AMBALA COLLEGE OF ENGINEERING AND APPLIED RESEARCH, AMBALA

DEPARTMENT OF APPLIED SCIENCES & HUMANITIES

Subject	**Mathematics-II**	**Semester**	**: 2nd**
Subject Code	**: B24-BSC-108**	**Lecture per Week**	**: 3**
Theory Marks	**: 70**	**Tutorials per Week**	**: 1**
Sessional Marks	**: 30**	**Practical**	**: 0**

Syllabus

B24-BSC-108 **Mathematics-II**

Lecture	Tutorial	Practical	Theory	Sessional	Total	Time
3	1	0	70	30	100	3Hrs.

Purpose **This course aims to provide prospective engineers with a comprehensive understanding of matrix operations, ordinary differential equations, and complex variables, enabling them to proficiently apply advanced mathematical concepts and tools to address complex problems.**

Course Outcomes

CO1 To develop the essential tool of matrices and linear algebra in a comprehensive manner.

CO2 To introduce effective mathematical tools for the solutions of differential equations that model physical processes.

CO3 To acquaint the student with vector calculus to solve advance engineering problems.

CO4 Acquaint the students with the formation and solutions for multivariable differential equations and basics of Curve fitting for fitting of data originated from real world problems.

UNIT-I

Matrices: Rank of a matrix, elementary transformations, elementary matrices, Gauss Jordon method to find inverse using elementary transformations, normal form of a matrix, linear dependence and independence of vectors, consistency of linear system of equations, linear and orthogonal transformations, Eigen values and Eigenvectors, properties of eigenvalues, Cayley – Hamilton theorem and its applications.

UNIT-II

First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations,

Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x.
Ordinary differential equations of higher orders:
Second order linear differential equations with constant coefficients, method of variation of parameters, Cauchy and Legendre's linear differential equations.

UNIT-III
Vector Calculus-Differentiation: Introduction, Scalar and Vector point functions, Gradient, divergence & Curl and their properties, Directional derivative.
Vector Calculus-Integration: Line integrals, surface integrals, volume integrals, Theorems of Green, Gauss and Stokes (without proof).

UNIT-IV
Partial Differential Equations: Formation of Partial Differential Equations, Solution to homogenous linear partial differential equations (with constant coefficients) by complimentary function and particular integral method.
Curve fitting by the method of least squares: Introduction, Fitting of a straight line, fitting of second degree curve, fitting of a polynomial of degree m, fitting of a geometric or power curve of the form $y = ab^x$, fitting of an exponential curve of the form $y = ab^x$

SuggestedBooks:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson,Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Erwin kreyszig and SanjeevAhuja, Applied Mathematics- II, Wiley India Publication, 2015.
4. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary ValueProblems, 9th
Edn., Wiley India, 2009.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
7. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice HallIndia, 1995.
8. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
9. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill,2004.
10. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint,
2008.
11. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
12 S. J. Farlow, Partial Differential Equations for Scientists and Engineers, Dover Publications, 1993.
AICTEModel Curriculum in Mathematics.
13. R. Haberman, Elementary Applied Partial Differential equations with Fourier Series and Boundary
Value Problem, 4th Ed., Prentice Hall, 1998.
14. Ian Sneddon, Elements of Partial Differential Equations, McGraw Hill, 1964.
15. Manish Goyal and N.P. Bali, Transforms and Partial Differential Equations, University
Science Press, Second Edition, 2010.

Note: The paper setter will set the paper as per the question paper templates provided.

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ACADEMIC CALENDER

Week	**Theory**	
	Lecture Day	**Topic(including assignment /test)**
1st	1st	Rank of Matrix
	2nd	Elementary transformation & Matrices
	3rd	Gauss Jordon method to find inverse using elementary transformations
	4th	Normal Form
2nd	5th	Finding P,Q such as PAQ=Normal function
	6th	Consistently & Solution of Linear Simutteneous Equation (Rank Method)
	7th	Linearty dependent and Independent Vectors and Orthogonality.
	8th	Eigen Values
3rd	9th	Characteristic equation
	10th	Eigen Vectors & Properties of Eigen Values
	11th	Eigen Vectors & Properties of Eigen Values
	12th	Cayley Hamilton Theorem & Its applications.
4th	13th	Cayley Hamilton Theorem & Its applications.
	14th	Test
	15th	Exact differential equation
	16th	Linear and Bernouli's Equations
5th	17th	Euler's equations
	18th	Equation solvable for p & y
	19th	Equation solvable for x

	20th	Clairaut's type differential equations of higher orders
6th	21st	Second order linear differential equations with constt. coefficients
	22nd	Method of variation of parameters, Cauchy linear differential equations
	23rd	Legendre's linear differential equations
	24th	Test
7th	25th	Introduction of vectors & scalars
	26th	Scalar and vector point functions
	27th	Divergence of a vector field
	28th	Curl of a vector field
8th	29th	Directional derivative
	30th	line integrals
	31st	Volume integral
	32nd	Surface integral,
9th	33rd	Green's theorem
	34th	Gauss Divergence Theorem
	35th	Stoke's Theorem
	36th	Test
10th	37th	Formation of Partial Differential Equations
	38th	Formation of Partial Differential Equations
	39th	Solution to homogenous linear partial differential equations (with constant coefficients) by complimentary function and particular integral method.
	40th	Solution to homogenous linear partial differential equations (with constant coefficients) by complimentary function and particular integral method.
11th	41st	Solution to homogenous linear partial differential equations (with constant coefficients) by complimentary function and particular integral method.
	42nd	Fitting of a straight line
	43rd	fitting of second degree curve
	44th	fitting of a polynomial of degree m
12th	45th	fitting of a geometric or power curve of the form $y = ab^x$
	46th	fitting of a geometric or power curve of the form $y = ab^x$
	47th	fitting of an exponential curve of the form $y = ab^x$
	48th	fitting of an exponential curve of the form $y = ab^x$
13th	49th	Revision
	50th	Revision
	51th	Revision
	52th	Test