



7 Algebra	& Mathematic	cal Methods	6 Credits (5	5L+1 T)	
ration 3h torials	rs		Marks: 100(75+25) 75 Lect	tures + 15	
Program	me: Diploma	Voor: Socond	Semester: Third		
Clas	ss: B.Sc.	Tear: Second			
			Subject: Mathematics		
Course Co	ode: B030301T		Course Title: Algebra & Mathematical Methods		
Course ou	tcomes:				
CO1: Grou	p theory is one of	the building blocks of	of modern algebra. Objective of this course is to introduce students to basic concepts of Group, R	ing theory	
and their pr	operties.				
CO2: A stu	Ident learning this	course gets a concep	ot of Group, Ring, Integral Domain and their properties. This course will lead the student to basic	course in	
advanced n	nathematics and A	lgebra.			
CO3: The o	course gives emph	asis to enhance stude	ents' knowledge of functions of two variables, Laplace Transforms, Fourier Series.		
CO4: On s	uccessful completi	ion of the course stud	lents should have knowledge about higher different mathematical methods and will help him in g	going for	
higher stud	ies and research.				
	Credits:6		Core Compulsory/Elective		
]	Max.Marks:25+7	5	Min. Passing Marks:		
	То	tal No. of Lectures	-Tutorials-Practical (in hours per week): L-T-P:6-0-0		
			Part- A		
			Algebra		
Unit			Topics	No. of	
				Lectures	
	Introduction to (CIE)	Indian ancient Mat	hematics and Mathematicians should be included under Continuous Internal Evaluation		
Ι				12	
	Equivalence relations and partitions, Congruence modulo n, Definition of a group with examples and simple properties, Subgroups,				
	Generators of a gr	roup, Cyclic groups.			
П				11	
	Permutation groups, Even and odd permutations, The alternating group, Cayley's theorem, Direct products, Coset decomposition,				
	Lagrange's theore	em and its consequen	ices, Fermat and Euler theorems		
III	Normal subgroups, Quotient groups, Homomorphism and isomorphism, Fundamental theorem of homomorphism, Theorems on 11				
	Isomorphism.				
	Kings, Subrings, I	Integral domains and	tields, Characteristic of a ring, Ideal and quotient rings, King homomorphism, Field of quotient		
IV	of an integral don	nain.		11	
	1			1	



ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत) Khwaja Moinuddin Chishti Language University, Lucknow, U.P. (India)

U.P. STATE GOVERNMENT UNIVERSITY,

(Recognised Under Section 2(f) & 12(B) of the UGC Act, 1956 & B.Tech. Approved by (AICTE)

Part- B				
Mathematical Methods				
Un	it	No. of		
	Topics	Lectures		
V	Limit and Continuity of functions of two variables, Differentiation of function of two variables, Necessary and sufficient condition for Differentiability of functions two variables, Schwarz's and Young theorem, Taylor's theorem for functions of two variables with examples, Maxima and minima for functions of two variables, Lagrange multiplier method, Jacobians.			
VT.	Existence theorems for Laplace transforms, Linearity of Laplace transform and their properties, Laplace transform of the derivatives			
VI	and integrals of a function, Convolution theorem, Inverse Laplace transforms, Solution of the differential equations using Laplace	11		
	transforms.			
VI	Fourier series, Fourier expansion of piecewise monotonic functions, Half and full range expansions, Fourier transforms (finite and	11		
	infinite), Fourier integral.			
X 7 T	Calculus of variations-Variational problems with fixed boundaries-Euler's equation for functionals containing first order derivative and			
VI.	II one independent variable, Extremals, Functionals dependent on higher order derivatives, Functionals dependent on more than one			
	Independent variable, Variational problems in parametric form.			
Sugg	ested Readings (Part-A Algebra):			
1.	J. B. Fraleigh, A first course in Abstract Algebra, Addison-weley			
2.	I. N. Herstein, Topics in Algebra, John Wiley & Sons			
3.	Suggested digital plate form: NPTEL/SWAYAM/MOOCS			
4.	Course books published in hindi maybe prescribed by the universities.			
Suggested Readings (Part-B Mathematical Methods):				
1. T.	M. Apostal, Mathematical Analysis, Person			
2. G.	F. Simmons, Differential Equations with Application and Historical Notes, Tata- Mc Graw Hill			
3. Er	win Kreyszig, Advanced Engineering Mathematics, John Wiley &Sons.			
4. Su	ggested digital plateform: NPTEL/SWAYAM/MOOCs			
5. Co	ourseBookspublishedinHindimaybeprescribedbytheUniversities.			
This co	ourse can be opted as an elective by the students of following subjects: Engg. and B.Sc. (C.S).			
	Suggested Continuous Evaluation Methods: Max.Marks:25			
SN	Assessment Type Max	x. Marks		
1 Cl	lass Tests	10		
2 0	2 Online Quizzes/Objective Tests 5			
3 Pı	3 Presentation 5			
4 A s	4Assignment (Introduction to Indian ancient Mathematics and Mathematicians)5			
Course pre requisites: To study this course, a student must have subject Mathematics in class 12 th				
Suggested equivalent online courses:				
Further Suggestions:				



	ial Equations & Mechanic	CS Shrs	Marks: 100(75+25)	6 Credits (5L- 75 Lectures + 15 Tutorials	+ 1 T)	
Program Cla	me: Diploma ss: B.Sc.	: Second	Widiks: 100(73+23)	Semester: Fourth		
	Subject: Ma	thematics				
Course Co	ode: B030401T		Course Title: Differential Equ	uations & Mechanics		
Course ou	tcomes:					
CO1: The	objective of this course is to	familiarize th	ne students with various methods of s	olving differential equations, partial differential equations	of first	
order and s	econd order and to have qua	litative applic	cations.			
C O2: A stu	ident doing this course is ab	le to solve dif	fferential equations and is able to mod	del problems in nature using ordinary differential equation	s. After	
ompleting	this course, a student will b	e able to take	more courses on wave equation, hea	t equation, diffusion equation, gas dynamics, nonlinear ev	olution	
quation et	c. These entire courses are in	nportant in ei	ngineering and industrial applications	for solving boundary value problem.		
CO3: The	object of the paper is to give	students kno	wledge of basic mechanics such as si	imple harmonic motion, motion under other laws and force	es.	
CO4: The	student, after completing the	course can g	so for higher problems in mechanic su	ich as hydrodynamics, this will be helpful in getting emplo	oyment in	
ndustry.						
	Credits:6		Co	ore Compulsory/Elective		
	Max.Marks:25+75		Min. Passing Marks:			
	,	⊥ Fotal No. of	Lectures-Tutorials-Practical (in	hours per week): L-T-P:6-0-0		
			Part- A			
			Differential Equation	ons		
Unit			Topics		No. of	
					Lecture	
Ι	Second order linear differential equations with variable coefficients: Use of known solution to find another, normal form, method of					
	undetermined coefficient, variation of parameters, Series solutions of differential equations, Power series method.					
		. • •				
II	Bessel, Legendre and Hype	rgeometric fu	inctions and their properties, recurrer	ce and generating relations.	11	
II	Bessel, Legendre and Hype Origin of first order partial	rgeometric fu 	quations. Partial differential equations	s of the first order and degree one, Lagrange's solution,		
II	Bessel, Legendre and Hype Origin of first order partial Partial differential equation system of surfaces.	rgeometric fu differential ea of first order	quations and their properties, recurrer quations. Partial differential equation and degree greater than one. Charpit	s of the first order and degree one, Lagrange's solution, 's method of solution, Surfaces Orthogonal to the given	11	
II	Bessel, Legendre and Hype Origin of first order partial Partial differential equation system of surfaces. Origin of second order PDE	rgeometric fu differential ea of first order	quations and their properties, recurrer quations. Partial differential equation and degree greater than one. Charpit	s of the first order and degree one, Lagrange's solution, 's method of solution, Surfaces Orthogonal to the given econd and higher order with constant coefficients,	11	

	Part- B			
Mechanics				
Unit	Topics	No.of Lectures		
V	Frame of reference, work energy principle, Forces in three dimensions, Poinsot's central axis, Wrenches, Null lines and planes.	12		
VI	Virtual work, Stable and Unstable equilibrium, Catenary, Catenary of uniform strength.	11		
VII	Velocities and accelerations along radial and transverse directions, and along tangential and normal directions, Simple Harmonic	11		
	motion, Motion under other law of forces. Elastic strings, Motion in resisting medium, Constrained motion, Motion on smooth and rough plane curves.			
VIII	Motion of particles of varying mass, Rocket motion, Central orbit, Kepler's laws of motion, Motion of particle in three dimensions,	11		
	Rotating frame of reference, Rotating Earth, Acceleration in terms of different coordinates systems.			

Suggested Readings (Part-A Differential Equations):

- ${\tt 1.} G.F. Simmons, Differential Equations with Application and Historical Notes, Tata-McGrawHill$
- 2. B.Rai, D.P.Choudhary& H.J.Freedman, ACourse of Ordinary Differential Equations, Narosa
- 3. IanN.Snedden,ElementsofPartialDifferentialEquations,DoverPublication
- 4. L.E.Elsgolts, Differential Equation and Calculus of variations, University Pressof the Pacific.
- 5. Suggesteddigitalplateform:NPTEL/SWAYAM/MOOCs
- 6. CourseBookspublishedinHindimaybeprescribedbytheUniversities.

Suggested Readings (Part-B Mechanics):

- 1. R.C.Hibbeler, Engineering Mechanics-Statics, Prentics HallPublishers
- 2. R.C.Hibbeler, Engineering Mechanics-Dynamics, Prentics HallPublishers
- 3. A.Nelson, Engineering Mechanics Statics and Dynamics, Tata Mc Graw Hill
- 4. J.L.Synge & B.A. Griffith, Principles of Mechanics, Tata Mc Graw Hill
- 5. Suggested digital plate form: NPTEL/SWAYAM/MOOCs
- 6. Course Books published in Hindi maybe prescribed by the Universities.

This course can be opted as an elective by the students of following subjects: Engg. and Tech. (UG), Economics (UG/PG), B.Sc. (C.S.)

	Suggested Continuous Evaluation Methods: Max. Marks:25			
SN	Assessment Type	Max.Marks		
1	Class Tests	10		
2	Online Quizzes/Objective Tests	5		
3	Presentation	5		
4	Assignment	5		
Course pre requisites: To study this course, a student must have Certificate Course in Applied Mathematics				
Suggested equivalent online courses:				

Further Suggestions:

•