RAJA NARENDRA LAL KHAN WOMEN'S COLLEGE (AUTONOMOUS)

Proposed Syllabus of 4 years
Bachelor of Science (Honours) in Mathematics

[w.e.f 2024-25]

[under NEP-2020]

SEMESTER-II

Raja N.L Khan Women's College (Autonomous)
Gope Palace, Midnapore- 721 102, West Bengal

Semester – II

Course Type	Course Code	Course Details		L-T-P	Credit	Marks Distribution			
						IA	CA	ESE	Total
MAJOR-02	**MTMHMJ-201**	**Group-A**	**Classical Algebra**	3-1-0	4	10	5	60	75
		Group-B	**Vector Analysis-I**						
		Group-C	**History of Mathematics**						
SEC	**MTM SEC-02**		**Object Oriented Programming in C++**	2-1-0	3	5	5	40	50
MINOR-02	**MTM MI-201**	**Group-A**	**Classical Algebra**	3-1-0	4	10	5	60	75
		Group-B	**Vector Analysis-I**						

SEC-Skill Enhancement Course, L-T-P=Lecture-Tutorial-Practical, IA-Internal Assessment; CA-Class Attendance; ESE-End Semester Examination

MAJOR-02

Course Code: MTMHMJ-201
Course Title: Classical Algebra, Vector Analysis-I & History of Mathematics
Credit: 04
No of Lectures: 60 hours
Full Marks: 75

Credit-04

MTMHMJ-201: Classical Algebra, Vector Analysis-I& History of Mathematics

Group-A: Classical Algebra Marks: 28

Polar representation of complex numbers, nth roots of unity, De Moivre's theorem for rational indices and its applications. Exponential, logarithmic, trigonometric and hyperbolic functions of complex variable.

Theory of equations: Relation between roots and coefficients, transformation of equation, Descartes rule of signs, Application of Sturm's theorem, cubic equation (solution by Cardan's method) and biquadratic equation (solution by Ferrari's method)

Inequality: The inequality involving AM≥ GM≥ HM, Cauchy-Schwartz inequality

Group-B: Vector Analysis-I Marks:23

Triple product, Vector equation of straight line and plane, Solution of vector equation, applications to geometry and mechanics: concurrent forces, couple, work done, Lamis's theorem, introduction to vector functions, operations with vector-valued functions, limits and continuity of vector functions, differentiation and integration of vector functions of one variable, space curve and its properties. \

Group- C: History of Mathematics Marks:09

Pre historic mathematics, the historical period down to 1000 BC:

Contribution of India, Babylon and Egypt,

The period from 1000 B.C to 300 B.C: origin of Green mathematics, from Pythagoras to Plato, influence of Plato and Aristotal.

The period from 300 B.C to 500 A.M: the school of Alexandria, Euclid, Eratosthenes and Archimedis

The period from 500 AM to 1000 A.M: Contribution of India and China.

The orient from 1000 to 1500: India and China

The sixteenth century, the seventh century, Contributions of Indian Mathematicians, Copernicus, Galileo, Descartes, Pascal, Marquis De, L'Hopitals, Napier, Newton, Wallis, Leibnitz, Keplar, Bernoulli's, The contributions of mathematics for eighteenth century and after: Taylor, Maclurin, Sir William, De-Moivre, Rowan Hamilton, D'Alembert, Lagrange, Laplace, Legendre, Gauss, Jacobi, Weirstrass, Dedikind, Cantor, Euler.

Reference Books:

- Titu Andreescu and Dorin Andrica, Complex Numbers from A to Z, Birkhauser, 2006.
- David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.
- K.B. Dutta, Matrix and linear algebra.
- K. Hoffman, R. Kunze, Linear algebra.
- W.S. Burnstine and A.W. Panton, Theory of equations.
- Ghosh& Chakraborty, Vector , U.N Dhar and Sons Pvt Ltd
- S.K.Mapa, Higher Algebra, Sarat Book Publishing House

- M.R. Speigel, Schaum's outline of Vector Analysis
- Marsden, J., and Tromba, Vector Calculus, McGraw Hill.
- D.E Smith, History of Mathematics Vol-I &II, Dover Publication.

Learning Outcomes of the course

(a) Understand the importance of roots of real and complex polynomials and learn various methods of obtaining roots
(b) Familiarize with relations, equivalence relations, partitions and basic properties of numbers.
(c) Apply De Moivre's theorem to solve numerical Problems and determine the roots of polynomial equation
(d) Know about the vector triple product, differentiation and integration of a vector function.
(e) Find the vector equation of plane, straight line and application in mechanics
(f) Know about the Legendary Mathematicians in India, Babylon and Egypt and their contributions in mathematics in different period.

Skill Enhancement Course (SEC)

MTM SEC-201: Object Oriented Programming in C++

Course Code: MTM SEC-201
Course Title: Object Oriented Programming in C++
Credit: 03
No of Lectures: 40 hours
Full Marks: 50

Unit-I

Character set , Key words: if, while, do, for, int, char, float, etc. Data type: character, integer, floating point, etc. Variables, Operators: =, == ,!, <> , etc. (arithmetic, assignment, relational, logical, increment, etc.). Expressions: arithmetic and logical expressions. Standard input/output. Use of while, if-else, for, do - while, switch, continue, etc. Arrays, strings, user defined function. Header File.

Unit-II

Programming paradigms, characteristics of object oriented programming languages, brief history of C++, structure of C++ program, differences between C and C++, basic C++ operators, Comments, working with variables, enumeration, arrays and pointer with applications.

Unit-III

Objects, classes, constructor and destructors, friend function, inline function, encapsulation, data abstraction, inheritance, polymorphism, dynamic binding, operator overloading, method overloading, overloading arithmetic operator and comparison operators.

Reference Books:

- A. R. Venugopal, Rajkumar, and T. Ravishanker, Mastering C++, TMH, 1997.

- S. B. Lippman and J. Lajoie, C++ Primer, 3rd Ed., Addison Wesley, 2000.
- Bruce Eckel, Thinking in C++, 2nd Ed., President, Mindview Inc., Prentice Hall.
- D. Parasons, Object Oriented Programming with C++, BPB Publication.
- BjarneStroustrup, The C++ Programming Language, 3rd Ed., Addison Welsley.
- E. Balaguruswami, Object Oriented Programming In C++, Tata McGrawHill
- Herbert Scildt, C++, The Complete Reference, Tata McGrawHill.

Learning Outcomes of the course

After completion of the course, the student will learn the following

(a) Learn about the keywords, arithmetic operators, logical operators, intrinsic function in C language

(b) Understand the control statements like while statement, do while statement, if else statement, go to statement etc which are used to solve mathematical as well as numerical problems.

(c) Understand and apply the programming concepts of C++ which is important for mathematical investigation and problem solving.

(d) Use mathematical libraries for computational objectives.

MINOR-02

Course Code: MTM MI-201
Course Title: Classical Algebra, Vector Analysis-I
Credit: 04
No of Lectures: 60 hours
Full Marks: 75

Group-A: Classical Algebra Marks: 30

Polar representation of complex numbers, nth roots of unity, De Moivre's theorem for rational indices and its applications. Exponential, logarithmic, trigonometric and hyperbolic functions of complex variable.

Theory of equations: Relation between roots and coefficients, transformation of equation, Descartes rule of signs, Application of Sturm's theorem, cubic equation (solution by Cardan's method) and biquadratic equation (solution by Ferrari's method)

Inequality: The inequality involving AM≥ GM≥ HM, Cauchy-Schwartz inequality

Group-B: Vector Analysis-I Marks: 30

Triple product, Vector equation of straight line and plane, Solution of vector equation, applications to geometry and mechanics: concurrent forces, couple, work done, Lamis's theorem, introduction to vector functions, operations with vector-valued functions, limits and continuity of vector functions, differentiation and integration of vector functions of one variable, space curve and its properties.

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- Ghosh& Chakraborty, Vector , U.N Dhar and Sons Pvt Ltd
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(a) Understand the importance of roots of real and complex polynomials and learn various methods of obtaining roots
(b) Familiarize with relations, equivalence relations, partitions and basic properties of numbers.
(c) Apply De Moivre's theorem to solve numerical problems and determine the roots of polynomial equation
(d) Know about the vector triple product, differentiation and integration of a vector function and its application to mechanics
(e) Find the vector equation of plane, straight line and application in mechanics