNIT-III	2	1	20
UNIT-IV	2	2	24
UNIT-V	2	2	24

Total marks including choice : 112marks

INTERNAL ASSIGNMENT :40MARKS

GUIDELINES TO THE PAPER SETTER :

PAPER SETTER IS REQUESTED TO COVER ALL THE UNITS AND ALSO REQUESTED TO GIVE QUESTION BASED ON REMEMBRANCE UNDERSTANDING (80%) APPLICATION OR CREATIVITY (20%).

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DR.V.S. KRISHNA GOVERNEMENT DEGREE COLLEGE (A),
VISAKHAPATNAM
SEMESTER – II END EXAMINATION
IBSC., MATHEMATICS, PAPER – II (CBCS)
SOLID GEOMETRY
w.e.f 2019-2020 (Revised October, 2018)

TIME : 3 HRS

MAX MARKS : 60

SECTION –A

5 x 8 = 40M

Answer All questions , each question carries 8 marks

1. a) A plane meets the co –ordinate axes in A,B,C. If the centroid of ΔABC is (a,b,c) , show that the equation to the plane is $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 3$

ఒక తలము యొక్క నిరూపకాక్షాలను A,B,C వద్ద తాకుచున్నది. ΔABC యొక్క కేంద్ర

భాసము (a,b,c) , అయితే తలము సమీకరణము $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 3$ అని చూపండి.

Or

- b) Find the bisecting plane of the acute angle between the planes $3x - 2y - 6z + 2 = 0$, $-2x + y - 2z - 2 = 0$

$3x - 2y - 6z + 2 = 0$, $-2x + y - 2z - 2 = 0$ తలముల మధ్యగల లఘుకోణ

సమద్విఖండన తలం సమీకరణం కనుక్కోండి.

2. a) Prove that the lines $\frac{x+1}{1} = \frac{y+1}{2} = \frac{z+1}{3}$ and $x + 2y + 3z - 8 = 0$; $2x + 3y + 4z - 11 = 0$ are intersecting and find the point of their intersection. Find also equation of the plane containing them.

$\frac{x+1}{1} = \frac{y+1}{2} = \frac{z+1}{3}$ మరియు అను రేఖలు ఖండించుకుంటాయని నిరూపించండి. మరియు

ఖండన బిందువును కనుక్కోండి. ఆ అంతేకాక ఆ రేఖలను కలిగి వున్న తలాన్ని

కనుక్కోండి.

or

- b) Find the S.D between the line $\frac{x}{y} = \frac{y}{z} = \frac{z}{1}$ and $\frac{x-1}{2} = \frac{y-1}{-5} = \frac{z+2}{2}$

పై రేఖల మధ్య అల్పతమ దూరాన్ని కనుక్కోండి.

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

$x^2 + y^2 + z^2 - y + 2z = 0$, $x - y + z = 2$; $x^2 + y^2 + z^2 + x - 3y + z - 5 = 0$, $2z - y + 4z - 1 = 0$ అనే రెండు వృత్తాలు ఒకే గోళంపై ఉంటాయని చూపి దాని సమీకరణం కనుక్కోండి.

or

b) find the pole of the plane $x - y - z + 9$ w.r.t to the sphere $x^2 + y^2 + z^2 - 2x + 4y - 6z + 5 = 0$

$x^2 + y^2 + z^2 - 2x + 4y - 6z + 5 = 0$ దృష్ట్యా $x - y - z + 9$ దృవం కనుక్కోండి.

4. a) Find the limiting points of the co -axial system determined by the spheres whose equations are.

$$x^2 + y^2 + z^2 - 8x + 2y - 2z + 32 = 0; x^2 + y^2 + z^2 - 7x + z + 23 = 0$$

పై సమీకరణాలు సూచించే గోళాలతో నిర్దష్టమయ్యే సహజ గోళ సరనికి అవధిబిందువులు కనుక్కోండి.

Or

b) if the line $\frac{x}{1} = \frac{y}{2} = \frac{z}{1}$ represents one of the these mutually perpendicular generators of the cone $11yz + 6zx - 14xy = 0$ find the equations of the other two.

$11yz + 6zx - 14xy = 0$ అనే శంఖువు యొక్క మూడు పరస్పర లంబజన రేఖల్లో

ఒకజనక రేఖ $\frac{x}{1} = \frac{y}{2} = \frac{z}{1}$ అయిన మిగిలిన రెండు లంబజనక రేఖల సమీకరణాలు

కనుక్కోండి.

a) Find the equations of the tangent planes to the cone $9x^2 - 4y^2 + 16z^2 = 0$ which contains the line $\frac{x}{32} = \frac{y}{72} = \frac{z}{27}$

$\frac{x}{32} = \frac{y}{72} = \frac{z}{27}$ అను రేఖను కలిగియున్న $9x^2 - 4y^2 + 16z^2 = 0$ అను శంఖువు

యొక్క స్పర్శతలములను కనుక్కోండి.

or

b) Find the equation to the right circular cylinder whose guiding circle $x^2 + y^2 + z^2 = 9$; $x - y + z = 3$

భూవక్తము $x^2 + y^2 + z^2 = 9$; $x - y + z = 3$ కలిగిన లంబదర్శుల స్పృశకం యొక్క సమీకరణం కనుక్కోండి.

SECTION - B

Answer any Five questions, each carries 4 marks

5x4 = 20 M

Find the equation of the plane through (4,4,0) and perpendicular to the planes $x+2y+2z = 5$ and $3x+3y+2z - 8 = 0$.

(4,4,0) బిందువు గుండా పోతూ, $x+2y+2z = 5$;

$3x+3y+2z - 8 = 0$. అను తలములకు లాబంగా వుండే తలసమీకరణం కనుక్కోండి.

Find the equations of the line through the point (1,1,1) and intersecting the lines

$$2x - y - z - 2 = 0 = x + y + z - 1; x - y - z - 3 = 0 = 2x + 4y - 2 - 4$$

(1,1,1) బిందువు గుండా పోతూ $2x - y - z - 2 = 0 = x + y + z - 1$;

$$x - y - z - 3 = 0 = 2x + 4y - 2 - 4$$

రేఖలను ఖండించే రేఖ సమీకరణాలను కనుక్కోండి.

Find the angles between the lines $x - 2y + z = 0$; $x + y - z = 3$; and $x + 2y + z = 5$; $8x + 12y + 5z = 0$

అను రేఖల మధ్యలో గల కోణం కనుక్కోండి.

Find the equation of the sphere passing through the circle $x^2 + y^2 = 4, z = 0$ and is intersected by the plane $x+2y+2z=0$ in a radius 3.

$x^2 + y^2 = 4, z = 0$ వృత్తం గుండా పోతూ మరియు $x+2y+2z=0$ తలంచే ఖండంపబడి 3

వ్యాసార్థంగా గల వృత్తం గుండా పోయే గోళ సమీకరణం కనుక్కోండి.

Find the equation of the sphere through the

$$\text{circle } x^2 + y^2 + z^2 - 2x + 3y - 4z + 11 = 0 \text{ orthogonally.}$$

$$x^2 + y^2 + z^2 - 2x + 3y - 4z + 6 = 0, 3x - 4y - 5z - 15 = 0$$

అను వృత్తం గుండా పోతూ $x^2 + y^2 + z^2 + 2x + 4y - 6z + 11 = 0$ అను గోళాన్ని

లంబచ్ఛేదనము చేయు గోళ సమీకరణం కనుక్కోండి.

Find the equations to the cone which passes through the three co - ordinate axis

$$\text{and the Lines } \frac{x}{1} = \frac{y}{-2} = \frac{z}{3} \text{ and } \frac{x}{2} = \frac{y}{1} = \frac{z}{1}$$

భూపక అక్షాల గుండా పోతూ $\frac{x}{1} = \frac{y}{-2} = \frac{z}{3}$ మరియు $\frac{x}{2} = \frac{y}{1} = \frac{z}{1}$ జనక రేఖలు గల

కాంక్షువు సమీకరణం కనుక్కోండి.

Find the equation of the cone whose vertex is $(1, 1, 1)$ and whose guiding curve is $x = 2, y^2 + z^2 = 4$

Sol: $(1, 1, 1)$ is the vertex. Let (x, y, z) be any point on the cone. Then the line segment joining the vertex and the point (x, y, z) must lie in the plane $x = 2$. So, the equation of the cone is $x = 2$.

Find the equation of the right circular cylinder whose guiding circle is $x^2 + y^2 + z^2 = 2, z = y + z = 2$

Sol: The guiding circle is $x^2 + y^2 + z^2 = 2, z = y + z = 2$. The axis of the cylinder is the line $x = 0, y = 0, z = 2$. The radius of the cylinder is $\sqrt{2}$. So, the equation of the cylinder is $x^2 + y^2 + z^2 = 2$.

Signature : Shamir : 1/1/2020

SEMESTER-III PAPER-3

Abstract Algebra

QUESTION PAPER PATTERN AND SCHEME(BLUE PRINT)

SECTION:A

EASSY ANSWER TYPE

5X8=40MARKS

(5 QUESTIONS OUT OF 10 QUESTION
WITH INTERNAL CHOICE)

SECTION:B

SHORT ANSWER TYPE

5X4=20MARKS

(5 QUESTIONS OUT OF 8 QUESTION)

60MARKS

TIME ALLOTTED: 3HOUR

TOPIC	E.Q	SAQ	MARKS ALLOTTED TO THE UNIT
UNIT-I	2	2	24
UNIT-II	2	2	24
UNIT-III	2	1	20
UNIT-IV	2	2	24
UNIT-V	2	1	20

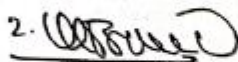
Total marks including choice : 112marks

INTERNAL ASSIGNMENT :40MARKS

GUIDELINES TO THE PAPER SETTER :

PAPER SETTER IS REQUESTED TO COVER ALL THE UNITS AND ALSO REQUESTED TO GIVE QUESTION BASED ON REMEMBRANCE UNDERSTANDING (80%) APPLICATION OR CREATIVITY (20%).

1. 

2. 

3.



DR.V.S. KRISHNA GOVERNEMENT DEGREE COLLEGE (A),
VISAKHAPATNAM

SEMESTER – III END EXAMINATION
II BSC., MATHEMATICS, PAPER – III (CBCS)
ABSTRACT ALGEBRA
w.e.f 2019-2020 (Revised October, 2018)

TIME : 3HRS

MAX MARKS : 60M

SECTION – A

Answer All questions, each questions carries 8 marks.

5 x 8 = 40 M

1. a) Prove that the set $-Z$ of all integers form an abelian group w.r.t. the operations defined by

$$a * b = a + b + 2 \text{ for all } a, b \in Z$$

పూర్ణాంకాల సమితి $a * b = a + b + 2$ for all $a, b \in Z$ పరిశ్రమ ద్వారా ఒక వినిమయ సమూహము అని చూపండి.

Or

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

సమూహము G లో $a, b \in G$, $o(a)=5, b \neq e$ మరియు $aba^{-1} = b^2$ అయితే b కి క్రమం.

2. a) If H is a non empty complex of a group G , prove that the necessary and sufficient condition for H to be a subgroup of G is $a, b \in H \Rightarrow ab^{-1} \in H$ where b^{-1} is the inverse of b in G .

ఒక సమూహము G లో H ఒక శూన్యతర కాంప్లెక్స్. G లో H ఒక ఉపసమూహము

అవటానికి అవశ్యకపర్యాప్త నియమము $a, b \in H \Rightarrow ab^{-1} \in H$ ఇక్కడ b కి H లో

విలోమ మూలకము b^{-1} . అని చూపండి.

Or

- b) State and prove lagrange's theorem for finite groups

పరిమిత సమూహాలకు లెగ్రాంజ్ సిద్ధాంతము వ్రాసి నిరూపించండి.

3. Prove that subgroup H of a Group G is a normal subgroup of G , iff each left coset of H in G is a right coset of H in G .

G లో H అభిలంబ ఉపసమూహం కావడానికి అవశ్యక పర్యాప్త నియమము : G లో H

యొక్క ప్రతి ఎడమ సహసమితి ఒక కుడి సహసమితి అని చూపండి.

Or

b) If H is a normal subgroup of G . Then prove that the set $\frac{G}{H}$ of all cosets of H in G w.r.t. coset multiplication is a group.

($G, \cdot$) H ఒక అభిలంబ ఉపసమూహం G లో H యొక్క సహసమితుల సమితి G/H

సహసమితుల గుణకారం దృష్ట్యా ఒక సమూహము అని చూపండి.

4. a) Prove that the necessary and sufficient condition for a homomorphism f of a group G onto a group G^1 with kernel K to be an isomorphism of G onto G^1 is that $K = \{e\}$

సమూహము G నుండి సమూహము G^1 కు నిర్వచించబడిన సంగ్రహ సమరూపత

G నుండి G^1 తుల్య రూపత ఆగుటకు ఆవశ్యక పర్యాప్త నియమము $K = \{e\}$ ఇక్కడ

$K = \ker f$ అని చూపండి.

Or

b) state and prove fundamental theorem on homomorphism of groups

సమూహాల యొక్క సమరూపతా మూలసిద్ధాంతం వ్రాసి నిరూపించండి.

5. a) state and prove cayleg's theorem

కెయిలీ సిద్ధాంతము వ్రాసి నిరూపించండి.

Or

b) prove that every subgroup of cyclic group is cyclic

చక్రీయ సమూహము యొక్క ప్రతిఉపసమూహము చక్రీయము అని చూపండి.

SECTION -B

Answer any Five questions, each carries 4 marks

6. Prove that in a group G , inverse of an element is unique.

సమూహము G లో ఏ మూలకానికైన విలోమము ఏకైకము అని చూపండి.

7. Find the order of each element of the group $G = Z_6 = \{0,1,2,3,4,5\}$, the composition being addition modulu 6.

$G = Z_6 = \{0,1,2,3,4,5\}$ సమితు $+_6$ దృష్ట్యా ఒక సమూహము. దానిలో ప్రతిమూలక

తరగతి కనుక్కోండి.

8. Prove that the identity of a subgroup H of a group is same as the identity of G .

ఒక సమూహము G లో ఒక ఉపసమూహము H లో తత్సమ మూలకము G లో తత్సమ

మూలకము ఒకటి అని చూపండి.

9. If H_1 and H_2 are two subgroups of a group G then prove that $H_1 \cap H_2$ is also a subgroup of G .

ఒక సమూహము G లో H_1 మరియు H_2 ఉపసమూహములు ఐతే $H_1 \cap H_2$ కూడా G లో ఉపసమూహము అవుతుంది అని చూపండి.

10. Prove that every subgroup of abelian group is normal

వినిమయ సమూహము యొక్క ప్రతి ఉపసమూహము అభిలంబముని చూపండి.

11. If f is a homomorphism of a group G into a group G' then prove that the kernel of f is a normal subgroup

సమూహము G నుండి సమూహము G' కు f ఒక సమరూపత అయితే కేర్ f అనేది G లో అభిలంబ ఉపసమూహము అవుతుంది అని చూపించండి.

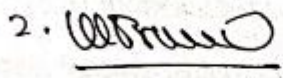
2. If for a group G , $f : G \rightarrow G$ is given by $f(x) = x^2$, $x \in G$ is a homomorphism. then G is abelian.

సమూహము G లో $f : G \rightarrow G$ ప్రమోయము $f(x) = x^2$, $x \in G$ అని నిర్వచింపబడితే ప్రమోయము సమరూపత అయితే G వినిమయము అని చూపండి.

3. Find the regular permutation group isomorphic to the multiplicative group $\{1, \omega, \omega^2\}$

గుణన సమూహము $\{1, \omega, \omega^2\}$ లో తుల్యరూపత కలిగిన క్రమ ప్రస్తార సమూహమును కనుక్కోండి

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SECTION 1A

SECTION 1B

5/12/1964

SHORT ANSWER TYPE

5/16/2004

SERIALS

TOPIC	E.Q.	SAQ	MARKS ALLOTTED TO THE UNIT
I	2	2	26
II	2	2	26
III	2	1	20
IV	2	1	20
V	2	2	26

INTERNAL ASSIGNMENT MARKS

PAPER SETTER IS REQUESTED TO COVER ALL THE UNITS AND ALSO REQUESTED TO GIVE QUESTION BASED ON REMEMBRANCE UNDERSTANDING (80%) APPLICATION OR CREATIVITY (20%).

on Saturday

2. (continued) 3.

11-10-1910

DR.V.S. KRISHNA GOVERNEMENT DEGREE COLLEGE (A),

VISAKHAPATNAM

SEMESTER – IV END EXAMINATION

II BSC., MATHEMATICS, PAPER – IV (CBCS)

Real Analysis

w.e.f 2019-2020 (Revised October, 2018)

TIME : 3HRS

MAX MARKS : 60M

SECTION – A

Answer all questions, each question carries 8 marks

5 x 8 = 40 M

1. a) Prove that $\lim_{n \rightarrow \infty} \left(\frac{1}{(n+1)^2} + \frac{1}{(n+2)^2} + \dots + \frac{1}{(n+n)^2} \right) = 0$ అని చూపండి

or

b) Prove that a monotone sequence is convergent if and only if it is bounded.

ఏక దిష్టానుక్రమం అభిసరిస్తుంది అది పరిబద్ధం అవుతుంది చూపండి.

2. a) Test for convergence of $\sum_{n=1}^{\infty} \sqrt[3]{n^3} + 1 - n$

$\sum_{n=1}^{\infty} \sqrt[3]{n^3} + 1 - n$ అభిసరణతను పరీక్షించండి.

Or

b) state and prove D'Alemberts test. ను ప్రవచించి నిరూపించండి.

3. a) if $f:[a,b] \rightarrow R$ is continuous on $[a,b]$ then f is bounded on $[a,b]$

$f:[a,b] \rightarrow R$, $[a,b]$ లో అవిచ్ఛిన్నమైతే $[a,b]$ లో పరిబద్ధం అని చూపండి.

Or

b) Examine for continuity the function f defined by $f(x) = |x| + |x - 1|$ at

$x = 0, 1$ ల వద్ద, $f(x) = |x| + |x - 1|$ అనే ప్రమేయపు అవిచ్ఛిన్నతను పరీక్షించండి.

4. a) State and prove Cauchy's mean value theorem

కోపి మధ్యమ మూల్య సిద్ధాంతాన్ని ప్రవచించి నిరూపించండి.

Or

b) prove that $x - \frac{x^2}{2} < \log(1+x) < x - \frac{x^2}{2(1+x)^2}$ అని చూపండి.

5. a) State and prove fundamental theorem of integral calculus.

సమాకలన మూల సిద్ధాంతాన్ని ప్రవచించి నిరూపించండి .

(OR)

b. prove that $\frac{1}{\pi} < \int_0^1 \frac{\sin \pi x}{1+x^2} dx < \frac{2}{\pi}$ ని చూపండి

SECTION-B

Answer any Five question each question carries 4marks

6. Prove that sequence $\{s_n\}$, where $s_n = \frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{n+n}$ is convergent.

$\{s_n\}$ అనునది అనుక్రమం అయిన where $s_n = \frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{n+n}$ అభిసరిస్తుంది. అని నిరూపించండి.

7. prove that $s_n = 2 - \frac{1}{2^{n-1}}$ is convergent.

$s_n = 2 - \frac{1}{2^{n-1}}$ అనుక్రమం అభిసరిస్తుందని చూపండి.

8. Examine the convergence of $\sum_{n=1}^{\infty} (-1)^{n+1} (\sqrt{n+1} - \sqrt{n})$ అభిసరణను పరీక్షించండి.

9. Test for convergence of $\sum \left(\frac{n+1}{n+2}\right)^n \cdot x^n$ అభిసరణతనును పరీక్షించండి.

10. Discuss the continuity of $f(x) = \frac{2x^4 - 6x^3 - x^2 + 3}{x-1}$ at $x=1$

$f(x) = \frac{2x^4 - 6x^3 - x^2 + 3}{x-1}$ ప్రమేయం యొక్క అవిచ్ఛిన్నతను $x=1$ వద్ద చర్చించండి.

Show that $\log(1+x) - \frac{2x}{2+x}$ ($x > 0$) is increasing .

($x > 0$) కు $\log(1+x) - \frac{2x}{2+x}$ ఆరోహణమని చూపండి.

2. If $f(x) = x^2$ on $[0,1]$ and $P = \{0, \frac{1}{4}, \frac{2}{4}, \frac{3}{4}, 1\}$ then compute $L(P, F)$ and $U(p, f)$

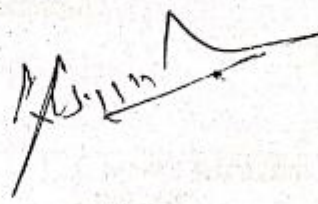
3. $[0,1]$ మీద $f(x) = x^2$ ప్రమేయానికి ఒక విభజన $p = \{0, \frac{1}{4}, \frac{2}{4}, \frac{3}{4}, 1\}$ అయితే $l(p, f)$ మరియు $U(p, f)$ కనుక్కోండి.

4. Evaluate $\int_0^{\frac{\pi}{4}} (\sec^4 x - \tan^4 x) dx$ కనుక్కోండి.

కనుక్కుండి

2. అవసరం

2.



SEMESTER-V PAPER-5

QUESTION PAPER PATTERN AND SCHEME(BLUE PRINT)

EASSY ANSWER TYPE

5X8=40MARKS

(5 QUESTIONS OUT OF 10 QUESTION
WITH INTERNAL CHOICE)

SHORT ANSWER TYPE

5X4=20MARKS

(5 QUESTIONS OUT OF 8 QUESTION)

60MARKS

ALLOTTED: 3HOUR

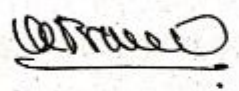
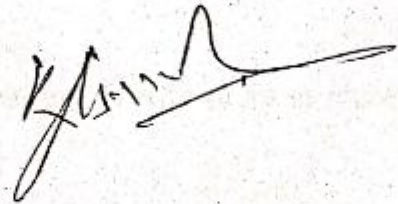
TOPIC	E.Q	SAQ	MARKS ALLOTTED TO THE UNIT
I	2	2	24
II	2	2	24
III	2	2	24
IV	2	1	20
V	2	1	20

Total marks including choice : 112marks

INTERNAL ASSIGNMENT : 40MARKS

GUIDELINES TO THE PAPER SETTER :

PAPER SETTER IS REQUESTED TO COVER ALL THE UNITS AND ALSO REQUESTED TO GIVE QUESTION BASED
ON REMEMBRANCE UNDERSTANDING (80%) APPLICATION OR CREATIVITY (20%).

1.  2.  3. 

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

SEMESTER – V END EXAMINATION

III BSC., MATHEMATICS, PAPER – V (CBCS)

Ring Theory & Vector Calculus

w.e.f 2019-2020 (Revised October, 2018)

ME : 3HRS

MAX MARKS : 60M

SECTION –A

Answers all questions, each questions carries 8 marks

5x8 = 40M

1. a) Prove that Every Finite integral domain is a field

ప్రతి పరిమిత పూర్ణాంక ప్రదేశము క్షేత్రం అవుతుంది అని చూపండి.

Or

b) Prove that the characteristics of an integral domain is either a prime or Zero.

పూర్ణాంక ప్రదేశం యొక్క లక్షణికం అభాజ్య సంఖ్య కాని లేక సున్నకాని అవుతుంది.

2.a) State and prove fundamental theorem of homomorphism

సమరూపతా మూల సిద్ధాంతమును వ్రాసి నిరూపించండి.

Or

b) prove that an ideal V of a commutative ring R with unity is maximal if and only if the quotient ring R/U is a field.

తత్స మూలకం కల వినిమయ వలయమైన R/U అనే ఆదర్శం అదిహతమం

కావడానికి ఆవశ్యక పర్యాప్త నియమంవ్యుత్పన్న వలయమైన R/U క్షేత్రం కావడం .

అవుతుంది అని చూపండి.

Find the directional derivative of $f = xy + yz + zx$ in the direction of the vector $\vec{i} + 2\vec{j} + 2\vec{k}$ at the point $(1,2,0)$

$\vec{i} + 2\vec{j} + 2\vec{k}$ దిశలో $f = xy + yz + zx$ యొక్క దైశిక వ్యుత్పన్నం $(1,2,0)$ బిందువు వద్ద కనుక్కోండి.

Or

If $\vec{a}$ is a constant vector prove that $\text{curl } \frac{\vec{a} \times \vec{r}}{r^3} = \frac{-\vec{a}}{r^3} + 3 \frac{\vec{r}}{r^5} (\vec{a} \cdot \vec{r})$

$\vec{a}$ స్థిర సదిశ అయితే $\text{curl } \frac{\vec{a} \times \vec{r}}{r^3} = \frac{-\vec{a}}{r^3} + 3 \frac{\vec{r}}{r^5} (\vec{a} \cdot \vec{r})$ అని చూపండి.

a) If $\vec{F} = (x^2 + y^2)\vec{i} - 2xy\vec{j}$ evaluate $\oint_C \vec{F} \cdot d\vec{r}$ where C is the rectangle in the xy plane bounded by $y=0$, $y=b$, $x=0$, $x=a$

$(x^2 + y^2)\vec{i} - 2xy\vec{j}$ అయితే xy తలంలో $y=0$, $y=b$, $x=0$, $x=a$ లచే విబద్ధమైన దీర్ఘ రేఖ వెంబడి $\oint_C \vec{F} \cdot d\vec{r}$ ను రాబెట్టండి.

or

b) If $F = 2xz\vec{i} - x\vec{j} + y^2\vec{k}$ evaluate $\int_V \vec{F} \cdot d\vec{v}$ where V is the region bounded by the surfaces $x=0, x=2, y=0, y=6, z=x^2, z=4$.

$F = 2xz\vec{i} - x\vec{j} + y^2\vec{k}$ అయి $x=0, x=2, y=0, y=6, z=x^2, z=4$. తలాలచే విబద్ధమైన అంతరాళం V అయితే $\int_V \vec{F} \cdot d\vec{v}$ గణించండి.

c) State and prove stokes theorem

గ్రీన్స్ సిద్ధాంతం ను వ్రాసి నిరూపించండి.

Or

d) Verify Green's theorem in the plane for $\int_C (3x^2 - 8y^2)dx + (4y - 8xy)dy$ where C is the region bounded by $y=\sqrt{x}$ and $y=x^2$

$y = \sqrt{x}, y = x^2$ వక్రాలచే పరివృత్తమైన c తలంలో $\oint_c (3x^2 - 8y^2)dx + (4y - 6xy)dy$ గ్రీన్ సిద్ధాంతం నిరూపించండి.

SECTION - B

Answer any five questions, each carries 4 marks

5x 4 = 20M

Prove that every Boolean ring is abelian.

ప్రతి బూలియన్ వలయం వినిమయం అని చూపండి.

Prove that a field has no zero divisions

క్షేత్రంలో శూన్యభాజకాలు లేవు అని చూపండి.

Prove that the homomorphic image of a ring is a ring

ఒక వలయం యొక్క సమరూపతా ప్రతిబింబం మరల వలయమ అవుతుందని చూపండి.

Prove that an ideal $U \neq R$ of a commutative ring R is a prime ideal if and only if R/U is an integral domain.

వినిమయ వలయమైన R కు U ఒక ఐడియల్ అయితే R/U పూర్ణాంక ప్రదేశం కావడానికి అవసరమైనది U ఒక అభాజ్య ఐడియల్ కావడం అని చూపండి.

Prove that $\text{grad}(\bar{A} \cdot \bar{B}) = (\bar{B} \cdot \bar{\nabla})\bar{A} + (\bar{A} \cdot \bar{\nabla})\bar{B} + \bar{B} \times \text{curl}\bar{A} + \bar{A} \times \text{curl}\bar{B}$ అని చూపండి.

Find the angle of intersection of intersection at $(4, -3, 2)$ of spheres

$x^2 + y^2 + z^2 = 29$ and $x^2 + y^2 + z^2 + 4x - 6y - 8z - 47 = 0$.

$(4, -3, 2)$ వద్ద $x^2 + y^2 + z^2 + 4x - 6y - 8z - 47 = 0$, $x^2 + y^2 + z^2 = 29$

గోళాలు ఖండించుకొనే కోణమెంత ?

1. Evaluate $\int_S \vec{F} \cdot \vec{N} \cdot ds$ where $\vec{F} = 18z\vec{i} - 12\vec{j} + 3y\vec{k}$ and S is the part of the plane $2x + 3y + 6z = 12$ located in the first octant.

2. Evaluate $\int_S \vec{F} \cdot \vec{N} \cdot ds$ where $\vec{F} = 18z\vec{i} - 12\vec{j} + 3y\vec{k}$ and S is the part of the plane $2x + 3y + 6z = 12$ located in the first octant.

3. Verify Stokes theorem for $\vec{F} = -y^3\vec{i} + x^3\vec{j}$ where S is the circular disc

$$x^2 + y^2 \leq 1, z = 0$$

4. Verify Stokes theorem for $\vec{F} = -y^3\vec{i} + x^3\vec{j}$ where S is the circular disc $x^2 + y^2 \leq 1, z = 0$.

5. Verify Stokes theorem for $\vec{F} = -y^3\vec{i} + x^3\vec{j}$ where S is the circular disc $x^2 + y^2 \leq 1, z = 0$.

2. Verify

3. Verify

SEMESTER-V PAPER-6

QUESTION PAPER PATTERN AND SCHEME(BLUE PRINT)

EASSY ANSWER TYPE

5X8=40MARKS

(5 QUESTIONS OUT OF 10 QUESTION
WITH INTERNAL CHOICE)

SHORT ANSWER TYPE

5X4=20MARKS

(5 QUESTIONS OUT OF 8 QUESTION)

ALLOTTED: 3HOUR

60MARKS

TOPIC	E.Q	SAQ	MARKS ALLOTTED TO THE UNIT
I	2	2	24
II	2	1	20
III	2	2	24
IV	2	1	20
V	2	2	24

Total marks including choice : 112marks

INTERNAL ASSIGNMENT :40MARKS

GUIDELINES TO THE PAPER SETTER :

PAPER SETTESR IS REQUESTED TO COVER ALL THE UNITS AND ALSO REQUESTED TO GIVE QUESTION BASED ON REMEMBERANCE UNDERSTANDING (80%) APPLICATION OR CREATIVITY (20%).

1. *[Signature]*

2. *[Signature]*

3. *[Signature]*

DR. V.S. KRISHNA GOVERNMENT DEGREE COLLEGE (A),
VISAKHAPATNAM
SEMESTER - V END EXAMINATION
III BSC., MATHEMATICS, PAPER - 6 (CBCS)
Linear Algebra
w.e.f 2019-2020 (Revised October, 2018)

6:3HRS

MAX MARKS : 60M

SECTION -A

For all questions, each question carries 8 marks

a) let $v(F)$ be a vector space . A non - empty set $w \subset v$ and sufficient condition for W to be a subspace of V is $a, b \in W$ and $\alpha, \beta \in F \Rightarrow a\alpha + b\beta \in w$ prove that the necessary

$$5 \times 8 = 40M$$

(F) ఒక సదిశాంతరాళము. శూన్యతర సమితి $w \subset v$. V లో W ఒక ఉపాంతరాళం కావడానికి అవశ్యక పర్యాప్త నియమం. $a, b \in F$ మరియు $\alpha, \beta \in w \Rightarrow a\alpha + b\beta \in w$ అని చూపండి.

Or

b) let $v(F)$ be a vector space and $S = \{\alpha_1, \alpha_2, \dots, \alpha_n\}$ is a finite subset of non zero vectors of $v(F)$. Then prove that S is linearly dependent if and only if some vector $\alpha_k \in S, 2 \leq k \leq n$, can be expressed as a linear combination of its preceding vectors.

$V(F)$ ఒక సదిశాంతరాళము $S \subset v$ మరియు $S = \{\alpha_1, \alpha_2, \dots, \alpha_n\}$ అనేది పరిమిత శూన్యతర సదిశల సమితి. S ఋజు పరాధీనతకు అవశ్యక పర్యాప్త నియమం, ఒక మూలకము, $\alpha_k \in S, 2 \leq k \leq n$ దాని ముందుదేటటువంటి సదిశల ఋజు సంయోగ మవుతుంది అని చూపండి.

a) if $v(F)$ is a finite dimensional vector space then prove that there exists a basis set of v .

$V(F)$ ఒక పరిమిత పరిమాణపు సదిశాంతరాళమైతే V కు ఆధారస్థితి వ్యవస్థితము అని చూపండి.

or

b) let W be a subspace of a finite dimensional vector space $V(F)$, then prove that $\dim(V/W) = \dim V - \dim W$

పరిమిత పరిమాణ సదిశాంతరాళానికి $V(F)$ గుణపాంతరాళము అయితే $\dim(V/W) = \dim V - \dim W$ అని చూపండి.

a) The mapping $T: V_3(R) \rightarrow V_2R$ is defined by $T(x,y,z) = (x-y, x-z)$ show that T is a linear transformation.

$T: V_3(R) \rightarrow V_2R$ ప్రమేయాన్ని $T(x,y,z) = (x-y, x-z)$ నిర్వచించబడినది. ఋజు పరివర్తమని చూపండి.

Or

b) state and prove Rank - Nullity theorem

కోటి - శూన్యత సిద్ధాంతము వ్రాసి నిరూపించండి.

a) find the characteristics roots and the corresponding characteristics vectors of

the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$

$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ మాత్రిక యొక్క లక్షణిక మూలాలు, అనురూప లక్షణిక సదిశలు కనుగొనండి.

Or

b) state and prove cayley - Hamilton theorem

కేలీ - హామిల్టన్ సిద్ధాంతం వ్రాసి నిరూపించండి.

c) state and prove cauchy - schwarz's in equality

కేసీ - ష్చార్జ్ అసమానతను వ్రాసి నిరూపించండి.

Or

b) Given $\{(2,1,3), (1,2,3), (1,1,1)\}$ is a basis of R^3 ; construct an orthogonal basis of R^3 using Gram-Schmidt process. $\{(2,1,3), (1,2,3), (1,1,1)\}$ ఒక ఆధారం అయితే ఒక లంబాధారం నిర్మించండి.

SECTION -B

Answer any five questions, each carries 4 marks

5x4=20M

Prove that the intersection of any two subspaces w_1 and w_2 of vector space $v(F)$ is also a subspace.

$v(F)$ నకు w_1 and w_2 లు ఉపాంతరాళాలు అయితే వాటి చేదక సమితి కూడా ఉపాంతరాళమగును అని చూపండి.

Show that the system of vectors $(1,3,2), (-1,-7,-8), (2,1,-1)$ of $v_3(R)$ is linearly dependent.

$v_3(R)$ యొక్క $(1,3,2), (-1,-7,-8), (2,1,-1)$ సదిశలు బూజు పరాధీనమని చూపండి.

Let $v(F)$ be a finite dimensional vector space. Then prove that any two bases of v have the same number of elements.

$v(F)$ ఒక పరిమిత సదిశాంతరళము. V యొక్క ఏరెండు ఆధారాల లోనైనా మూలకాల సంఖ్య సమానము అని చూపండి.

Describe explicitly the linear transformation $T: R^2 \rightarrow R^2$ such that $T(2,3) = (4,5)$ and $T(1,0) = (0,0)$

$T: R^2 \rightarrow R^2$ ప్రమేయం $T(2,3) = (4,5)$ మరియు $T(1,0) = (0,0)$ గా నిర్వచిస్తే బూజు పరివర్తనాన్ని నిర్ణయించండి.

let $U(F)$ and $v(F)$ be two vector spaces. let $T: U(F) \rightarrow V(F)$ be linear transformation. then prove that the range set $R(T)$ is a subspace of $V(F)$

$U(F), V(F)$ లు రెండు సదిశాంతరాళాలు. $T: u \rightarrow v$ ఒక బూజు పరివర్తనం అయితే $v(F)$ నకు $R(T)$ ఉపాంతరాళం అని చూపండి.

Prove that the characteristic vectors corresponding to distinct characteristics roots of a matrix are linearly independent.

ఒక మాత్రిక యొక్క విభిన్న లక్షణిక మూలాలకు అనురూపములైన లక్షణిక సదిశలన్నియు బూజు స్వాతంత్ర్యాలు అని చూపండి.



state and prove parallelogram law

సంకరచతుర్భుజ న్యాయమును వ్రాసి నిరూపించండి.

Prove that $\{(\frac{1}{3}, \frac{-2}{3}, \frac{-2}{3}), (\frac{2}{3}, \frac{-1}{3}, \frac{2}{3}), (\frac{2}{3}, \frac{2}{3}, \frac{-1}{3})\}$ is an orthonormal set in R^3 with standard inner product.

3 అంతరలబ్ధాంతరాళంలో ప్రమాణ అంతర లబ్ధం దృష్ట్యా

$\{(\frac{1}{3}, \frac{-2}{3}, \frac{-2}{3}), (\frac{2}{3}, \frac{-1}{3}, \frac{2}{3}), (\frac{2}{3}, \frac{2}{3}, \frac{-1}{3})\}$ లంబాభిలంబ సమితి అనిబూజువు చేయండి.

1. 2. 3.

SEMESTER-VI, PAPER-VII(A)
QUESTION PAPER PATTERN AND SCHEME(BLUE PRINT)

EASSY ANSWER TYPE
(5 QUESTIONS OUT OF 10 QUESTION
WITH INTERNAL CHOICE)

5X8=40MARKS

SHORT ANSWER TYPE
(5 QUESTIONS OUT OF 8 QUESTION)

5X4=20MARKS

NOTED: 3HOUR

TOPIC	E.Q	SAQ	MARKS ALLOTTED TO THE UNIT
	2	2	24
	2	1	20
	2	2	24
	2	1	20
	2	2	24

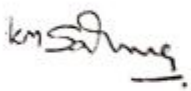
60MARKS

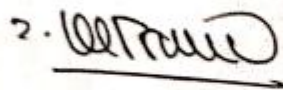
Total marks including choice : 112marks

INTERNAL ASSIGNMENT :40MARKS

GUIDELINES TO THE PAPER SETTER :

PER SETTESR IS REQUESTED TO COVER ALL THE UNITS AND ALSO REQUESTED TO GIVE QUESTION BASED
REMEMBERANCE UNDERSTANDING (80%) APPLICATION OR CREATIVITY (20%).

1. 

2. 

3. 

DR.V.S. KRISHNA GOVERNMENT DEGREE COLLEGE (A),
VISAKHAPATNAM
SEMESTER - VI END EXAMINATION
III BSC., MATHEMATICS, PAPER - VII(A) (CBCS)
Elective -VII(A): Numerical Analysis
w.e.f 2019-2020 (Revised October, 2018)

ME : 3HRS

SECTION -A

MAX MARKS : 60M

Answer all questions, each questions carries 8 marks

5x8 =40M

1. a) $u = \frac{4x^2y^2}{z^4}$ and errors in x, y, z be 0.001 compute the relative maximum error in u when $x=y=z=1$
 $u = \frac{4x^2y^2}{z^4}$ అయి x, y, z లలో దోషం 0.001 అయితే $x=y=z=1$ అయినప్పుడు u లో సాపేక్ష గరిష్టదోషం అంచనా వేయండి.

or

- b) Derive general error formula of a function of n variables
n చలరాశుల ప్రమేయంలో సాధారణ దోష సూత్రమును ఉత్పాదించండి.

2. a) using bisection method find a root of the equation $x^3 - x - 11 = 0$ correct to 3 decimal places
 $x^3 - x - 11 = 0$ యొక్క మూలాన్ని ద్విఖండన పద్ధతి ద్వారా 3 దశాంశములు వరకు సరించి కనుగొనుము.

or

- b) using Newton Raphson method, find the real root of the equation $3x = \cos x + 1$
 $3x = \cos x + 1$ యొక్క మూలాన్ని న్యూటన్ రాఫ్సన్ పద్ధతి ద్వారా కనుగొనుము.

3. a) prove the following నిరూపించండి

1) $\Delta - \nabla = \Delta \nabla = \nabla \Delta$

2) $1 + \Delta = E$

3) $1 - \nabla = E^{-1}$

4) $(1 + \Delta)(1 - \nabla) = 1$

5) $\Delta = \nabla E = E \nabla$

Or



Find the missing value from the following data

0	5	10	15	20	25
6	10	-	17	-	31

పెంచిన విలువలును కనుక్కోండి

State and prove Newton's forward interpolation formula న్యూటన్ పురోగమన అంతర్వేశన సూత్రము ప్రవచించి నిరూపించండి.

Using STRILING'S formula to evaluate $f(1.22)$ from the following data

x	1.0	1.1	1.2	1.3	1.4
$f(x)$	0.841	0.891	0.932	0.963	0.985

ఇవ్వబడినది నీర్లింగ్స్ సూత్రమును ఉపయోగించి $f(1.22)$ విలువలను కనుక్కోండి.

Derive Newton divided difference formula for interpolation

నిర్వచన విభాగిత భేద సూత్రమును అంతర్వేశనమునకు రాబెట్టుము

or

State and prove lagrange's formula

లాగ్రేజ్ సూత్రమును వ్రాసి నిరూపించండి

SECTION-B

Answer five questions, each question carries 4 marks $5 \times 4 = 20M$

Define absolute, relative and percentage errors.

సాపేక్ష, సాపేక్ష మరియు దోషశాతము నిర్వచించండి.

Choose appropriate numbers and write general error formula for interpolation.

అనువైన సంఖ్యలును నిర్వచించండి మరియు సాధారణ దోష సూత్రము అంతర్వేశనానికి వ్రాయండి.

Find cube root of 30 using bisection method.

30 యొక్క ఘనమూలమును కనుక్కోండి.

Show that $\Delta^n(a^{cx+d}) = (a^{ch} - 1)^n a^{cx+d}$ అని చూపండి.

Construct the backward difference table for the following data

Year (x) :	1891	1901	1911	1921	1931
Population f(x) :	46	66	81	93	101

పై డిఫరెన్స్ టేబుల్ తిరోగమన భేద పట్టికను తయారుచేయండి.

Show that $\Delta = \frac{1}{2}\delta^2 + \delta\left(1 + \frac{\delta^2}{4}\right)^{1/2}$ అని చూపండి.

Find the value of f(8), f(15) from the following table using Newton Divided difference formula.

x :	4	5	7	10	11	13
f(x) :	48	100	294	900	1210	2028

పై డిఫరెన్స్ టేబుల్ న్యూటన్ విభాగిత భేద సూత్రం ఉపయోగించి f(8), f(15) లను కనుక్కోండి.

State Lagrange's formula and define divided difference

గ్రాంజ్ సూత్ర మును వ్రాసి , విభాగిత భేదము నిర్వచించండి.

1. విభాగిత భేద

2. న్యూటన్ విభాగిత భేద

3.

న్యూటన్ విభాగిత భేద

SEMESTER-VI, PAPER-VII(B)

QUESTION PAPER PATTERN AND SCHEME(BLUE PRINT)

EASSY ANSWER TYPE

5X8=40MARKS

(5 QUESTIONS OUT OF 10 QUESTION
WITH INTERNAL CHOICE)

SHORT ANSWER TYPE

5X4=20MARKS

(5 QUESTIONS OUT OF 8 QUESTION)

60MARKS

OTED: 3HOUR

TOPIC	E.Q	SAQ	MARKS ALLOTTED TO THE UNIT
	2	1	24
	2	1	24
	2	2	20
	2	2	20
	2	2	20

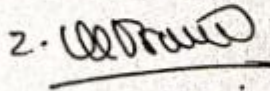
Total marks including choice : 112marks

INTERNAL ASSIGNMENT :40MARKS

GUIDELINES TO THE PAPER SETTER :

PAPER SETTER IS REQUESTED TO COVER ALL THE UNITS AND ALSO REQUESTED TO GIVE QUESTION BASED ON REMEMBRANCE UNDERSTANDING (80%) APPLICATION OR CREATIVITY (20%).

1. kkm Salma

2. 

3. 

DR. V.S. KRISHNA GOVERNEMENT DEGREE COLLEGE (A),
VISAKHAPATNAM

SEMESTER – VI

III BSC. MATHEMATICS, PAPER – VII(B)

Elective –VII(B) : Laplace Transforms

III B.Sc., Mathematics.

w.e.f 2019-2020 (Revised October, 2018)

TIME : 3 HRS

MAX. MARKS : 60 MARKS

SECTION-A

Answer all questions , each question carries 8 marks

5x8=40 Marks

- a) Suppose $f_1(s)$ and $f_2(s)$ are Laplace forms of $F_1(t)$ and $F_2(t)$ respectively then show that

$$L\{C_1 F_1(t) + C_2 F_2(t)\} = c_1 L\{f_1(t)\} + c_2 L\{f_2(t)\} \text{ Where } c_1 \text{ and } c_2 \text{ are any constants}$$

(OR)

- b) If $F(t)$ is a function of class A, then prove that Laplace transform of $F(t)$ exists

a) If $L\{F(t)\} = f(s)$ and $G(t) = \begin{cases} F(t-a), & t > a \\ 0, & t < a \end{cases}$ then show that $L\{G(t)\} = e^{-as} f(s)$

(OR)

b) If $L\{F(t)\} = f(s)$ then prove that $L\{F(at)\} = \frac{1}{a} f\left[\frac{s}{a}\right]$

a) If $L\{F(t)\} = f(s)$ then prove that $L\{t^n F(t)\} = (-1)^n \frac{d^n}{ds^n} f(s)$ for $n = 1, 2, 3, \dots$

(OR)

b) If $C(t) = \int_t^\infty \frac{\cos x}{x} dx$ then prove that $L\{C(t)\} = \frac{\log(s^2 + 1)}{2s}$



State and prove First shifting theorem for Inverse Laplace transforms

Find $L^{-1}\left\{\frac{s-2}{(s-2)^2+5^2} + \frac{s+4}{(s+4)^2+9^2} + \frac{1}{(s-2)^2+3^2}\right\}$

Prove that $L^{-1}\left\{\frac{P}{(p^2-2p+2)(p^2+2p+2)}\right\} = \frac{1}{2}(\sin t)(\sinh t)$

(OR)

State and prove the convolution theorem for inverse Laplace transforms

SECTION-B

Answer any five questions, each question carries 4 marks

5×4=20MARKS

Show that x^n is of exponential order as $x \rightarrow \infty$, n being any positive integer.

State and prove first shifting theorem for Laplace transforms.

Q2 $\int_0^\infty \frac{t}{\sqrt{\pi}} e^{-t^2} dt = \frac{1}{2}$ then prove that $L\left[\frac{1}{\sqrt{\pi t}}\right] = \frac{1}{p^{3/2}}$

Let $f(t) = \frac{2}{\sqrt{\pi}} \int_0^t e^{-x^2} dx$, then show that $L\{f(t)\} = \frac{1}{s\sqrt{s+1}}$

State and prove first shifting theorem for inverse linear transforms.

Show that $L^{-1}\left\{\frac{1}{(s^2+a^2)^2}\right\} = \frac{1}{2a^3}(\sin at - at \cos at)$

Apply the convolution theorem to show that $\int_0^t \sin u \cos(t-u) du = \frac{1}{2}(t \sin t)$

Using Heaviside's expansion formula find $L^{-1}\left\{\frac{2p^2+5p-4}{p^3+p^2-2p}\right\}$

Kkm Singh

2. Answered

3.

[Handwritten signature]

SEMESTER-VI, PAPER-VIII -A -1

QUESTION PAPER PATTERN AND SCHEME(BLUE PRINT)

EASSY ANSWER TYPE

5X8=40MARKS

(5 QUESTIONS OUT OF 10 QUESTION
WITH INTERNAL CHOICE)

SHORT ANSWER TYPE

5X4=20MARKS

(5 QUESTIONS OUT OF 8 QUESTION)

60MARKS

ATED: 3HOUR

PIC	E.Q	S A Q	MARKS ALLOTTED TI THE UNIT
	2	1	20
	2	1	20
	2	2	24
	2	2	24
	2	2	24

Total marks including choice : 112marks

INTERNAL ASSIGNMENT :40MARKS

GUIDELINES TO THE PAPER SETTER :

PER SETTESR IS REQUESTED TO COVER ALL THE UNITS AND ALSO REQUESTED TO GIVE QUESTION BASED
REMEMBERANCE UNDERSTANDING (80%) APPLICATION OR CREATIVITY (20%).

1. 100% 2. 100% 3. 100%

DR.V.S. KRISHNA GOVERNEMENT DEGREE COLLEGE (A),
VISAKHAPATNAM

III B.Sc SEMESTER – VI, Paper – VIII –A-1.

Advanced Numerical Analysis

(Cluster Elective)

w.e.f 2019-2020 (Revised October, 2018)

3HRS

MAX MARKS : 60M

SECTION –A

Questions are compulsory

Each question has an integral choice

Each question carries 8 marks

5x8 = 40M

1) Fit a parabola of the form $y = a + bx + cx^2$ to the following data

X	1	2	3	4	5	6	7
Y	23	5.2	9.7	16.5	29.4	35.5	54.4

దత్తాంశానికి $y = a + bx + cx^2$ రూపంలో పరావలయాన్ని అనుసంధానించండి.

or

Fit a straight line to the data given below

X	1	3	5	7	9
Y	1.5	2.8	4.0	4.7	6.0

దత్తాంశానికి సరళరేఖను సాధానించండి.

The following table of values of x and y is given

X	0	1	2	3	4	5	6
Y	6.9897	7.4815	7.7815	8.1291	8.4510	8.7506	9.0309

Find $\frac{dy}{dx}$ when i) $x=1$, $x=3$, (iii) $x=6$

Also find $\frac{d^2y}{dx^2}$ when $x=3$

X	0	1	2	3	4	5	6
Y	6.9897	7.4815	7.7815	8.1291	8.4510	8.7506	9.0309

(i) $x=1$, $x=3$ మరియు $x=6$



ను $\frac{dy}{dx}$ ను కనుక్కోండి $x=3$ అయిన $\frac{d^2y}{dx^2}$ ను కనుక్కోండి.

or

Given the following data find

X	0	2	3	4	7	9
Y	4	26	58	112	466	922

పద్ధతంశానికి $f^1(b)$ ను కనుక్కోండి?

1. a) State and prove general quadrature formula

సాంకేతిక క్షేత్ర కలన సూత్రము రాబెట్టుము.

or

b) Find the sum of squares of first n natural numbers by using Euler -Maclaurin's summation formula.

మొదట n సహజసంఖ్యల వర్గాల మొత్తానికి సూత్రాన్ని ఆయిలర్ - మెక్లారిన్ సంగకలన

సూత్రాన్ని ఉపయోగించి కనుక్కోండి.

2. a) solve the following system of equations by using factorisation method

$2x+y+z=2$; $x+3y+2z=2$; $3x+y+2z=2$ అను సమీకరణములను కారణాంకాల పద్ధతి

ద్వారా కనుగొనుము.

Or

b) using jacobi's method solve the system of equations $10x+2y+z=9$;

$x+10y-z=-22$; $-2x+3y+10z=22$ అను సమీకరణములను జాకోబి పద్ధతిద్వారా

కనుగొనుము.

5.a) solve the differential equations $\frac{dy}{dx} = \frac{y-x}{y+x}$ with $y(0) = 1$ by modifies Euler's

Method

సవరిత ఆయిలర్ పద్ధతినుపయోగించి $\frac{dy}{dx} = \frac{y-x}{y+x}$; $y(0) = 1$ సధించండి.

b) using Runge - Kuttamethod find $y(0.1)$ and $y(0.2)$ for the differential

equation $\frac{dy}{dx} = x+y^2$, $y(0) = 1$

$\frac{dy}{dx} = x+y^2$, మరియు $y(0) = 1$ వన $y(0.1)$ మరియు $y(0.2)$ విలువలను రంగా -

పట్టిక పద్ధతిని పయోగించి సాధించుము.

SECTION - B

Answer any five from the following eight questions

5x4 = 20M

Fit a straight line for the following data

X	6	7	7	8	8	8	9	9	10
Y	5	5	4	5	4	3	4	3	3

పై దత్తాన్ని సరళరేఖను సాధించండి.

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.5$ for the data.

X	1.5	2.0	2.5	3.0	3.5	4.0
Y	3.375	7.0	13.625	24.0	38.875	59.0

పై దత్తంకమును పయోగించి $x=1.5$ వద్ద $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ విలువలను కనుగొనుము.

Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's 3/8 rule taking $h = 1/6$

సింప్సన్ - 3/8 సూత్రమును ఉపయోగించి $\int_0^1 \frac{dx}{1+x^2}$ ను కనుక్కోండి ($h=1/6$)

Evaluate the integral $\int_4^{5.2} \log x dx$, using Weddle's rule.

వెడల్ సూత్రమును ఉపయోగించి $\int_4^{5.2} \log x dx$ ను కనుక్కోండి.

1. Solve the following system of equations by using matrix inversion method

$x+2y+z = 8$; $2x+3y+4z = 20$; $4x+3y+2z = 6$ అను సమీకరణమును మాత్రికా

విలోమ్యమును ఉపయోగించి సాధించుము.

2. Solve the following system of equation by using Gauss - Elimination

method. $2x+y+z=10$; $3x+2y+3z=18$; $x+4y+9z=16$ అను సమీకరణమును మాత్రికా

విలోమ్యమును ఉపయోగించి సాధించుము.

Using picard's method find a solution of the differential equation

$$y' = x + y^2; y(0) = 0$$

$y' = x + y^2; y(0) = 0$ యొక్క సాధనను పికార్డ్ పద్ధతిద్వారా కనుగొనుము.

Using Taylor's series of method find $y(0.1)$ for $\frac{dy}{dx} = x - y^2$ and $y(0) = 1$

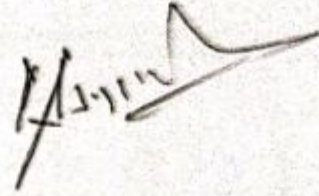
$y' = x - y^2$ మరియు $y(0) = 1$ అయిన $y(0.1)$ విలువను తైలర్ - శ్రేణి

పద్ధతినుపయోగించి సాధించుము.

1. కనుగొనుము

2. అనియును

3.



SECTION 4, PART 4-2

SECTION 4, PART 4-2 (CONTINUED)

SECTION 4, PART 4-2

SECTION 4, PART 4-2

SECTION 4, PART 4-2

SECTION 4, PART 4-2

SECTION 4, PART 4-2

SECTION 4, PART 4-2

SECTION 4, PART 4-2

SECTION 4, PART 4-2	SECTION 4, PART 4-2	SECTION 4, PART 4-2	SECTION 4, PART 4-2

SECTION 4, PART 4-2

SECTION 4, PART 4-2

SECTION 4, PART 4-2

SECTION 4, PART 4-2

SECTION 4, PART 4-2

SECTION 4, PART 4-2

DR.V.S. KRISHNA GOVERNEMENT DEGREE COLLEGE (A),
VISAKHAPATNAM

SEMESTER – VI, Paper – VIII –B-2.

Cluster Elective : VIII B-2 : Integral Transforms

III B.Sc Mathematics

w.e.f 2019-2020 (Revised October, 2018)

3HRS

MAX MARKS :

SECTION –A

all questions, each question carries 8 marks

5 x 8 = 40 M

i) Using laplace transform, find solution of

$$y'' + 25y = 10 \cos(5t), \text{ Where } y(0) = 2, y'(0) = 0$$

or

ii) solve $(D^3 + D^2 + 4D - 4)x = 68e^t \sin 2t$

$$x_0 = 1, x_1 = -19, x_2 = -37$$

a) solve $(D - 2)x - (D + 1)y = 6e^{3t}$

$$(2D - 3)x + (D - 3)y = 6e^{3t}$$

$$x(0) = 3, y(0) = 0$$

Or

b) solve : $\frac{\partial y}{\partial t} - 2 \frac{\partial^2 y}{\partial x^2}$ if $y(0,t) = 0 = y(5,t)$, $y(x,0) = 10 \sin 4\pi x$

a) solve the integral equation

$$f(t) = t + 2 \int_0^t \cos(t-u)F(u)du$$

or

b) solve $2 F(t) = 2 - t + \int_0^t F(t-u)F(u)du$

a) Find the Fourier transform of

$$f(x) = \begin{cases} x, & |x| \leq a \\ 0, & |x| \geq a \end{cases}$$



Or

c) state and prove Modulation Theorem

d) state and prove convolution theorem for Fourier transform.

Or

e) use parseval's identities to prove that

$$\int_0^{\infty} \frac{dt}{(a^2+t^2)(b^2+t^2)} = \frac{\pi}{2ab(a+b)}$$

SECTION - B

Answer any five questions, Each carries 4 marks

5 x 4 = 20M

6. using Laplace transform , solve

$$y'' + y = \cos x, \text{ where } y(0) = 0 = y'(0)$$

7. solve : $(D^2 + 3D + 2)x = 0$ and

$$x = x_0, Dx = x_1, \text{ at } t = 0$$

8. Find the bounded solution of

$$\frac{\partial y}{\partial x} = 2 \frac{\partial y}{\partial t} + y \text{ if } (y, 0) = 6e^{-3x}$$

9. Solve : $\int_0^t \frac{F(u)}{\sqrt{t-u}} du = 1 - t - t^2$

10. Find the fourier sine transform of

$$F(x) = \begin{cases} x & \text{for } 0 < x < 1 \\ 2-x & \text{for } 1 < x < 2 \\ 0 & \text{for } x > 2 \end{cases}$$

11. State and prove change of scale property for Fourier transform

12. Derive relationship between Fourier transform and Laplace Transform

13. Find the finite cosine transform of $(1 - \frac{x}{\pi})^2$