

Lesson Plan for Course: B.Sc(H) Sem-I Code: MTMACOR01T Credit: 6

- Course Name: Calculus, Geometry and Ordinary, Differential Equation
- Course coordinator: Sudip Mondal
- Course Outcomes:
 - CO-1. To trace curve in two dimensional Cartesian and polar coordinates.
 - CO-2. To understands concavity and inflection points, envelopes, asymptotes of a curve and to calculate their arc length, area and surface of revolution.
 - CO-3. To construct Reduction formulae, derivations and illustrations of reduction formulae.
 - CO-4. To solve several ODEs.
 - CO-5. To solve the problems related to two and three dimensions.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Jul	Unit-1: Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of type $e^{ax+b} \sin x$, $e^{ax+b} \cos x$, $(ax + b)^n \sin x$, $(ax + b)^n \cos x$.	BS	10	Theoretical-08 Tutorial-02
	Unit-4: Differential equations and mathematical models, General, particular, explicit, implicit and singular solutions of a diff. equation.	PD	06	Theoretical-05 Tutorial-01
Aug	Unit -1: Concavity and inflection points, envelopes, asymptotes, curve tracing in Cartesian coordinates, tracing in polar coordinates of standard curves, L'Hospital's rule, applications in business, economics and life sciences.	BS	17	Theoretical-14 Tutorial-03
	Unit - 4: Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear and Bernoulli eqns.	PD	12	Theoretical-10 Tutorial-02
1st Internal Assessment				
Sep	Unit-2 : Reduction formulae, derivations and illustrations of reduction formulae for the integration of $\sin^n x$, $\cos^n x$, $\tan^n x$, $\sec^n x$, $(\log x)^n$, $\sin^n x \sin^m x$, parametric equations, parametrizing a curve, arc length, arc length of parametric curves, area of surface of revolution. Techniques of sketching conics.	BS	13	Theoretical-11 Tutorial-02
	Unit - 4: Special integrating factors and transformations.	PD	07	Theoretical-06 Tutorial-01
Oct	Unit -3: Reflection properties of conics, translation and rotation of axes and second degree equations, classification of conics using the discriminant, polar equations of conics. Spheres, Cylindrical surfaces. Central conicoids, paraboloids, plane sections of conicoids, Generating lines, classification of quadrics.	BS	20	Theoretical-17 Tutorial-03
2nd Internal Assessment				

Nov	Unit-3: Illustrations of graphing standard quadric surfaces like cone, ellipsoid.	BS	05	Theoretical-04 Tutorial-01
Dec	End Semester Examination			
	Assessment: Internal Assessment & Assignment		Total: 90 Hrs	Theoretical-75 Tutorial-15

Books:

- Walter Rudin, Principles of Mathematical analysis, Third Edition, Mc Grawhill Education
- S. K. MAPA, Introduction to Real Analysis, Sarat Book Distributor, India, 2019.

Lesson Plan for Course: B.Sc(H) Sem-I Code: MTMACOR02T Credit: 6

- Course Name: Algebra
- Course coordinator: Biswajit Sarkar
- Course Outcomes:
 - CO-1. To aware with polar representation of complex numbers, n-th roots of unity, De Moivre's theorem with its application.
 - CO-2. Able to apply Descarte's rule of signs and to solve cubic and biquadratic equations, $AM \geq GM \geq HM$ in inequality.
 - CO-3. To familiar with equivalence relations, well-ordering property of positive integers, Division algorithm, principles of mathematical induction.
 - CO-4. To find rank of a given matrix, and to solve systems of linear equations
 - CO-5. To find out Eigen values, Eigen Vectors, inverse of a matrix though Cayley-Hamilton theorem.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Jul	Unit -2 : Equivalence relations and partitions, Functions, Composition of functions.	SM	11	Theoretical-09 Tutorial-02
Aug	Unit -2 : Invertible functions, One to one correspondence and cardinality of a set. Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm. Congruence relation between integers, Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic.	SM	19	Theoretical-16 Tutorial-03
1st Internal Assessment				
Sep	Unit -3: Systems of linear equations, row reduction and echelon forms, vector equations, the matrix equation $Ax = b$, solution sets of linear systems, applications of linear systems, linear independence.	SM	11	Theoretical-09 Tutorial-02
Oct	Unit 4: Matrix, inverse of a matrix, characterizations of invertible matrices, Rank of a matrix, Eigen values, Eigen Vectors and Characteristic Equation of a matrix, Cayley-Hamilton theorem and its use in finding the inverse of a matrix.	SM	20	Theoretical-17 Tutorial-03
	Unit-1: Polar representation of complex numbers, n-th roots of unity, De Moivre's theorem for rational indices and its applications. • <i>Theory of equations:</i> Relation between roots and coefficients, Transformation of equation, Descartes rule of signs.	PD	14	Theoretical-12 Tutorial-02
2nd Internal Assessment				
Nov	Unit -1 : Inequality: The inequality involving $AM \geq GM \geq HM$, Cauchy-Schwartz inequality.	SM	09	Theoretical-07 Tutorial-02
	Unit -1 : Theory of equations: Cubic (Cardan's method) and biquadratic eqns. (Ferrari's method).	PD	06	Theoretical-05 Tutorial-01

Dec				End Semester Examination	
	Assessment: Internal Assessment & Assignment		Total: 90 Hrs	Theoretical-75	Tutorial-15

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