Annai Hajira Women's College

Melapalayam, Tirunelveli -627 005

(A Unit of As-Sathiq Educational Society)

(Affiliated to Manonmaniam Sundaranar University)

Department of Mathematics

UG-Programme

B. Sc., Mathematics

Choice Based Credit System

(with effect from the academic year 2021 – 2022 onwards)

Syllabus 2021 – 2024, 2022 - 2025

PO, PSO & COs of Mathematics

Course Code: MA

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UG - Programme - Course Structure under CBCS

B.Sc - Mathematics

(Applicable to the candidates admitted from the academic year 2021-2022 onwards)

FIRST SEMESTER

Sub - Code	Subject Title	Lecture Hours	Credits
C1TL11	Part I: Tamil	6	4
C2EN11	Part II: Communicative English -I	6	4
CMMA11	Core I : Calculus and Classical Algebra	6	4
CPPS11	Add on Major :Professional English for Physical Sciences– I	4	4
CAMA11	Allied I : Algebra and Differential Equations	6	4
CEVS11	Common : Environmental Studies	2	2
Total		**30**	**22**

SECOND SEMESTER

Sub - Code	Subject Title	Lecture Hours	Credits
C1TL21	Part I Tamil	6	4
C2EN21	Part II Communicative English -II	6	4
CMMA21	Core II : Differential Equations & Analytical Geometry of Three Dimensions	6	4
CPPS21	Add on Major : Professional English for Physical Sciences-II	4	4
CAMA21	Allied II : Vector Calculus and Fourier Series	6	4
CVBE21	Common : Value Based Education	2	2
Total		**30**	**22**

THIRD SEMESTER

Sub - Code	Subject Title	Lecture Hours	Credits
C1TL31	Part I: Tamil	6	4
C2EN31	Part II: English	6	4
CMMA31	Core III : Sequences and Series	6	4
CAST11	Allied II: Statistics – I	6	3
CSMA31	Skill Based Core: Vector Calculus	4	4
CNMA31	Non Major Elective : Mathematics for Competitive Examinations – I	2	2
CYOG31	Common : Yoga	2	2
Total		**32**	**23**

FOURTH SEMESTER

Sub - Code	Subject Title	Lecture Hours	Credits
C1TL41	Part I – Tamil	6	4
C2EN41	Part II – English	6	4
CMMA41	Core IV : Abstract Algebra	6	4
CAST21	Allied II : Statistics II	6	3
CSMA41	Skill Based Core : Trigonometry, Laplace Transforms and Fourier Series	4	4
CNMA41	Non Major Elective : Mathematics for competitive Examinations II	2	2
CCDE41	Common: Computers for Digital Era	2	2
C5EA41	Extension Activities : NCC/NSS/YRC/YWF/PE	-	1
Total		**32**	**24**

FIFTH SEMESTER

Sub - Code	Subject Title	Lecture Hours	Credits
CMMA51	Core V: Linear Algebra	5	4
CMMA52	Core VI : Real Analysis	5	4
CMMA53	Core VII : Statics	5	4
CMMA54	Core VIII : Integral Transforms and Z Transforms	5	4
CEMA52	Major Elective I : Discrete Mathematics	4	4
CEMA54	Major Elective II : Operations Research I	4	4
CCSB51	Skill Based Common : Personality Development	2	2
Total		**30**	**26**

SIXTH SEMESTER

Sub - Code	Subject Title	Lecture Hours	Credits
CMMA61	Core IX : Complex Analysis	5	4
CMMA62	Core X: Graph Theory	5	4
CMMA63	Core XI : Number Theory	4	4
CMMA64	Core XII : Dynamics	4	4
CMMA65	Core XIII : Numerical Methods	4	4
CEMA62	Major Elective III : Fuzzy Mathematics	4	4
CEMA64	Major Elective- IV : Operations Research II	4	4
Total		**30**	**28**

Programme Outcomes

On successful completion of the Undergraduate Program the graduates/ students will able to

	Programme Outcomes
PO1	Bachler's Degree in Mathematics is the culmination of in – depth knowledge of Algebra, Calculus, Geometry, Differential Equations and Several other branches of Mathematics. This also leads to study of related areas like computer science, Statistics. Thus, this program helps the learners in building a social foundation for higher studies in Mathematics.
PO2	The skills and knowledge gained has intrinsic beauty, which leads to proficiency in analytic reasoning. This can be utilized in modelling and solving real life problems.
PO3	Students undergoing this program learn to logically questions assertions, to recognise patterns and to distinguish between essential and irrelevant aspects of problems. They also share ideas and insights while seeking and benefitting from knowledge and insight of others. This helps them to learn behave responsibly in a rapidly changing independent society.
PO4	Students completing this program will be able to present Mathematics clearly and precisely, make vague ideas precise by formulating them in the language of Mathematics, describe mathematical ideas from multiple perspectives and explain fundamental concepts of Mathematics to non-mathematician.
PO5	Completion of this program will also enable the learners to join teaching profession in primary and secondary schools.
PO6	This program will also help students to enhance their employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

Programme Specific Outcome

After the completion of B.Sc., program in Mathematics, the students are able to have	
PSO1	**A Solid Foundation in Knowledge:** B. Sc., Degree is the culmination of depth knowledge of my core branches of Mathematics such as Calculus, Classical Algebra, Analytical Geometry, Differential Equations, Sequence and series, Abstract Algebra, Real and Complex Analysis, Number Theory, Mechanics, Operations Research, Statistics, Graph Theory, Discrete Mathematics, Trigonometry, Transforms and their Applications and C++/Python. Thus, this program helps students in creating a solid foundation for further higher studies and research in Mathematics.
PSO2	**A Competency in Skills:** The skills and knowledge gained have intrinsic logic which leads to proficiency in analytical reasoning critical understanding, analysis and synthetic in order to solve theoretical and practical problems. This can orient students towards applications of Mathematics in other disciplines and moreover, it can also be applied in modelling and solving the real-life problems.
PSO3	**Problem Solving Techniques:** Students undergoing this program learn to logically understand the question assertions to clarify the patterns and to evaluate the difference between the necessities and unnecessities of the problems which helps to analyze the problem clearly and to take correct decision for solving the problems.
PSO4	**Interdisciplinary and Research Skills:** Students completing this program will be able to create and present mathematical concepts clearly and precisely, to describe the mathematical ideas from multiple perspectives and to explain the fundamental concepts of mathematics people in a better manner.
PSO5	**A Proficiency in Employments:** The program will helps students build up with employability for government jobs, jobs in banking , insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

Course Outcome

FIRST SEMESTER

Part III: Core I Calculus and Classical Algebra

CO No.	Course Outcome	Knowledge Level
CO1	Apply the mathematical knowledge to analyze the properties of a curve such as curvature, radius of curvature, Involute and Evolute.	K3, K4
CO2	Classify double and triple integrals	K4
CO3	Identify Beta and gamma function and to apply the rules of beta and gamma function in evaluating double and triple integrals.	K3
CO4	Construct different types of equations and tofind the roots of the equations by Newton's Theorem	K1,K6
CO5	Solve the different types of reciprocal equations and to find the number of realroots using Descartes rule of signs.	K6

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	2
CO2	2	3	3	3	1
CO3	3	3	3	1	1
CO4	3	1	3	2	2
CO5	3	1	2	1	2
Total contribution of COs to PSOs	14	11	14	10	8
Weighted Percentage of COs contribution to PSOs	93.33	73.33	93.33	66.66	53.33

Part IV: Allied Paper I - Algebra and Differential equations

CO No.	Course Outcome	Knowledge Level
CO1	Construct different types of equations and to compare and to find the relationships betweenroots and coefficients.	K6, K1
CO2	Identify the transformation of equations andto find approximate solutions to equations by making use of Newton's Method and Korner's Method.	K3
CO3	Identify types of matrices and to find the characteristic equation of matrix. Eigen values and eigen vectors can be determined by applying Cayley Hamilton Theorem.	K3, K5
CO4	Distinguish the differential equations of first order and higher degrees and to identify the equations which are all solvable for p, x, y and the equations in the standard form Pp+Qq=R.	K3, K4
CO 5	Identify and distinguish Laplace transformation and inverse Laplace transformation	K3, K4

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	1	2
CO2	3	3	3	2	1
CO3	2	3	3	1	2
CO4	3	3	2	3	2
.CO5	2	2	3	2	2
Total contribution of COs to PSOs	13	13	14	9	9
Weighted Percentage of COs contribution to PSOs	86.6	86.6	93.3	60	60

SECOND SEMESTER

Part III Core II: Differential Equations and Analytical Geometry of Three Dimensions

CO No.	Course Outcomes	Knowledge Level
CO1	Solve the differential equations which are all solvable for x, y, p and Clairaut's form. Also, to illustrate the method of solving the differential equations of the form $f_1(D)x+g_1(D)y=h_1t$, $f_2(D),x+g_2(D)y = h_2(t)$.	K2,K6
CO2	Identify and solve the second order linear differential equation with constant coefficients and to interpret the linear equations of second orderwith variable coefficients.	K2, K3, K6
CO3	Analyze the 3D-co-ordinate systems and how to find the direction cosines and direction ratios.. Also to find the angle between planes, the length of the perpendicular and angle of bisection.	K1,K4
CO4	Find and classify the equation of lines in different forms and calculate the image of the point, image of a line andto distinguish lines and planes. The angle between the line and plane can be determined. coplanar lines can be shown and the shortest distance between	K1,K2,K5
CO5	The equations of spheres and circles of intersection can be interpreted.	K2,K4

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	1	2
CO2	3	2	3	2	1
CO3	3	3	2	3	2
CO4	2	3	3	2	1
CO5	3	1	2	1	1
Total contribution of Cos to PSOs	14	11	13	9	7
Weighted Percentage of COs contribution to PSOs	93.33	73.33	86.66	60	46.66

Allied Paper II: Vector Calculus & Fourier Series

CO No.	Course outcomes	Knowledge level
CO1	Analyze what is meant by vector differentiation and how to apply vector differentiation and its properties.	K4, K3
CO2	Evaluate the double and triple integrals.	K5
CO3	Analyze and apply vector integration. By making use of Vector integration line, surface and volume integrals can be interpreted.	K2, K3, K4
CO4	Analyze and apply Green's, Stokes and divergence theorems	K3
CO5	Determine the functions whether the functions are odd or even. By making use of these concepts half range series can be found out.	K3, K5

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	2	2
CO2	3	3	3	3	2
CO3	3	3	2	2	1
CO4	2	2	3	1	1
CO5	3	2	2	2	1
Total contribution of COs to PSOs	14	13	13	10	7
Weighted Percentage of COs contribution to PSOs	93.33	86.66	86.66	66.67	46.67

THIRD SEMESTER

PART III: Core III - Sequences and Series I

CO No.	Course Outcome	Knowledge Level
CO1	Analyse the real number system and also to classify rational and irrational numbers. To find the upper bounds, least upper bounds and maximum element and to elaborate triangle inequality and Cauchy-Schwartz Inequality.	K1,K2,K4
CO2	Categorize the sequences as bounded sequences, monotonic sequences,convergent sequences and divergent sequences. Also to find the algebra of limits	K1,K4
CO3	Demonstrate the behavior of monotonic sequences and to apply Cauchy's first limit theorem, Make use of Cauchy's Second limit theorem and Cesaro's Theorem. Construct subsequence and to explain Cauchy's general principle of convergence.	K2,K3,K6
CO4	Interpret the series and to apply n^{th} term test, Comparison test, Kummer's test, D'Alembert's ratio test, Raabe's test, Guass test and root test to compile the nature of the series.	K2, K3,K6
CO5	Analyse the alternating series. Apply the test for convergence for series of arbitrary terms. Also to identify the power series and to determine the radius of convergence.	K1,K3,K4,K5

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	2	2	3	3	1
CO3	3	3	2	3	2
CO4	3	1	3	2	2
CO5	3	1	2	1	2
Total contribution of COs to PSOs	14	10	13	12	10
Weighted Percentage of COs contribution to PSOs	93.33	66.67	86.67	0.8	66.67

Allied Paper –II: Statistics –I

CO No.	Course Outcomes	Knowledge Level
CO1	Find and relate the concepts of moments, skewness and kurtosis and to demonstrate the method of least squares and to classify parabolic, exponential and logarithmic curves.	K1,K2,K3
CO2	Interpret correlation and regression and to illustrate Karl'sPearson'scoefficientofcorrelationandalsothelinesofregressionandcoefficientofregression	K2
CO3	Develop the statistical techniques used in the theory of attributes and to analyze consistency of data and criteria independence and to interpret Yule's coefficient of association.	K3,K4
CO4	Explain distribution function and its properties, able to find mathematical expectation and to find the cumulants using generating function.	K2
CO5	Distinguish discrete and continuous probability distributions and to construct binomial, Poisson distribution	K4,K6

K1-Remember,K2-Understand,K3-Apply,K4-Analyze,K5-Evaluate,K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	2	1
CO2	3	2	3	3	2
CO3	2	2	3	2	1
CO4	2	1	2	1	1
CO5	3	2	3	2	2
Total contribution of Cos to PSOs	13	9	14	10	7
Weighted Percentage of Cos contribution To PSOs	86.66	60	93.33	66.67	46.66

Skill Based core - Vector Calculus

CO No.	Course Outcome	Knowledge Level
CO1	Classify the vector point function and scalar point function. Determine the derivative of a vector and derivative of product of scalar and vector function.	K2,K5
CO2	Find divergence, curl. Make use of the Laplacian operator.	K1,K3
CO3	Interprettheintegrationofpointfunctionandtoillustratelineintegral .Tosolvesurfaceintegral.	K5,K6
CO4	Analyze and solve the volume integral. Also to illustrate and make use of Guass Divergence Theorem to solve problems.	K2,K3,K6
CO5	To solve problems based on Green's theorem and Stoke's Theorem	K6

K1-Remember,K2-Understand,K3-Apply,K4-Analyze,K5-Evaluate,K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	1	3
CO2	2	2	3	2	1
CO3	3	3	3	3	2
CO4	3	1	2	2	1
CO5	1	1	2	3	3
Total contribution of Cos to PSOs	12	10	13	12	10
Weighted Percentage of Cos contribution To PSOs	80	66.67	86.67	80	66.67

PART IV

Non-Major Elective Paper I

Mathematics for Competitive Examinations - I

CO No.	Course Outcome	Knowledge Level
CO1	Interpret simplification and find averages	K1, K2
CO2	Determine ratio and proportion	K5
CO3	Assess partnership and solve percentage problems	K4,K5
CO4	Distinguish profit and loss	K4
CO5	Solve problems on numbers	K6

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	2	3	3	1
CO3	2	3	2	3	2
CO4	3	1	3	2	2
CO5	1	1	1	3	2
Total contribution of COs to PSOs	12	10	12	14	10
Weighted Percentage of COs contribution to PSOs	80	66.67	80	93.33	66.67

FOURTH SEMESTER

Part III Core IV - Abstract Algebra

CO No.	Course Outcome	Knowledge Level
CO1	Explain the definitions of groups and itsexamples. Also to determine the order of an element. Illustrate about subgroups.	K2,K4
CO2	Interpret cyclic groups and to find the generators of cyclic subgroups. Illustrate and apply Lagrange's Theorem, Euler's Theorem and Fermat's Theorem.	K1,K3,K6
CO3	Elaborate about Normal Subgroups and group homomorphism. Illustrate Isomorphism, Automorphism . Also to apply Cayley's theorem wherever required.	K4,K5
CO4	Compare and classify Rings and its types. Illustrate about Integral domain andFields. To summarize about maximal and minimal ideals.	K1,K6
CO5	Utilize the concept of homomorphism and isomorphism on rings. Also to find kernel ofhomomorphism and to make use of fundamental theorem.	K3,K5

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	2	2	3	3	3
CO3	3	3	2	2	2
CO4	2	1	3	1	2
CO5	2	2	2	1	2
Total contribution of COs to PSOs	12	11	13	10	12
Weighted Percentage of COs contribution to PSOs	80	73.33	86.67	66.67	80

Allied Paper II Statistics II

CO No.	Course Outcomes	Knowledge Level
CO 1	To list out the characteristics of index numbers and to find Laspeyer's and Paache's, Fisher and Bowley's Edgeworth's index numbers. The method to classify and analyse the unit test, commodity reversal test, time reversal test and circular tests can be shown.	K1, K2
CO2	Construct testing of hypothesis and to distinguish null hypothesis and alternative hypothesis. Type I and Type II errors can be classified. The level of significance and test of significance for large samples can be explained.	K2, K4, K6,
CO3	Identify the distributions such as t-distributions and F-distribution. By making use of t-test the single mean and difference of means can be found out. Variance ratio test based on Chi-Square distribution by making use of this the goodness of fit can be decided.	K1, K3,K5
CO4	To find analysis of variance. One way and two way classified data can be explained and to randomize block design. Latin squares can be analysed and constructed.	K1,K4,K5
CO5	To explain statistical quality control and its advantages. Process control can be illustrated by making use of this control chart, range chart, P-chart can be designed	K2,K3

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	1	1
CO2	3	3	3	3	2
CO3	3	2	2	3	2
CO4	2	3	2	3	3
CO5	3	2	3	2	1
Total contribution of COs to PSOs	14	12	13	12	9
Weighted Percentage of COs contribution to PSOs	93.33	80	86.66	80	60

Skill Based Core Paper –II
Trigonometry, Fourier Series, Laplace Transforms

CO No.	Course Outcome	Knowledge Level
CO1	Summarize about Trigonometry and to illustrate about the expansion of sin x, cosn x, $Sin^n x$, $Cos^n x$	K2,K3
CO2	Obtain the relationship between hyperbolic functions and circular function. Explain about inverse hyperbolic functions. To find summation of the series using C+ iS method.	K1,K4
CO3	Illustrate laplace transform	K5
CO4	Solved differential equations with constant coefficients by making use of Laplace Transforms.	K6
CO5	Solve problems based on Fourier series. Identify the odd and even functions and to deducehalf range series.	K3,K6

K1-Remember,K2-Understand,K3-Apply,K4-Analyze,K5-Evaluate,K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	2	2	3	3	3
CO3	3	3	2	2	2
CO4	3	2	3	1	2
CO5	3	3	1	1	1
Total contribution of Cos to PSOs	14	13	12	10	11
Weighted Percentage of COs contribution to PSOs	93.33	86.67	80	66.67	73.33

PART IV: Non-Major Elective

Mathematics for Competitive Examinations – II

CO No.	Course Outcome	Knowledge Level
CO1	Analyse and solve the problems based on simple interest and compound interest.	K2,K6
CO2	Apply short tricks on solving time and work problems	K3
CO3	Making use of the concept of time and distance while solving problems	K5
CO4	Utilize Chain rule	K4
CO5	Find solutions for pipes and Cistern problem	K1

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	2	2	3	3	3
CO3	3	3	2	2	2
CO4	3	2	3	2	3
CO5	3	3	1	3	3
Total contribution of COs to PSOs	14	13	12	13	14
Weighted Percentage of COs contribution to PSOs	93.33	86.67	80	86.67	93.33

FIFTH SEMESTER

Part – III Core -V

Linear Algebra

CO No.	Course Outcome	Knowledge Level
CO1	Explain the definitions and general properties of vector spaces. Also to explain subspace. They know where to apply fundamental theorem of homomorphism.	K1,K2
CO2	Determine the span of a set and to check whether the given set is Linearly dependent or not. Also to find basis and dimensions.	K4
CO3	Illustrate and apply Rank Nullity theorem. Explain the definitions and examples of inner product space. Apply Gram Schmidt Orthogonalization process.	K3,K6
CO4	Construct matrices and also to summarize the elementary transformations. Determine the Inverse of matrix and rank of a matrix. To make use of Cayley Hamilton Theorem.	K2,K6
CO5	Determine Eigen Values and Eigen Vectors .Identify bilinear forms and quadratic forms. Also to deduce Diagonal form from Quadratic form.	K4,K5

K1-Remember,K2-Understand,K3-Apply,K4-Analyze,K5-Evaluate,K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	2	2	3	3	1
CO3	3	3	2	3	2
CO4	2	1	3	2	2
CO5	2	2	2	1	3
Total contribution of Cos to PSOs	12	11	13	12	11
Weighted Percentage of Cos contribution to PSOs	80	73.33	86.67	0.8	73.33

Part – III Core -VI Real Analysis

CO No.	Course Outcome	Knowledge Level
CO1	Explain about Metric spaces and to construct an open ball. Also to interpretinterior	K1,K3
CO2	Interpret about closed sets and to findclosure. To determine limit points. Analyze about complete metric space. Discuss about Cantor's intersection theorem and Baire's Category theorem.	K2,K4
CO3	Summarize continuity. Illustrate about uniform continuity.	K3,K5
CO4	Explain about connectedness and to deduce the connected subsets of R. To obtain the relationship between connectedness and continuity.	K4,K6
CO5	Illustrate about compactness and to find the connected subsets of R. Illustrate and make use of Heine Borel Theorem. To determine the relationship between compactness and continuity.	K3,K6

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	2	2	3	3	1
CO3	3	3	2	3	2
CO4	1	2	3	2	2
CO5	1	2	2	3	3
Total contribution of COs to PSOs	10	12	13	14	11
Weighted Percentage of COs contribution to PSOs	66.67	80	86.67	93.33	73.33

PART iii Core – Vii

Statics

CO No.	Course Outcome	Knowledge Level
CO1	Explaintheforcesactingatapointandtoapplytheparallelogramlawoffforces, Triangle law of forces and Lami's theorem.	K2,K4
CO2	Interpret parallel forces and moments. Analyse the resultant of two parallel forces and the resultant of two unlike unequal parallel forces. To apply Varigon's theorem.	K1,K6
CO3	Summarize equilibrium of three forces acting on a rigid body and to illustrate three coplanar forces theorem and to make use of the above theorem to solve problems.	K3,K5
CO4	Explain about laws of friction. Also to determine the angle of friction and Illustrate about the equilibrium of a particle and to make use of the concepts to solve the problems.	K1,K2,K6
CO5	Interpret the equilibrium of strings. To deduce the equation of catenary and its geometrical properties.	K2,K4

K1-Remember,K2-Understand,K3-Apply,K4-Analyze,K5-Evaluate,K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	2	3	3	1
CO3	3	3	2	3	3
CO4	1	2	3	2	3
CO5	1	2	1	3	3
Total contribution of Cos to PSOs	11	12	12	14	13
Weighted Percentage of Cos contribution to PSOs	73.33	80	80	93.33	86.67

Core – VIII Integral Transforms and Z Transforms

CO No.	Course Outcome	Knowledge Level
CO1	Apply Fourier transforms and to explain the properties.	K2,K4
CO2	Solve problems on infinite Fourier cosineand Sine Transforms	K1,K6
CO3	Identify and solve Finite Fourier transfoms	K3,K5
CO4	Illustrate Z transforms and its properties.	K1,K2,K6
CO5	Utilize inverse Z transforms to solve difference equations.	K2,K4

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	2	3	3	1
CO3	1	3	2	2	3
CO4	2	2	3	1	3
CO5	2	3	2	2	3
Total contribution of COs to PSOs	11	13	13	12	13
Weighted Percentage of COs contribution to PSOs	73.33	86.67	86.67	80	86.67

Major Elective I : Discrete Mathematics

CO No.	Course Outcome	Knowledge Level
CO1	Illustrate and use the statements, notations and connectives Construct truth table and utilize conditional and biconditional statements.	K2,K3
CO2	Analyze and explain Predicate calculus.	K1,K4
CO3	Elaborate Groups and monoids. Also to develop Group codes	K6
CO4	Construct Lattices and special lattices. Analyze and explain Boolean algebra	K5
CO5	Convert From one form to another form (Decimal, Binary, Octal, and Hexadecimal). Evaluate Binary addition, subtraction multiplication and division.	K2,K6

K1-Remember,K2-Understand,K3-Apply,K4-Analyze,K5-Evaluate,K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	1	3
CO2	3	3	3	3	2
CO3	3	3	2	1	3
CO4	2	3	3	3	3
CO5	1	3	2	3	2
Total contribution of Cos to PSOs	12	14	13	11	13
Weighted Percentage of COs contribution to PSOs	80	93.33	86.67	73.33	86.67

Major Elective II : Operations Research I

CO No.	Course Outcome	Knowledge Level
CO1	Solve Linear Programming Problem bymaking use of Graphical method, Simplex method.	K4
CO2	Interpret the concept of duality. Classify primal and dual problems. Utilizing the concept of duality, solve problems on dual simplex method.	K3
CO3	Solve Transportation problems by making use of North – west corner rule, Matrix- Minima method, Vogel's Approximation rule. Evaluate Degeneracy and unbalanced transportation problems.	K2,K5
CO4	Determine the solution for Assignment problems.	K1,K6
CO5	Solve sequencing problems.	K5

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	1	3
CO2	2	1	2	3	3
CO3	2	1	2	3	2
CO4	2	3	1	3	3
CO5	3	3	2	3	3
Total contribution of COs to PSOs	12	11	10	13	14
Weighted Percentage of COs contribution to PSOs	80	73.33	66.67	86.67	93.33

SIXTH SEMESTER

Part – III Core – IX Complex Analysis

CO No.	Course Outcome	Knowledge Level
CO1	Explain analytic functions and determine the functions of a complex variables and to utilize Cauchy Reimann equations	K2,K3
CO2	Elaborate Bilinear Transformations and classify the elementary transformations. Also to find fixed points.	K4,K5
CO3	Illustratecomplexintegrationsandtomakeuseof Cauchy'sIntegralFormula	K1,K6
CO4	Explain series expansions and to determine Taylor's Series, Laurent's Series. Determine zeros of an analytic function.	K2,K6
CO5	Determine residues and to make use of Cauchy's Residue Theorem. Also to evaluate definite integrals	K4,K5

K1-Remember,K2-Understand,K3-Apply,K4-Analyze,K5-Evaluate,K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	2	2	2	3	1
CO3	3	3	3	3	2
CO4	1	2	2	2	2
CO5	1	2	1	1	3
Total contribution of COs to PSOs	10	12	11	12	11
Weighted Percentage of Cos contribution To PSOs	66.67	80	73.33	80	73.33

Part III Core – X Graph Theory

CO No.	Course Outcome	Knowledge Level
CO1	Construct graph and to explain its definition. Determine degrees. Also to performoperations on graph	K2,K3
CO2	Classify degree sequence and graphicsequence. Illustrate connectedness, compactness and connectivity.	K4,K5
CO3	Construct Eulerian Graphs and Hamiltonian graphs. Elaborate the characterizations of trees and to find centre of a tree.	K1,K6
CO4	Interpret Planar graphs and to determine chromatic numbers and chromatic index.	K2, K6
CO5	Explain Chromatic Polynomials and the properties of digraphs.	K4

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	2	2	3	3	1
CO3	1	3	2	3	2
CO4	2	2	1	1	2
CO5	1	2	1	1	3
Total contribution of Cos to PSOs	9	12	10	11	11
Weighted Percentage of COs contribution to PSOs	60	80	66.67	73.33	73.33

Part III Core –XI: Number Theory

CO No.	Course Outcome	Knowledge Level
CO1	Explain Peano's theorem and to utilize mathematical induction. Also to make use of binomial theorem	K1,K5
CO2	Illustrate Division Algorithm. Determine GCD. To deduce the Diaphantine equation ax+by=c	K3,K5
CO3	Interpret the fundamental theorem of arithmetic. Explain The Sieve of Eratosthenes and to use Goldbach Conjecture.	K2,K6
CO4	Summarize the basic properties of congruences and to apply Chinese Remainder Theorem	K2,K4
CO5	Elaborate Fermat's Theorem, Wilson's Theorem and to apply Kraitchik Factorization Method.	K6

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	2	2	3	3	1
CO3	1	3	2	3	2
CO4	2	2	1	1	2
CO5	1	2	1	1	3
Total contribution of Cos to PSOs	9	12	10	11	11
Weighted Percentage of COs contribution to PSOs	60	80	66.67	73.33	73.33

Part III Core – XII Dynamics

CO No.	Course Outcome	Knowledge Level
CO1	Illustrate projectiles and to find the equation of path, range and maximum height and time of flight.	K2,K3
CO2	Elaborate about the collision of elastic bodies. Interpret law of impact and classify direct and oblique impact.	K1,K4
CO3	Determine simple harmonic motion in a straightline. Summarize the composition of SHM of the same period in the same line and along two perpendicular directions.	K2,K6
CO4	Interpret motion under the action of central forces. Derive velocity and acceleration in polar coordinates.	K5,K6
CO5	Obtain the differential equation of central orbit. Also to deduce the pedal equation of central orbit.	K3,K6

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	2	2	3	3	2
CO3	3	3	2	3	2
CO4	2	2	3	1	2
CO5	2	2	2	1	3
Total contribution of COs to PSOs	12	12	13	11	12
Weighted Percentage of COs contribution to PSOs	80	80	93.33	73.33	80

Part III Core – XIII Numerical methods

CO No.	Course Outcome	Knowledge Level
CO1	Obtain solution for numerical algebraic and transcendental equations by making use of various methods.	K1,K3,K4
CO2	Find finite difference for first and higher order differences. To classify forward and backward differences.	K2,K6
CO3	To apply interpolation formula in Newton's Forward and backward, Guass Forward and backward formula.	K5,K6
CO4	Make use of numerical differentiation and integration in Newton's forward &backward differences for differentiation. Also to utilize Trapezoidal rule and Simpson's 1/3 and 3/8rule.	K3,K4
CO5	Solve Difference equations and to determine the order and degree of difference equation. Solve linear difference equation and find complementary function and to deduce particular Integral of the function.	K1,K6

K1-Remember,K2-Understand,K3-Apply,K4-Analyze,K5-Evaluate,K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	3	3	3
CO2	2	2	3	3	1
CO3	2	3	2	3	2
CO4	2	2	2	3	2
CO5	1	2	2	2	3
Total contribution of Cos to PSOs	9	12	12	14	11
Weighted Percentage of Cos contribution to PSOs	73.33	80	80	93.33	73.33

Major Elective III Fuzzy Mathematics

CO No.	Course Outcome	Knowledge Level
CO1	Explain Crisp sets and fuzzy sets and illustrate the characteristics and significance of Paradigm Shift.	K1,K2
CO2	Elaborate the Additional properties of α cuts and the extension principle for fuzzy sets.	K1,K4
CO3	Perform fuzzy set operations. Also to determine fuzzy complements, fuzzy intersections and fuzzyunions.	K5,K6
CO4	Determine fuzzy numbers and Linguistic variables. Apply arithmetic operations on intervals and on fuzzy numbers. Construct lattice of fuzzy numbers.	K2,K3,K4
CO5	Analyze and classify fuzzy decision making, individual decision making, Multi person decisionmaking problems.	K5,K6

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PO mapping (Course Articulation Method)

PSOs / Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	3	3	3
CO2	2	1	3	3	1
CO3	2	1	2	3	2
CO4	1	2	2	3	2
CO5	2	2	1	2	3
Total contribution of COs to PSOs	9	9	11	14	11
Weighted Percentage of COs contribution to PSOs	60	60	73.33	93.33	73.33

Major Elective IV Operations Research II

CO No.	Course Outcome	Knowledge Level
CO1	Interpret the games and strategies. Solve two persons zero sum games. Make use of mixed strategies and dominance property.	K2,K3
CO2	Analyze the replacement of items that deteriorate with time. Illustrate replace montage of a machine taking money value into consideration and elaborate there placement of items that completely fail suddenly and Staffing problems.	K1,K5
CO3	Explain the queuing models and to classify into (M/M/1:FCFS), (M/M/1:∞/FCFS), (M/M/S:/FCFS)	K4,K6
CO4	Compose net work scheduling using PERT/CPM. Explain the rules of network construction. Make use of PERT calculation.	K2,K3
CO5	Analyse and solve inventory control problems.	K5,K6

K1-Remember,K2-Understand,K3-Apply,K4-Analyze,K5-Evaluate,K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	3	2	3
CO2	2	1	3	2	1
CO3	2	1	2	2	2
CO4	2	2	2	2	1
CO5	1	2	1	1	3
Total contribution of Cos to PSOs	9	9	11	9	10
Weighted Percentage of Cos contribution To PSOs	60	60	73.33	60	66.67

16/8/2021

Signature of the HoD

Head of the Department of
Mathematics
Annai Hajira Women's College
Melapalayam

16/8/21

Signature of the Principal

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