

### VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE

(An Autonomous Institute of Government of Maharashtra)

# **Department of Mathematics**

## [NEP 2020]

First Year B. Tech. Syllabus Semester I and II Effective from Academic Year 2023 – 24

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4		R5MA1011T	Civil Engineering	09
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7		R5MA1014T	Computer Engineering/ Information Technology	15
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Course co	le	R5MA1001T	Semester	Ι	Credits	3	Lectures/week	2L:1T:0P
Course	Course         Mathematics – I (Civil Engineering/ Textile Technology)							
<ul> <li>Course Outcomes:</li> <li>After the completion of course, the student should be able to <ol> <li>Characterize a linear system in terms of number of solutions, whether it is consistent or not.</li> <li>Compute eigenvalues and eigenvectors of a square Matrix and determine if it is diagonalizable</li> <li>Calculate functional value of some point in a neighborhood using Taylor's series expansion and find the limit of a function at a point or at infinity using L'Hospital's rule.</li> <li>Determine if an infinite series is convergent or not using suitable test.</li> <li>Be familiar with the theorems of differentiability such as mean value theorem and interpret it geometrically.</li> <li>Evaluate partial derivatives and implement/ apply it to find minima and maxima of a multivariate function. Also Find directional derivatives and gradient and illustrate geometric meaning with the hel of sketches.</li> <li>Apply definite integration to evaluate surface areas and volumes of revolution and evaluate improper integrals.</li> <li>Evaluate multiple integrals for regions in a plane and find volume, area bounded by the curves, mass, center of gravity of solid geometric figures.</li> <li>Estimate the solution of non -linear equations using numerical methods.</li> </ol></li></ul>							not. izable on and find ret it ltivariate s with the help ate improper curves, mass,	
10. Apj pro	bly different t blems.	echniques like int	erpolation, nun	heric	al integrat	on to	solve different eng	gineering
Module	Content							Lectures
1	I       Linear Algebra:       08         Rank of a matrix, System of linear equations- check for consistency, Eigenvalues & eigenvectors of a matrix, Diagonalization, Cayley-Hamilton theorem, Minimal polynomial, Finding Inverse and Powers of a matrix.       08						08	
2	Differential Mean value Taylor's the Derivative, I Gradient, m Lagrange's sequence an comparison	d <b>Calculus:</b> theorem, Rolle's orem and Truncat Differentiation of axima, minima an multipliers methoo d series, Tests for test, alternating se	theorem, Indete ion error, Parti an implicit fun d saddle points d, tangent plan convergence - eries test, absol	ermi al D ction of a e and ratio ute c	nate form, erivatives, n, Direction n multivaria l normal li test, root t convergence	L' Ho Chair nal De able fu ne, Co rest, p re test	ospital's rule, n rule, Total erivative, unction, onvergence of -series test,	09

3	Integral Calculus:	09
	Evaluation of definite integration to find surface areas and volumes of revolution, Introduction to Improper Integrals and Gamma functions and its properties, Multiple integrals, change of order of integration in double integrals, Change of variables (Cartesian to polar), Triple integrals (Cartesian, cylindrical and spherical co-ordinates). Applications: areas and volumes, Center of mass and Gravity (constant and variable densities).	
4	Numerical methods:	06
	Numerical solutions of non-linear equations, Interpolation by Newton's and Lagrange polynomials, Integration by trapezoidal and Simpson's rule.	
References	5:	
<ul> <li>G.E</li> <li>Erw</li> <li>Rar</li> <li>Vee</li> <li>N.P</li> <li>200</li> </ul>	B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9 <sup>th</sup> Edition, Pearson, Reprin Kreyszig, Advanced Engineering Mathematics, 9 <sup>th</sup> Edition, John Wiley & sons, 20 <sup>th</sup> nana B. V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11 <sup>th</sup> Reprarajan T., Engineering Mathematics for first year, Tata McGraw Hill, New Delhi 200 B.Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications 8.	orint, 2002. 06. orint, 2010. 08. s, Reprint

- B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36<sup>th</sup> Edition, 2010.
- M.K.Jain, S.R.K. Iyengar, R.K.Jain, Numerical methods for scientific and engineering computation, Fourth Edition.

Course co	ode	R5MA1002T	Semester	Ι	Credits	3	Scheme	2L:1T	:0P
Course		Mathematics –	(Mechanical	Eng	gineering/	Proc	luction Eng	gineerin	ng)
Course O	utcomes:								
After the	completion	of course, the stu	ident should	be a	able to				
<ol> <li>Ch</li> <li>Co</li> <li>Ca</li> <li>Ca</li> <li>Ca</li> <li>Ca</li> <li>Ca</li> <li>Ca</li> <li>Ca</li> <li>Ca</li> <li>Ca</li> <li>Ev</li> <li>Be</li> <li>Geo</li> <li>Ev</li> <li>ma</li> <li>Ch</li> </ol>	aracterize a l mpute eigen lculate funct d find the lim termine if an familiar with ometrically. aluate partial ditivariate fun caning with the ply definite if proper integraluate multip ass, center of aracterize co	inear system in to values and eigenvious ional value of sor- nit of a function a infinite series is the theorems of derivatives and interior. Also Find the help of sketche integration to evaluate rals. ble integrals for re- gravity of solid gomplex functions	erms of number vectors of a squee point in a magnetic point in a magnetic and the point or at convergent or differentiability implement/ ap directional de es. luate surface a egions in a pla geometric figure in terms of an	er o uare leig infi no ity s ply riva area ne a res.	f solutions e Matrix an hborhood u nity using t using suif such as me it to find r atives and y as and volu and find volu icity and f	, who nd de using L'Ho table an va minir gradi mes olumo ind h	ether it is c etermine if g Taylor's s ospital's ru test. alue theore na and max ent and illu of revoluti e, area bou	consister it is dia series ex ile. em and i xima of ustrate g on and unded by onjugate	nt or not. gonalizable spansion nterpret it a geometric evaluate v the curves, es.
Module	Content								Lectures
1	Linear Alg	ebra:							08
	Rank of a n Eigenvalue theorem, M	natrix, System of s & eigenvectors inimal polynomi	linear equatio of a matrix, D al, Finding Inv	ns- iag vers	check for onalizatior e and Pow	cons n, Ca ers o	istency, yley-Hami f a matrix.	lton	
2	Differentia	l Calculus:							10
	Mean value Taylor's the Derivative, Gradient, m Lagrange's of sequence test, compa	e theorem, Rolle's eorem and Trunca Differentiation o naxima, minima a multipliers meth- e and series, Tests rison test, alterna	s theorem, Ind ation error, Pa f an implicit f nd saddle poin od, tangent pla s for convergent ting series test	eter rtia unc nts ane nce t, at	minate for l Derivativ tion, Direc of a multiv and norma -ratio test, psolute con	rm, L es, C tiona ariat al line root verg	2'Hospital' Chain rule, al Derivativ ble function e, Converge t test, p-ser ence test.	s rule, Total ve, n, gence ies	
3	Integral Ca	alculus:							10
	Evaluation revolution, properties, integrals, C	of definite integra Introduction to Ir Multiple integrals hange of variable	ation to find su nproper Integr s, change of or es (Cartesian to	urfa rals der	ce areas an and Gamr of integra blar), Tripl	nd vo na fu tion e inte	olumes of inctions an in double egrals	d its	

	(Cartesian, cylindrical and spherical co-ordinates). Applications: areas and volumes, Center of mass and Gravity (constant and variable densities);	
4	<b>Complex Variables – Differentiation:</b> Complex Functions- Limits, Continuity and differentiability, Analytic functions, Cauchy Riemann equations, Harmonic conjugates	05
Reference	es:	

- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
- Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & sons, 2006.
- Ramana B. V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11<sup>th</sup> Reprint, 2010.
- Veerarajan T., Engineering Mathematics for first year, Tata McGraw Hill, New Delhi 2008.
- N. P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint 2008.
- B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36<sup>th</sup> Edition, 2010.
- Susan Jane Colley, Vector Calculus, 4<sup>th</sup> Edition,2012
- David Poole , Linear Algebra A Modern Introduction, Third Edition
- S. Kumareson, Linear Algebra A Geometric Approach
- John H. Matthews and Russell W. Howell, Complex Analysis for Mathematics and Engineering, Third Edition

Course co	se code R5MA1003T Semester I Credits 3 Scheme 2L:1T:0P								
Course	Course Mathematics – I (Electrical Engineering/ Electronics Engineering/ Electronics and Telecommunication Engineering/ Computer Engineering/ Information Technology)								/ neering/
Course O	ourse Outcomes:								
After the	fter the completion of course, the student should be able to								
<ol> <li>Constant</li> <li>Constant</li> <li>Constant</li> <li>Constant</li> <li>Deconstant</li> <li>Canter</li> <li>Canter</li> <li>Canter</li> <li>Canter</li> <li>Canter</li> <li>Canter</li> <li>Canter</li> <li>Canter</li> <li>Canter</li> <li>Constant</li> <li>Con</li></ol>	<ol> <li>Compute eigenvalues and eigenvectors of a square Matrix and determine if it is diagonalizable</li> <li>Demonstrate the concepts of vector spaces, subspaces, span, basis, dimension and their properties with examples and identify their subspaces.</li> <li>Calculate functional value of some point in a neighborhood using Taylor's series expansion and find the limit of a function at a point or at infinity using L'Hospital's rule.</li> <li>Determine if an infinite series is convergent or not using suitable test.</li> <li>Be familiar with the theorems of differentiability such as mean value theorem and interpret it geometrically.</li> <li>Evaluate partial derivatives and apply it to find minima and maxima of a multivariate function. Also Find directional derivatives and gradient and illustrate geometric meaning with the help of sketches.</li> <li>Apply definite integration to evaluate surface areas and volumes of revolution and evaluate improper integrals.</li> <li>Evaluate multiple integrals for regions in a plane and find volume, area bounded by the curves, mass, center of gravity of solid geometric figures.</li> </ol>						gonalizable heir apansion Interpret it ate function. h the help evaluate y the curves,		
Module	Content								Lectures
1	Linear Alg	;ebra:							15
	Rank of a matrix, System of linear equations- check for consistency, Eigenvalues & eigenvectors of a matrix, Diagonalization, Cayley-Hamilton theorem, Minimal polynomial, Finding Inverse and Powers of a matrix, Linear dependence and independence of vectors, Vector spaces, Basis, Dimension, Subspaces, Linear transformations, Rank of a Linear transformation, Orthogonal transformation, Inner product spaces.								
2	Differentia	d Calculus:							09
	2 <b>Differential Calculus:</b> 09 Mean value theorem, Rolle's theorem, Indeterminate form, L'Hospital's rule, Taylor's theorem and Truncation error, Partial Derivatives, Chain rule, Total Derivative, Differentiation of an implicit function, Directional Derivative, Gradient, maxima, minima and saddle points of a multivariable function, Lagrange's multipliers method, tangent plane and normal line, Convergence of sequence and series, Tests for convergence -ratio test, root test, p-series test, comparison test, alternating series test, absolute convergence test.								

3	Integral Calculus:	09
	Evaluation of definite integration to find surface areas and volumes of revolution, Introduction to Improper Integrals and Gamma functions and its properties, Multiple integrals, change of order of integration in double integrals, Change of variables (Cartesian to polar), Triple integrals (Cartesian, cylindrical and spherical co-ordinates). Applications: areas and volumes, Center of mass and Gravity (constant and variable densities).	
Reference	es:	
<ul> <li>G</li> <li>20</li> <li>E</li> <li>R</li> <li>21</li> <li>V</li> <li>V</li> <li>B</li> <li>S</li> <li>C</li> </ul>	.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9 <sup>th</sup> Edition, Pears 202. rwin Kreyszig, Advanced Engineering Mathematics, 9 <sup>th</sup> Edition, John Wiley & s amana B. V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 1 2010. eerarajan T., Engineering Mathematics for first year, Tata McGraw Hill, New D . S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36 <sup>th</sup> Edition, usan Jane Colley, Vector Calculus, 4 <sup>th</sup> Edition,2012 avid Poole, Linear Algebra A Modern Introduction, Third Edition	son, Reprint, sons, 2006. 1 <sup>th</sup> Reprint, elhi 2008. 2010.
•	Kumanagan Lingan Alashus A Casmatria Annuagah Esputh Edition	

Course co	ode	R5MA1011T	Semester	II	Credits	3	Scheme	2L:1T:0P
Course		Mathematics – II	(Civil Enginee	ering	)	1		
Course O After the 1. For equ 2. Find fund 3. Dev vect 4. App eval field 5. Mo solv 6. Find num	<ol> <li>Course Outcomes:</li> <li>After the completion of course, the student should be able to         <ol> <li>Formulate Differential equations from the given physical problems and solve first order Differential equations using different techniques.</li> <li>Find the complete solution of a differential equation with constant coefficients in terms of complementary function and particular integral.</li> <li>Develop better understanding of scalar and vector fields and apply gradient to solve problems involving normal vectors to level surfaces.</li> <li>Apply the integral theorems such as Stoke's theorem, Green's theorem and Gauss divergence theorem to evaluate line, surface and volume integrals and give physical interpretation of curl and divergence of a vector field.</li> <li>Model physical phenomena using partial differential equations such as heat and wave equation and solve them using separation of variables method.</li> <li>Find the Fourier series representation of a periodic function and evaluate the value of a series of real numbers.</li> </ol> </li> </ol>							Differential ementary volving normal orem to e of a vector uation and eries of real
Module	Content							Lectures
1	Ordinary D	Differential Equat	ions:					12
	Solving Firs order linear functions an parameters, and boundar	t order equations - differential equation d Particular integr Method of Undeter y value problems.	- Exact, linear a ons with consta als by operator ermined coeffic	and E ant co meth ients	Bernoulli's pefficients, nod, metho , Euler-Cau	equa Con d of 1chy	ations, higher aplementary variation of equation; initial	
2	Partial Diff	erential Equation	ıs:					06
	Classification Solutions of Two- dimen	on of second order one-dimensional sional Laplace equ	linear PDEs, M Heat equation, lation,	1etho First	d of Separa and second	atior 1 orc	n of variables, ler wave equation,	
3	Vector calc	ulus:						08
	Vector functions- Limits, continuity and differentiation, scalar and vector fields, gradient, divergence and curl, Line integrals, Surface integrals, Volume integrals, Stoke's theorem, Gauss' Divergence theorem, Green's theorem							
4	Fourier Ser	ries:						06
	Definition o periodic fun range series,	f Fourier series, D ction of arbitrary p , Parseval's identit	irichlet's condi period 21, series y	tions s of E	, Evaluatio	n of ld Fi	Fourier series of unctions, Half	

#### **References:**

- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002
- Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & sons, 2006.
- Ramana B. V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11<sup>th</sup> Reprint, 2010.
- Veerarajan T., Engineering Mathematics for first year, Tata McGraw Hill, New Delhi 2008.
- B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36<sup>th</sup> Edition, 2010.
- Susan Jane Colley, Vector Calculus, 4<sup>th</sup> Edition,2012

Course co	se code R5MA1012T Semester II Credits 3 Scheme 2L:1T: 0P									
Course		Mathematics –	II (Mechanica	l En	gineering/	Pro	duction Engine	eering)		
Course O After the 1. Forn Diff 2. Find com 3. Stud appl 4. Dev invo 5. App theo and 6. Mod and	<ol> <li>After the completion of course, the student should be able to         <ol> <li>Formulate Differential equations from the given physical problems and solve first order Differential equations using different techniques.</li> <li>Find the complete solution of a differential equation with constant coefficients in terms of complementary function and particular integral.</li> <li>Study complex power series, classify singularities of a function, evaluate line integrals and apply residue theorem to evaluate real integrals.</li> <li>Develop better understanding of scalar and vector fields and apply gradient to solve problems involving normal vectors to level surfaces.</li> <li>Apply the integral theorems such as Stoke's theorem, Green's theorem and Gauss divergence theorem to evaluate line, surface and volume integrals and give physical interpretation of curl and divergence of a vector field.</li> <li>Model physical phenomena using partial differential equations such as heat and wave equation and solve them using separation of variables method.</li> </ol> </li> </ol>							l		
Module	odule Content Lectures							;		
1	Ordinary I	Differential Equ	ations:					10		
	First order of order linear functions an parameters, initial and b	equations (linear differential equand Particular inte Method of Unde boundary value p	and nonlinear ations with cor grals by opera etermined coef roblems.	); Bo Istar tor 1 ficio	ernoulli's e nt coefficies nethod, me ents, Euler-	equa nts, etho Cau	tions, higher Complementar d of variation of thy equation;	ry of		
2	Partial Dif	ferential Equati	ons:					06		
	Classificati variables, S wave equat	on of second ord colutions of one-c ion, Two- dimen	er linear PDEs limensional H sional Laplace	s, Mo eat e equ	ethod of Se equation, F ation,	epara irst a	ation of and second ord	ler		
3	Vector calo	culus:						08		
	Vector func fields, grad Volume int theorem.	ctions- Limits, co ient, divergence a egrals, Stoke's th	ntinuity and d and curl, Line leorem, Gauss	iffer inte ' Di	entiation, s grals, Surfa vergence th	scala ace i neor	ar and vector ntegrals, em, Green's			

4	Complex Variables – Integration:	08
	Cauchy's Integral theorem and formula, Taylor's series- radius of convergence, Laurent's series, Singularities and Poles, Residue theorem, Evaluation of real integrals using contour integration and concept of residues	
Reference	25:	
• G.I 20	B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9 <sup>th</sup> Edition, Pearso 02.	on, Reprint,
• Er	win Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & so	ons, 2006.
• Ra 20	mana B. V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11 10.	<sup>th</sup> Reprint,
• Ve	erarajan T., Engineering Mathematics for first year, Tata McGraw Hill, New De	lhi 2008.
• N.I Re	print 2008.	cations,
• B. • Su	S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36 <sup>th</sup> Edition, 2 san Jane Colley, Vector Calculus, 4 <sup>th</sup> Edition, 2012.	010.
• Jol En	nn H. Matthews and Russell W. Howell, Complex Analysis for Mathematics and gineering, Third Edition	

Course co	codeR5MA1013TSemesterIICredits3Scheme2L:1T:0P									
Course		Mathematics –	II (Electrical I	Engi	neering/ El	ectr	onics Engineerin	g/		
		Electronics and	Telecommuni	cati	on Enginee	ring	7)			
Course O	utcomes:									
After the	fter the completion of course, the student should be able to									
1. Fin	nd the complementary	ete solution of a c	differential equation	uatio	on with con	stan	t coefficients in t	erms of		
2. Fo	rmulate Diff	erential equations	s from the give	u. en pl	hysical prol	blen	ns and solve first	order		
Di 3 Ch	fferential equ	ations using different	erent techniqu	es. alvti	icity find h	arm	onic conjugates a	and study		
geo	ometric prop	erties of conform	al mappings.	aryt	ienty, iind n	am	ionie conjugates t	ind study		
4. Stu	dy complex	power series, cla peorem to evaluat	ssify singulari te real integral	ities s	of a function	on, e	evaluate line integ	grals and		
5. De	velop better	understanding of	scalar and ve	ctor	fields and a	appl	y gradient to solv	e problems		
inv 6. Ar	volving norm	al vectors to leve ral theorems sucl	el surfaces. h as Stokes the	eore	m. Green's	the	orem and Gauss o	livergence		
the	eorem to eval	luate line, surface	and volume i	nteg	grals and give	ve p	hysical interpreta	tion of curl		
and	d divergence	of a vector field.						Ι_		
Module	Content							Lectures		
1	Ordinary l	Differential Equ	ations:					12		
	Solving Fir	st order equation	s – Exact, line	ar a	nd Bernoul	li's	equations,			
	Complement	ntary functions ar	nd Particular in	nteg	rals by oper	rato	r method,			
	method of y	variation of paran	neters, Method	d of	Undetermination	ned	coefficients,			
2	Vooton ool			uyv	alue proble			08		
2	vector cal	culus:				_		08		
	Vector fund fields, grad	ctions- Limits, co ient. divergence a	ntinuity and d and curl. Line	iffer inte	entiation, s grals. Surfa	cala	r and vector ntegrals.			
	Volume int	egrals, Stoke's th	eorem, Gauss	' Di	vergence th	eor	em, Green's			
	theorem.									
3	Complex V	/ariables – Diffe	rentiation:					07		
	Complex F	unctions- Limits, Cauchy Riemann	Continuity an equations Ha	ıd di rmo	fferentiabil	ity, ates	Analytic Conformal			
	mappings,	Linear fractional	transformation	ns ai	nd their pro	pert	ies.			

4.	<b>Complex Variables – Integration:</b>	07
	Cauchy's Integral theorem and formula, Taylor's series- radius of convergence, Laurent's series, Singularities and Poles, Residue theorem, Evaluation of real integrals using contour integration and concept of residues.	
Reference	es:	
<ul> <li>Er</li> <li>Ve</li> <li>S.</li> <li>E.4</li> <li>19</li> </ul>	win Kreyszig, Advanced Engineering Mathematics, 10 <sup>th</sup> Edition, John Wiley & s eerarajan T., Engineering Mathematics for first year, Tata McGraw Hill, New De L.Ross, Differential Equations 3 <sup>rd</sup> Edition, Wiley India, 1984. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hal 95.	sons, 2006. 1hi 2008. 1 India,
• B.	S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36 <sup>th</sup> Edition, 2	010.

• Susan Jane Colley, Vector Calculus, 4<sup>th</sup> Edition, 2012

Course code		R5MA1014T	Semester	II	Credits	3	Scheme	2L:1T:0P
Course		Mathematics – II (Computer Engineering/ Information Technology)						
Course Outcomes: After the completion of course, the student should be able to								
<ol> <li>Formulate Differential equations from the given physical problems and solve first order Differential equations using different techniques.</li> <li>Find the complete solution of a differential equation with constant coefficients in terms of complementary function and particular integral.</li> <li>Express a logical statement in terms of predicates, quantifiers and logical connectives.</li> <li>Construct correct direct and indirect proofs (proofs by contradiction and contraposition), proof by induction, exhaustion and find a counterexample to disprove a proposed statement.</li> <li>Solve counting problems involving the sum rule, multiplication rule, permutations and combinations (with and without repetitions), principle of inclusion- exclusion, and Pigeonhole principle.</li> <li>Use Generating Functions to solve counting problems, recurrence relations and establishing Binomial Identities.</li> <li>Determine properties of relations, identify equivalence and partial order relations and sketch relations.</li> </ol>								
Module	Content							Lectures
1	Ordinary l	Differential Equ	ations:					10
	Solving Fir higher orde Complement method of Euler-Cauc	st order equation r linear differenti ntary functions ar variation of paran hy equation; initi	s – Exact, line al equations w nd Particular in neters, Method al and bounda	ear an vith nteg d of ury v	nd Bernoul constant co rals by ope Undetermin alue proble	li's beffio rato ned ems.	equations, cients, r method, coefficients,	
2	Logic:							05
	Proposition contradiction	al equivalences, and ons, Predicates and	Methods of pr nd Quantifiers,	roof, Du	Tautologie ality Law.	es ar	ıd	
3	Counting:							12
	The basics combinatio relations, so exclusion p	of counting, the p ns with repetition olving recurrence rinciple, applicat	vigeonhole pri a, Binomial co relations, gen ion of inclusic	ncip effic erat on-e	le, permuta cients and i ing functio cclusion.	tion dent ns, i	is and ities, recurrence nclusion -	
4	<b>Relations:</b>							07
	Relations a Representir classes, Par	nd their propertie ng Relations, Clos tial Ordering, To	s, n-ary Relations, n-ary Relations sure of Relations stal ordering,	ions ons,	and their a Equivalenc	ppli æ Ro	cations, elations and	

#### **References:**

- Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay, R. Manohar, Tata McGraw Hill, 2008
- Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, John Wiley & sons, 2006.
- Kenneth H. Rosen, Discrete Mathematics and its Applications, 7<sup>th</sup> Edition, Tata McGraw Hill, 2012
- E.A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
- Elements of Discrete Mathematics, C. L. Liu and D. P. Mohapatra 4<sup>th</sup> Ed., McGraw Hill Edu.(India) Pvt. Ltd.
- B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36<sup>th</sup> Edition, 2010.

Course code		R5MA1015T	Semester	II	Credits	3	Scheme	2L:1T:0P	
Course		Mathematics – II ( <i>Textile Technology</i> )							
Course Outcomes:									
<ul> <li>After the completion of course, the student should be able to</li> <li>1. Examine the different types of data and its interpretation using statistics.</li> <li>2. Apply the discrete and continuous probability distributions to find probabilities of various events and</li> </ul>									
<ol> <li>Appry the discrete and continuous probability distributions to find probabilities of various events and the expected value of a random variable.</li> <li>Find the relation between two or more phenomena with the help of curve fitting and correlation-regression analysis.</li> </ol>									
<ol> <li>Determine the effect of various parameters using ANOVA.</li> <li>Demonstrate the ability of statistical quality control with suitable case studies.</li> <li>Estimate population parameters using sampling and Perform hypothesis testing on population means, variances and proportions.</li> </ol>									
Module	Content							Lectures	
1	Introductio	n and need for sta	atistics in Text	iles:				06	
	Introduction to statistics, Methods of data collection, need for SQC techniques, Classification and graphical representation of data								
	Frequency distribution, Measures of central tendency -concepts of Mean, Median & Mode, Partition values- concept of quartiles, percentile; Measures of dispersion- quartile deviation, Standard Deviation, Coefficient of variation.								
2	Correlation & Regression Analysis: 08						08		
	Introduction to bi-variate data, Correlation analysis, Coefficient of correlation and Rank correlation, Regression analysis, curve fitting, method of least squares, Multivariate data analysis.								
3	Probability Distributions:						08		
	Review of P continuous r Moments, B	robability, Conditi andom variables, I inomial distributio	ional probabilit Probability den on, Poisson dis	y, Ba sity f stribu	iyes' theore function, Ex tion, Nor	em. I xpec mal	Discrete and etation, Variance, distribution.		
4	Estimation	and Testing of H	ypothesis:					12	
	Concepts of Two types o sample theor sample mean parameters- Limit Theore	Statistical hypothe f errors, Level of s ry, Student's t test n and sample prop- point estimation & em.	esis, Null and A significance, Te , F test and Chi- ortion, standard t interval estim	Alterr ests o -squa l erro ation	ate hypoth f significar are test; Sau r of estima (confidenc	esis nce t mpli tor, e int	, Critical region, based on Large ng distribution of Estimation of tervals), Central		

5	Analysis of Variance:	03					
	Introduction, one way analysis and two way analysis.						
6	Statistical Quality Control:	03					
	Introduction to Statistical quality control techniques and control charts- Mean chart, R chart, np chart, p chart, C chart.						
References:							
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