Allied Mathematics 2024- 2027 Batch

SCHEME OF THE PROGRAMME

S.No	Sem.	Class	Title	Inst. Hours	Credit	Exam hours	Marks		Total marks
							CIA	SE	
1		I.B.Sc (C.S) I.B.C.A I.B.Sc I.T	Numerical Methods	4	4	3	25	75	100
2	I	I.B.Sc(Chemistry), I.B.Sc(Physics), I.B.Sc(Geology)	Algebra, Analytical Geometry (3D) and Trigonometry	4	4	3	25	75	100
3		I M.Com	Operations Research	4	4	3	25	75	100
4		I.B.Sc(Chemistry), I.B.Sc(Physics), I.B.Sc(Geology)	Calculus and Fourier Series	4	3	3	25	75	100
5		I.B.Sc (C.S) I.B.C.A I.B.Sc I.T	Mathematical Statistics	4	4	3	25	75	100
6	II	I.B.Sc (C.S) I.B.C.A I.B.Sc I.T	Operations Research	4	4	3	25	75	100
7		I.B.Sc(Physics), I B.Sc(Geology), I B.Sc(Chemistry)	Differential equations and Transforms	4	4	3	25	75	100

Semester-I AC I Allied Mathematics for Chemistry, Physics &Geology	**ALGEBRA, ANALYTICAL GEOMETRY OF 3D AND TRIGONOMETRY**	Course Code:
Instruction Hours: 4	Credits: 4	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K1 -Recalling** **K2 -Understanding** **K3 -Applying** **K4 - Analyzing** **K5 - Evaluating** **K6 - Creating**
Course Objectives:	• To gain the knowledge about the summation of series • To find inverse of a matrix using Cayley Hamilton theorem. • To understand straight line and sphere • To know the expansion of sin $n\theta$, cosine $n\theta$ • To aquire the knowledge about hyperbolic and inverse hyperbolic functions.

UNIT	**CONTENT**	**HOURS**
Unit I	**BINOMIAL, EXPONENTIAL AND LOGARITHMIC SERIES.** Binomial, Exponential and logarithmic series (formulae only) - Summation and approximation related problems only. **Chapter3: Sec 10, Chap 4: Sec 3, 9**	**12 Hours**
Unit II	**MATRICES** Eigen values and Eigen Vectors - Verifications of Cayley – Hamilton's Theorem – Simple Problems. **Chapter 2: Sec 16.1-16.3**	**12 Hours**
Unit III	**THE RIGHT LINE AND THE SPHERE** Right line – Coplanar lines – conditions for the coplanarity of lines - Number of arbitrary constants in the equations of the straight line - the shortest distance between the two lines – Spheres – Definitions – the sphere through four given points – Equations of a circle. **Chapter 3: Sec 3.1,3.2, Chapter 4: Sec 4.1, 4.2 &4.3**	**12 Hours**
Unit IV	**EXPANSION OF TRIGONOMETRIC FUNCTIONS** Expansion of Sin θ ,Cos $n\theta$ and tan $n\theta$, $sin^n\theta$,$cos^n\theta$,$sin^m\theta cos^m\theta$– Simple problems. **Chapter 3: Sec 1,2,4,4.1**	**12 Hours**
Unit V	**HYPERBOLIC FUNCTIONS** Hyperbolic functions – Relations between hyperbolic functions and circular Trigonometry functions–Inverse hyperbolic functions – Simple problems. **Chapter 4: Sec 1,2,2.2&2.3**	**12 Hours**

Text Books:
1. T.K. Manickavasagam Pillai and S. Narayanan ,Algebra Volume IS.Viswanathan Printers and   Publishers Pvt. Ltd., Chennai, 1985.
2. Analytical geometry 3D and Vector Calculus, Arumugam and issac, edition 2017.
3. T.K. ManickavasagamPillai and S.Narayanan, "Trigonometr   y" S.ViswanathanPrintersand Publishers Pvt. Ltd., Chennai.
4. T.K. Manichavasagam Pillay and S.Narayanan , Algebra volume II, S.V. Publication, Revised Edition, 1985.

Reference Books:
1. M.L. Khanna., Algebra, Edition 4 ,Jai Prakash Nath Publications, 1957.
2. S.Arumugam and ThangaPandiIssac, Trignometry and Fourier series, New gamma Publications, 1999.

Web- Resources:
- http://www.gacariyalur.ac.in/econtent/maths/ug/UG-I-16SACMA1-Allied-Mathematics.pdf
- https://www.google.com/search?client=firefox-b-d&q=%E2%80%A2+https%3A%2F%2Fwww.sakshieducation.com%2FEngg%2FEnggAcademia%2FCommonSubjects%2FMathMethods-Fourier_Series.pdf++

Course Outcomes:
   On completion of the course the learner will be able

CO 1:	to know the relation between binomial exponential and summation of series.
CO 2:	to analysis and evaluate the eigen values and eigen vectors.
CO 3:	to recognize three dimensional shapes in the world around them
CO 4:	to finding trigonometric functions using definition and identities.
CO 5:	to apply the formulas for derivatives and integrals of the hyperbolic and inverse hyperbolic functions

Semester-II AC II Allied Mathematics for Chemistry, Physics &Geology	**CALCULUS AND FOURIER SERIES**	Course Code:
Instruction Hours: 6	Credits: 3	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K1 -Recalling** **K2 -Understanding** **K3 -Applying** **K4 - Analyzing** **K5 - Evaluating** **K6 - Creating**
Course Objectives:	• To differentiate the given functions using Leibnitz's theorem. • To introduce the notion of curvature, radius of curvature and Jacobians. • To integrate simply by changing the order of the given integration. • To acquire the knowledge of solving definite integrals. • To gain the knowledge of Fourier series.

UNIT	CONTENT	HOURS
Unit I	**DIFFERENTIATION** Differentiation- The nth derivative of standard functions-Leibnitz's Theorem for nth derivative of a product of functions (Statement Only) –Simple Problems. **Chapter 3: Sec 1.1- 1.6, 2.1-2.2**	**12Hours**
Unit II	**CURVES** Curvature– Radius of curvature in Cartesian only -Total Differential Coefficients-Jacobians of two and three variables–Simple Problems. **Chapter 10 : Sec 2.1-2.4,2.6**	**12Hours**
Unit III	**DEFINITE INTEGRALS AND INTEGRATION BY PARTS** General properties of definite integrals – Evaluation of definite integrals – Integration by parts **Chapter 1: sec 11, 12**	**12Hours**
Unit IV	**REDUCTION FORMULA** **Reduction formula** (where n is a positive integer) for 1). $\int_a^b e^{ax} x^n dx$ 2).$\int_a^b sin^n x dx$ 3).$\int_a^b cos^n x dx$ 4). $\int_0^x e^{ax} x^n dx$ 5).$\int_a^{\frac{\pi}{2}} sin^n x dx$ 6). Without proof $\int_a^{\frac{\pi}{2}} sin^n x\, cos^m x dx$ - and illustrations. **Chapter 1 : Sec 13.1-13.5**	**12Hours**
Unit V	**FOURIER SERIES** Definition of Fourier Series – Finding Fourier Coefficients - Use of Odd and Even functions in evaluating Fourier Coefficients – Half range sine & cosine series **Chapter 6 : Sec 1-5**.	**12Hours**

Text Book:

1.T.K. Manickavasagam Pillai and S.NarayananCalculusVol -I, S.Viswanathan Printers and Publishers Pvt. Ltd.,Chennai,2011.

2. T.K.Manickavasagam Pillai and S.Narayanan Calculus vol –II, S.Viswanathan Printers and Publishers Pvt.Ltd.,Chennai, 2011.

3. . T.K.Manickavasagam Pillai and S.Narayanan Calculus vol –III, S.Viswanathan Printers and Publishers Pvt.Ltd.,Chennai, 2011.

Reference Books:

1. S.Arumugam, Calculus, New Gamma Publishing House, Palayamkottai, 2001.
2. An Introduction to Laplace Transforms and Fourier Series ,April 2014 by Phil Dyke

Web- Resources:
- http://www.gacariyalur.ac.in/econtent/maths/ug/UG-I-Allied-Maths-Calculus.pdf
- https://www.sakshieducation.com/Engg/EnggAcademia/CommonSubjects/MathMethods-Fourier_Series.pdf

Course Outcomes:
On completion of the course the learner will be able

CO 1:	to calculate the nth derivatives of the function
CO 2:	to sketch curves in Cartesian coordinate systems.
CO 3:	to apply the reduction formulae for finding integration.
CO 4:	to find the area by changing the given order of integration.
CO 5:	to calculate the Fourier coefficients

Semester-II AC III Allied Mathematics for Chemistry, Physics &Geology	**DIFFERENTIAL EQUATIONS AND TRANSFORMS**	Course Code:
Instruction Hours: 4	Credits: 4	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K1 -Recalling K2 -Understanding K3 -Applying K4 - Analyzing K5 - Evaluating K6 - Creating**	
Course Objectives:	• To study the concepts of linear equations. • To study the basic concepts of partial differential equations. • To understand the concepts of Laplace Transform. • To find the inverse Laplace transform of the given functions. • To gain the knowledge of vectors	
UNIT	**CONTENT**	**HOURS**
Unit I	**LINEAR EQUATIONS WITH CONSTANT** **COEFFICIENTS** Linear equations with constant coefficients –Evaluation of particular integral of x^k where k is a positive integer and $e^{ax}f(x)$, – Simple Problems. **Chapter II : Sec1-4**	**12Hours**
Unit II	**PARTIAL DIFFERENTIAL EQUATIONS** Partial differential Equations –Formation of equations by elimination of constants and arbitrary functions- Definition of General, Particular, Complete and singular integral (Geometrical meaning not expected) –**Chapter IV:Sec 2.1, 2.2, 3, 4**	**12Hours**
Unit III	**LAGRANGE'S METHOD** Lagrange's method of solving the linear equations (Pp+Qq=R) – Simple Problems - Solutions of first order equations of the standard forms F(p,q)=0, F(x,p,q)=0, F(y,p,q)=0, F(z,p,q)=0, F(x,p)=F(y,q) -Clairaut's form –Simple Problems. **Chapter IV : Sec 5.1 – 5.4 &6.1**	**12Hours**

Unit IV	**LAPLACE TRANSFORM** Definition – Laplace transform of functions e^{at}, cosat, sinat, $t^n$where n is a positive integer –Shifting theorems –Laplace transform of $e^{-at}f(t)$ –Laplace transform of e^{-at} cosbt, e^{-at}sinbt and $e^{-at}f(t)$ – Laplace transform of $f^{'}(t)$ and $f^{''}(t)$ –Simple Problems. **Chapter V :Sec 1 -5**	**12Hours**
Unit V	**INVERSE LAPLACE TRANSFORM** Inverse transform of standard forms –Application to the solution of ordinary differential equations with constant coefficient involving the above transformations –Simple Problems. **Chapter V: Sec 6-9**	**12Hours**

Text Books:

1. T.K. Manickavasagam Pillai and S.NarayananCalculusVol –II
2. I, S.Viswanathan Printers and Publishers Pvt. Ltd.,Chennai,2011

Reference Books:

1. M.L.Khanna, Differential equations, Jai Prakash Nath&Co,Meerut, 14thEdition.
2. M.K.Venkatraman, Engineering Mathematics (Volume II),National Publication & Co 1983.

Web-Resources:

- https://www.math.ust.hk/~machas/differential-equations.pdf
- https://web.stanford.edu/~boyd/ee102/laplace.pdf

Course Outcomes:
On completion of the course the learner will be able

CO 1:	to solve the linear differential equations
CO 2:	to find the complete solution of partial differential equations.
CO 3:	to find the Laplace transform of the given functions
CO 4:	to solve the ordinary differential equations using inverse Laplace transform.
CO 5:	to make the students gain wide knowledge in vectors

Semester-I AC I Allied Mathematics for CS, B.C.A& IT	**Numerical Methods**	Course Code:
Instruction Hours: 4	Credits: 3	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K1 -Recalling** **K2 -Understanding** **K3 -Applying** **K4 - Analyzing** **K5 - Evaluating** **K6 - Creating**
Course Objectives:	• To introduce the various topics in Numerical methods. • To make understand the fundamentals of algebraic equations. • To apply interpolation and approximation on examples. • To solve problems using Numerical Differentiation and integration. • To solve linear systems, numerical solution of ordinary differential equations.

UNIT	CONTENT	HOURS
Unit I	**FUNDAMENTALS OF ALGEBRAIC EQUATION:** Solution of algebraic and transcendental equations-Bisection method- ,Newton Raphson method –linear system of equations – Gauss elimination method . **Chapter2:Sec2.1,2.2,2.5 Chapter 6: Sec 6.3.2**	12 Hours
Unit II	**INTERPOLATION AND APPROXIMATION:** Gauss Jacobi and Gauss Seidal –Interpolation with unequal intervals : Lagrange's interpolation . **Chapter 6: Sec 6.4 Chapter 3:Sec 3.9,3.9.1**	12 Hours
Unit III	**INTERPOLATION WITH EQUAL INTERVAL:** Interpolation with equal intervals-Newton's forward and Backward difference formula **Chapter 3:Sec 3.6**	12 Hours
Unit IV	**NUMERICAL DIFFERENTIATION AND INTEGRATION :** Numerical integration using Trapezoidal, Simpon's 1/3 rule, Simpon's3/8 rule **Chapter5: 5.4, 5.4.1, 5.4.2, 5.4.3**	12 Hours
Unit V	**INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS :** Taylor's series method –Euler's method –Runge Kutta method for solving 2nd order equations **Chapter 7:Sec 7.2,7.4,7.5**	12 Hours

Text Books:
1. S.S.Sastry, Introductory Methods of Numerical Analysis, 3rd Edition Prentice Hall of India, New Delhi, 1998 **.**

Reference Books:

1. M.K.Jain, S.R.K. Iyengar and R.K. Jain,Numerical Methods for Scientific and Engineering Computation, New Age International Private Limited, 2001.
2. M.K.Venkatraman, Numerical methods in Science and Engineering, National Publisher Company, Fifth Edition, 2001.

Web- Resources:

- https://en.wikipedia.org/wiki/Runge%E2%80%93Kutta_methods
- https://www.bmj.com/about-bmj/resources-readers/publications/statistics-square-one/11-correlation-and-regression

Course Outcomes:
On completion of the course the learner will be able

CO 1:	Know how to solve various problem s on numerical methods
CO 2:	Use approximation to solve problems.
CO 3:	Differentiation and Integration concept are applied
CO 4:	Apply direct methods for solving linear systems
CO 5:	Numerical solution of ordinary differential equations

Semester-II AC III Allied Mathematics for CS, B.C.A & IT	**OPERATIONS RESEARCH**	Course Code:
Instruction Hours: 4	Credits: 3	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K1 -Recalling** **K2 -Understanding** **K3 -Applying** **K4 - Analyzing** **K5 - Evaluating** **K6 - Creating**	
Course Objectives:	● To find the solution of the LPP using graphical method ● To understand different types of LPP ● To solve transportation problem using various methods. ● To train the students to solve the sequencing problem. ● To explore the concepts of Network analysis.	
UNIT	**CONTENT**	**HOURS**
Unit I	**LPP-GRAPHICAL SOLUTION METHOD** Operations Research : Introduction – Nature and Characteristic features of OR- OR and decision making - Linear programming formulations and graphical solution of two variables- Canonical and Standard forms of LPP . **Chapter 1 :Sec 1.1,1.2,1.7 and Chapter 2 :Sec 2.1 - 2.2**	**12 Hours**
Unit II	**LPP-SIMPLEX METHOD** Simplex method : Simplex method for <,=,> constraints – Charner's method of penalties – Two phase simplex method . **Chapter 3 : Sec 3.1,3.3,3.5**	**12 Hours**
Unit III	**TRANSPORTATION PROBLEMS** Mathematical formulation of the problem – Degeneracy Transportation problem – Transportation Algorithm – Unbalanced Transportation Problem- Assignment algorithm – Unbalanced Assignment problems. **Chapter 6 :Sec 6.1,6.2,6.5,6.7 to 6.9**	**12 Hours**
Unit IV	**SEQUENCING PROBLEMS** Processing of n jobs through two machines – Processing of n jobs and k machines – Processing of 2 jobs and through m machines. **Chapter 10 :Sec 10.1 - 10.5**	**12 Hours**
Unit V	**NETWORK SCHEDULING BY PERT/CPM** Network – Rules of Network construction – Time calculations in Networks – CPM computation – PERT computation. **Chapter 21 :Sec 21.1 - 21.7**	**12 Hours**

Text Book:
1. KantiSwarup , P.K. Gupta and Man Mohan, Operations Research, Sultan Chand and Sons , Educational Publishers , New Delhi, 2002.

Reference Books:
1. V. Sundaresan, K. Ganesan, Resource Management Techniques, A.R. Publications, 2002 .
2. J.K.Sharma, Operations Research Theory and Applications, Macmillan India Ltd, 3rd edition, 2006.

Web- Resources:
- https://stemez.com/subjects/science/1HOperationsReseach/1HOperationsReseach.php
- https://www.acsce.edu.in›15...PDF
- https://web.stanford.edu›notesPDF

Course Outcomes:
On completion of the course the learner will be able

CO 1:	To formulate the given simplified description of a suitable real work problem as a linear programming models in general, standard and canonical forms.
CO 2:	to interpret different types of LPP.
CO 3:	to solve transportation and assignment problems
CO 4:	to understand the sequencing problem
CO 5:	to aquire the knowledge about network analysis.

Semester-II AC II Allied Mathematics for CS, B.C.A & IT	**STATISTICS**	Course Code:
Instruction Hours: 4	Credits: 3	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K1 -Recalling** **K2 -Understanding** **K3 -Applying** **K4 - Analyzing** **K5 - Evaluating** **K6 - Creating**	
Course Objectives:	• To find the solution of the LPP using graphical method • To understand different types of LPP • To solve transportation problem using various methods. • To train the students to solve the sequencing problem. • To explore the concepts of Network analysis.	
UNIT	**CONTENT**	**HOURS**
Unit I	**INTRODUCTION OF STATISTICS:** Definition of statistic- characteristics – Uses of statistic in statistics in commerce and business- Primary and secondary data- Definition method of collecting primary data- characteristics of Questionnaire- Sources of secondary data – Classification of data- objectives- Types of classification – Formation of frequency distribution (one way classification) Problem only.(**Chap 1: 1.5-1.11 , Chap 3: 3.2-3.7, Chap 5: 5.3-5.13**)	**12 Hours**
Unit II	**MEASURE OF CENTRAL TENDENCY:** Measure of central tendency - Characteristic of a good average- Arithmetic mean, medium, mode, geometric mean harmonic mean - Simple problems SPSS- Packages , operation and Uses. (**Chap7: 7.4-7.10,7.16-7.22, 7.29-7.35, 7.39-7.41,7.47-7.49**)	**12 Hours**
Unit III	**MEASURE OF DISPERSION:** Measure of dispersion – Range, Q.D, M.D, S.D and theirs coefficients – simple problem only . (**Chap8:8.4-8.20**)	**12 Hours**
Unit IV	**SKEWNESS AND LINEAR REGRESSION:** Skewness- Types and method – Karl Persons and Bowley's Coefficients of Skewness- Linear Regression: Definition – Regression lines X on Y and Y on X - Properties of Regression	**12 hours**

	Coefficient (without proof) – Simple problem. (**Chap 9:9.4-9.12, Chap 11:11.6-11.8**)	
Unit V	**SIMPLE CORRELATIONS:** Simple correlations - Definition – Types of Correlation - Methods of Correlations- Scatter diagram , Karl's Pearson's Coefficient of Correlation and Spearman's Rank correlation coefficient (Repeated & not repeated rank) Properties of Correlation coefficient (No proof) Simple problems. (**Chap 10: 10.2,10.4-10.11, 10.25-10.30**)	**12 Hours**

TEXTBOOK :

    S.P.Gupta , Statistical Method, Sultan Chand & Sons.

Semester-I-CC IV I .M.Com	**OPERATIONS RESEARCH**	Course Code:
InstructionHours:6	Credits: 4	ExamHours:3
InternalMarks-25	ExternalMarks-75	TotalMarks: 100

Cognitive Level	**K1-Recalling** **K2Understanding** **K3-Applying** **K4-Analyzing** **K5-Evaluating** **K6- Creating**
CourseObjectives:	• To find the solution of the LPP using graphical method • To understand different types of LPP • To solve transportation problem using various methods. • To train the students to solve the sequencing problem. • To explore the concepts of Network analysis.

UNIT	CONTENT	HOURS
Unit I	**LPP-GRAPHICALSOLUTIONMETHOD** OperationsResearch:Introduction–NatureandCharacteristicfeaturesofOR-ORanddecisionmaking-Linear programming formulations and graphical solution of two variables- Canonical and Standard forms of LPP. **Chapter1:Sec 1.1,1.2,1.7andChapter2:Sec 2.1- 2.2**	**18 Hours**
UnitII	**LPP-SIMPLEXMETHOD** Simplex method: Simplex method f or <,=,> constraints –Charner's method of penalties–Two phase simplex method. **Chapter3:Sec3.1,3.3,3.5**	**18 Hours**
Unit III	**TRANSPORTATIONPROBLEMS** Mathematical formulation of the problem – Degeneracy Transportation problem – Transportation Algorithm – Unbalanced Transportation Problem- Assignment algorithm – Unbalanced Assignment problems. **Chapter6:Sec6.1,6.2,6.5,6.7to6.9**	**18 Hours**
UnitIV	**SEQUENCINGPROBLEMS** Processing of n jobs through two machines–Processing of n jobs and k machines – Processing of 2 jobs and through m machines. **Chapter10:Sec10.1-10.5**	**18 Hours**
UnitV	**NETWORKSCHEDULINGBYPERT/CPM** Network–Rules of Network construction–Time calculations in Networks – CPM computation – PERT computation. **Chapter21:Sec21.1-21.7**	**18 Hours**

Text Book:

1.KantiSwarup,P.K.Guptaand ManMohan, Operations Research, SultanChand and Sons, Educational Publishers , NewDelhi,2002.

Reference Books:
1. V.Sundaresan,K.Ganesan,ResourceManagementTechniques,A.R.Publications,2002.
2. J.K.Sharma, Operations Research Theory and Applications, Macmillan
India Ltd, 3rdedition,2006.

Web-Resources:
- https://stemez.com/subjects/science/1HOperationsReseach/1HOperationsReseach.php
- https://www.acsce.edu.in›15...PDF
- https://web.stanford.edu›notesPDF

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