DON BOSCO ARTS & SCIENCE COLLEGE

ANGADIKADAVU

(Affiliated to Kannur University Approved by Government of Kerala)

ANGADIKADAVU P.O., IRITTY, KANNUR – 670706

COURSE PLAN

BSc MATHEMATICS

(2017 – 20)

SEMESTER - VI

ACADEMIC YEAR - (2019-20)

VI Semester BSc Mathematics (2017 - 20)			
SL. No.	Name of Subjects with Code	Name of the Teacher	Duty Hours per week
1.	6B10 MAT – Liner Algebra	Prija V.	5
2.	6B11 MAT – Numerical Methods & Partial Differential Equations	Athulya P.	5
3.	6B12 MAT – Complex Analysis	Najumunnisa K.	5
4.	6B13 MAT – Mathematical Analysis and Topology	Sebin Abraham	5
5.	6B14 A MAT – Operations Research	Ajeena Joseph	5
	Name of Class Incharge	Athulya P.	

TIME TABLE

Day	09.50 Am - 10.45 Am	10.45 Am -11.40 Am	11.55 Am -12.50 Pm	01.40 Pm - 02.35 Pm	02.35 Pm - 03.30 Pm
1	6B11 MAT – Numerical Methods & Partial Differential Equations	6B10 MAT – Liner Algebra	6B12 MAT – Complex Analysis	6B13 MAT – Mathematical Analysis and Topology	6B14 A MAT – Operations Research
2	6B12 MAT – Complex Analysis	6B14 A MAT – Operations Research	6B13 MAT – Mathematical Analysis and Topology	6B11 MAT – Numerical Methods & Partial Differential Equations	6B10 MAT – Liner Algebra
3	6B13 MAT – Mathematical Analysis and Topology	6B11 MAT – Numerical Methods & Partial Differential Equations	6B10 MAT – Liner Algebra	6B14 A MAT – Operations Research	6B12 MAT – Complex Analysis
4	6B10 MAT – Liner Algebra	6B13 MAT – Mathematical Analysis and Topology	6B12 MAT – Complex Analysis	6B14 A MAT – Operations Research	6B11 MAT – Numerical Methods & Partial Differential Equations
5	6B14 A MAT – Operations Research	6B12 MAT – Complex Analysis	6B11 MAT – Numerical Methods & Partial Differential Equations	6B10 MAT – Liner Algebra	6B13 MAT – Mathematical Analysis and Topology

Subject Code:	**6B10 MAT**
Subject Name:	**Linear Algebra**
No. of Credits:	**4**
No. of Contact Hours:	**90**
Hours per Week:	**5**
Name of the Teacher:	**Prija V**

Module –I: Vector Spaces (22 Hours)
Introduction, Vector spaces, Subspaces, Linear Combinations and Systems of Linear Equations, Linear Dependence and Linear Independence, Bases and Dimension, Maximal Linearly Independent Subsets. (Sections 1.1 to 1.7 of Text1)

Module II: Linear Transformations and Matrix Representations (18 Hours)
Linear Transformations, Null Spaces, and Ranges, The Matrix Representation of a Linear Transformation, Composition of Linear Transformations and Matrix Multiplication (theorems without proof). (Sections 2.1 to 2.3 of Text1)

Module III: System of Linear Equations (32 Hours)
System of linear homogeneous equations. Null space and nullity of matrix. Sylvester's law of nullity. Range of a matrix. Systems of linear non homogeneous equations. Characteristic roots and characteristic vectors of a square matrix. Some fundamental theorems (without proof). Characteristic roots of Hermitian, Skew Hermitian and Unitary matrices. Characteristic equation of a matrix, Cayley-Hamilton theorem. (Relevant topics in the sections 6.1 to 6.6, 6.8 and 11.1 to 11.3, and 11.11 of Text 2)

Module – IV: Numerical Methods for Linear System of Equations (18 Hours)
Diagonalizability (Section 5.2 of Text 1). Gauss elimination, Gauss-Jordan Method, Modification of Gauss method to compute the inverse. (Sections 6.3.2 to 6.3.4 of Text 3)

Prescribed Textbook
1. S. H. Friedberg, Arnold J. Insel and Lawrence E. Spence, Linear Algebra, 2nd Edition, PH Inc.
2. S. Narayanan and Mittal, A Text Book of Matrices, Revised Edition, S. Chand
3. S. S. Sastry, Introductory Methods of Numerical Analysis, Fourth Edition, PHI.

Books for Reference

1. R. R. Stoll and E. T. Wong, Linear Algebra Academic Press International Edn (1968)
2. G. D. Mostow and J.H. Sampson, Linear Algebra, McGraw-Hill Book Co NY (1969)
3. S. Kumaresan, Linear Algebra-A Geometric Approach, Prentice Hall of India (2000)
4. J. B. Fraleigh and R.H. Beauregard , Linear Algebra, Addison Wesley
5. P. Saika, Linear Algebra, Pearson Education.

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	21-10-2019 To 25-10-2019	1	Introduction, Vector Spaces.
		2	Vector spaces, Subspaces, Definitions.
		3	Examples .
		4	Examples .
		5	Linear Combinations and Systems of Linear Equations
		6	Theorem.
		7	Theorem.
		8	Theorem.
2	28-10-2019 To 01-11-2019	9	Theorem.
		10	Linear Dependence and Linear Independence.
		11	Definitions.
		12	Examples .
		13	Theorem.
		14	Theorem.
		15	Exercise questions.
3	04-11-2019 To 08-11-2019	16	Exercise questions.
		17	Class test.
		18	Bases and Dimension,Definitions.
		19	Examples .
		20	Examples .
		21	Theorem.
4	11-11-2019 To 15-11-2019	22	Exercise questions.
		23	Exercise questions.
		24	Maximal Linearly Independent Subsets
		25	Definitions , Examples .
		26	Examples .
		27	Theorem.
		28	Theorem.
5	18-11-2019 To 23-11-2019	29	Class test.
		19 Nov	Union Inauguration
		30	Linear Transformations. Composition of Linear Transformations and Matrix Multiplication (theorems without proof).
		31	Definitions.
		32	Examples .

No of Weeks	Dates	Session	Topic
		33	Theorem.
		34	Assignment.
		23 Nov	Sports Day
6	25-11-2019 To 29-11-2019		Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
7	01-12-2019 To 05-12-2019		Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
8	09-12-2019 To 13-12-2019	35	Null Spaces, and Ranges, Definitions.
		36	Examples .
		37	Exercise questions.
		38	Theorem.
		39	Class test.
		12 Dec	Arts Day
		13 Dec	Arts Day
9	16-12-2019 To 20-12-2019	16 Dec	First Internal VI Semester UG
		17 Dec	First Internal VI Semester UG
		18 Dec	First Internal VI Semester UG
		40	The Matrix Representation of a Linear Transformation.
		41	Examples .
		20 Dec	Christmas Celebration
10	23-12-2019 To 28-12-2019		Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday

No of Weeks	Dates	Session	Topic
			Christmas – Holiday
			Christmas – Holiday
11	**30-12-2019 To 03-01-2020**	42	Exercise questions.
		43	Theorem.
		44	Theorem.
		45	Composition of Linear Transformations and Matrix Multiplication
		02 Jan	**Mannam Jayanthi – Holiday**
		46	
12	**06-01-2020 To 10-01-2020**	47	Examples .
		48	Exercise questions.
		49	Theorem.
		50	Class test.
		51	System of linear homogeneous equations.
		52	Characteristic equation of a matrix
		53	Examples .
		54	Theorem.
13	**13-01-2020 To 17-01-2020**	55	Exercise questions.
		56	Null space and nullity of matrix
		57	Examples .
		58	Exercise questions.
		59	Theorem.
		60	Class test.
		61	Range of a matrix, Definitions, Examples.
14	**20-01-2020 To 24-01-2020**	62	Examples .
		63	Systems of linear non homogeneous equations.
		64	Exercise questions.
		65	Sylvester's law of nullity, Theorem.
		66	Exercise questions.
		67	Characteristic roots and characteristic vectors of a square matrix, Examples .
		68	Exercise questions.
		69	Class test.
		70	Some fundamental theorems (without proof)
15	**27-01-2020 To 31-01-2020**	71	Assignment, Exercise questions.
		72	Characteristic roots of Hermitian
		73	Examples .
		74	Exercise questions.

No of Weeks	Dates	Session	Topic
		75	Theorem.
		76	Skew Hermitian and Unitary matrices.
		77	Cayley-Hamilton theorem
16	03-02-2020 To 07-02-2020	78	Class test.
		79	Diagonalizability ,Definition, Examples.
		80	Theorem.
		81	Exercise questions
		82	Gauss elimination, Gauss-Jordan Method,
		83	Exercise questions
		84	Examples .
17	10-02-2020 To 14-02-2020	85	Exercise questions
		86	Modification of Gauss method to compute the inverse.
		87	Exercise questions
		88	Exercise questions
		89	Class test.
		90	Revision.
18	17-02-2020 To 22-02-2020	17 Feb	Second Internal VI Semester UG
			Second Internal VI Semester UG
			Second Internal VI Semester UG
			Second Internal VI Semester UG
		21 Feb	Mahasivaratri – Holiday
			Second Internal VI Semester UG
19	24-02-2020 To 28-02-2020	24 Feb	College Day
			Study Leave
			Study Leave
			Study Leave
			Study Leave
20	02-03-2020 To 06-03-2020		Study Leave
			Study Leave
		04 Mar	University Exam VI Semester UG

Subject Code:	**6B 11 MAT**
Subject Name:	**Numerical Methods and Partial Differential Equations**
No. of Credits:	**4**
No. of Contact Hours:	**90**
Hours per Week:	**5**
Name of the Teacher:	**Athulya P.**

Module I : Solution of Algebraic and Transcendental Equation(15 Hours)
Introduction to solution of algebraic and transcendental equation**,** Initial approximations, Bisection method, Regula-falsi method, Newton-Raphson method, General iteration method. (Sections 3.2, 3.2.1, 3.3, 3.4, 3.5, 3.6 of Text 1)

Module II: Interpolation (20 Hours)
Interpolation with unevenly spaced points, Langrange interpolation, Newton's divided differences interpolation, Finite difference operators and finite differences, Newton's interpolation formulae, Central difference interpolation. (Sections 4.2, 4.2.1, 4.2.3, 4.3.1, 4.3.2, 4.3.3 of Text 1)

Module III: Numerical Differentiation and Integration (15 Hours)
Introduction, Numerical differentiation, Numerical differentiation using difference formulae (without error estimation), Numerical integration, Trapezoidal rule, Simpson's rule. (Sections 6.1, 6.2, 6.2.1, 6.3, 6.3.1, 6.3.2 of Text 1)

Module IV: Numerical Solutions of Ordinary Differential Equations (15 Hours)
Introduction, Picard's method, Solution by Taylor series method, Euler method, Runge- Kutta methods. (Sections 7.1 to 7.5 of Text 1)

Module V – Partial Differential Equations (25 Hours)
Basic concepts, Separation of variables. Use of Fourier series, D'Alembert's solution of the wave equation, Heat equation- Solution by Fourier series, Laplacian in polar coordinates. (Sections 11.1, 11.3 to 11.5 and 11.9 of Text 2)

Prescribed Textbook

1. S. R. K. Iyengar and R. K. Jain, Mathematical methods, Narosa Publishing House.
2. E. Kreyzig, Advanced Engineering Mathematics, 8th Edition, John Wiley

Books for Reference

1. S.S. Sastry, Introductory Methods of Numerical Analysis, Fourth Edition, PHI.
2. F.B. Hidebrand, Introduction to Numerical Analysis, TMH.
3. W.E. Boyce and R.C. Deprima, Elementary Differential Equations and Boundary Value Problems, Wiley 9th Edition.
4. P. Duchateau and D. W. Zachmann, Theory and Problems of Partial Differential Equations, Schaum's Outline Series.

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	21-10-2019 To 25-10-2019	1	Introduction to solution of algebraic and transcendental equation
		2	Initial approximations-Examples
		3	Bisection method
		4	Examples
		5	Examples
		6	Regula-falsi method
		7	Examples
		8	Examples
2	28-10-2019 To 01-11-2019	9	Newton-Raphson method
		10	Examples
		11	Examples
		12	Class test
		13	General iteration method
		14	Examples
		15	Examples
3	04-11-2019 To 08-11-2019	16	Examples
		17	Examples
		18	Class test
		19	Module II **Interpolation,** Interpolation with unevenly spaced points
		20	Langrange interpolation
		21	Examples
4	11-11-2019 To 15-11-2019	22	Examples
		23	Examples
		24	Newton's divided differences interpolation
		25	Examples
		26	Finite difference operators and finite differences
		27	Examples
		28	Examples
5	18-11-2019 To 23-11-2019	29	Newton's interpolation formulae
		19 Nov	**Union Inauguration**
		30	Examples
		31	Central difference interpolation

No of Weeks	Dates	Session	Topic
		32	Examples
		33	Examples
		34	
		23 Nov	**Sports Day**
6	**25-11-2019 To 29-11-2019**		**Semester Break**
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
7	**01-12-2019 To 05-12-2019**		**Semester Break**
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
8	**09-12-2019 To 13-12-2019**	35	Examples
		36	Class test
		37	Module III **Numerical Differentiation and Integration.** Introduction, Numerical differentiation
		38	Examples-Using difference formula
		39	Examples
		12 Dec	**Arts Day**
		13 Dec	**Arts Day**
9	**16-12-2019 To 20-12-2019**	**16 Dec**	**First Internal VI Semester UG**
		17 Dec	**First Internal VI Semester UG**
		18 Dec	**First Internal VI Semester UG**
		40	
		41	
		20 Dec	**Christmas Celebration**
10	**23-12-2019**		**Christmas – Holiday**
			Christmas – Holiday
			Christmas – Holiday

No of Weeks	Dates	Session	Topic
	To 28-12-2019		Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday
11	30-12-2019 To 03-01-2020	42	Numerical integration- Trapezoidal rule,
		43	Examples
		44	Examples
		45	Examples
		02 Jan	Mannam Jayanthi – Holiday
		46	Simpson's rule.
12	06-01-2020 To 10-01-2020	47	Examples
		48	Examples
		49	Examples
		50	Examples
		51	Composite rule
		52	Class test
		53	Module IV: **Numerical Solutions of Ordinary Differential Equations**- Picard's method
		54	Examples
13	13-01-2020 To 17-01-2020	55	Examples
		56	Examples
		57	Examples
		58	Solution by Taylor series
		59	Examples
		60	Examples
		61	Euler method,
14	20-01-2020 To 24-01-2020	62	Backward Euler method
		63	Improved Euler method
		64	**Euler Cauchy mathod**
		65	Examples
		66	Examples
		67	Examples
		68	Examples
		69	Runge- Kutta method
		70	Examples
15	27-01-2020 To	71	Examples
		72	Examples
		73	Class test

No of Weeks	Dates	Session	Topic
	31-01-2020	74	Module V **Partial Differential Equations** Basic concepts, Separation of variables.
		75	Examples
		76	Examples
		77	Use of Fourier series, D'Alembert's solution of the wave equation
16	03-02-2020 To 07-02-2020	78	Use of Fourier series, D'Alembert's solution of the wave equation
		79	Examples
		80	Heat equation- Solution by Fourier series
		81	Heat equation- Solution by Fourier series
		82	Examples
		83	Examples
		84	Laplacian in polar coordinates.
17	10-02-2020 To 14-02-2020	85	Examples
		86	Examples
		87	Examples
		88	Revision
		89	Revision
		90	Revision
18	17-02-2020 To 22-02-2020	17 Feb	Second Internal VI Semester UG
			Second Internal VI Semester UG
			Second Internal VI Semester UG
			Second Internal VI Semester UG
		21 Feb	Mahasivaratri – Holiday
			Second Internal VI Semester UG
19	24-02-2020 To 28-02-2020	24 Feb	College Day
			Study Leave
			Study Leave
			Study Leave
			Study Leave
20	02-03-2020 To 06-03-2020		Study Leave
			Study Leave
		04 Mar	University Exam VI Semester UG

Subject Code:	**6B12MAT**
Subject Name:	**Complex Analysis**
No. of Credits:	**4**
No. of Contact Hours:	**90**
Hours per Week:	**5**
Name of the Teacher:	**Najumunnisa K.**

Module I : Complex Numbers and Functions (25 Hours)
Complex numbers Complex numbers, Polar form of complex numbers powers and roots, Derivative, Analytical function, Cauchy-Riemann equations, Laplace equation, Exponential- Trigonometric - Hyperbolic functions (without mapping), Logarithm and general power. (Sections 12.1 to 12.8 except 12.5)

Module II: Complex Integration (23 Hours)
Line integral in the complex plane, Cauchy's integral theorem (Theorem-1 without proof), Cauchy's integral formula, Derivatives of Analytic functions, Cauchy's Inequality, Liouville's and Moreras theorems. (Sections 13.1 to 13.4)

Module III: Power series and Taylor series (22 Hours)
Sequences, series, Convergence tests, Ratio test, Root test, Power series, radius of convergence of a power series. Taylor series and Maclaurin series, Taylor's Theorem (without proof), important special Taylor series. (Sections 14.1, 14.2, 14.4)

Module IV: Laurent Series, Residue Integration (20 Hours)
Laurent series, Laurent Theorem (without proof), Singularities and zeros, Zeros of Analytic functions, Analytic or Singular at Infinity, Residue integration method, residue theorem. (Sections 15.1 to 15.3)

Prescribed Textbook

E. Kreyzig, Advanced Engineering Mathematics, 8th Edition, John Wiley, 1993.

Books for Reference

1. J. W. Brown and R. V. Churchill, Complex Variables and Applications,8th Edition, Mc Graw Hill.
2. M. J. Ablowitz and A. S. Fokas, Complex Variables, Cambridge Text, 2nd Edition.
3. S. Ponnusamy, Foundation of Complex Analysis : Narosa.
4. M. R. Spiegel, Complex Variables, Schaum's Outline series.
5. J. M. Howie, Complex Analysis, Springer India Reprint.

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	21-10-2019 To 25-10-2019	1	Complex numbers-Introduction
		2	Basic Properties and Examples
		3	Complex Plane and
		4	Polar form of complex numbers
		5	powers and roots
		6	Examples
		7	Complex Function And Derivative
		8	Analytical function
2	28-10-2019 To 01-11-2019	9	Definitions
		10	Cauchy-Riemann equations
		11	Laplace equation
		12	Examples
		13	Exponential
		14	Trigonometric
		15	Problems
3	04-11-2019 To 08-11-2019	16	Hyperbolic functions
		17	Problems
		18	Logarithm and general power
		19	Discussion
		20	Class Test
		21	Seminar
4	11-11-2019 To 15-11-2019	22	Line integral in the complex plane
		23	Examples
		24	Definitions
		25	Cauchy's integral theorem
		26	Cauchy's integral formula
		27	Problems
		28	Problems
5	18-11-2019 To 23-11-2019	29	Discussion
		19 Nov	Union Inauguration
		30	Derivatives of Analytic functions
		31	Problems
		32	Problems
		33	Cauchy's Inequality
		34	Problems

No of Weeks	Dates	Session	Topic
		23 Nov	Sports Day
6	25-11-2019 To 29-11-2019		Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
7	01-12-2019 To 05-12-2019		Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
8	09-12-2019 To 13-12-2019	35	Liouville's theorem
		36	Problems
		37	Moreras theorems
		38	Discussion
		39	Class Test
		12 Dec	Arts Day
		13 Dec	Arts Day
9	16-12-2019 To 20-12-2019	16 Dec	First Internal VI Semester UG
		17 Dec	First Internal VI Semester UG
		18 Dec	First Internal VI Semester UG
		40	Assignment
		41	Discussion
		20 Dec	Christmas Celebration
10	23-12-2019 To 28-12-2019		Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday

No of Weeks	Dates	Session	Topic
11	30-12-2019 To 03-01-2020	42	Class Test
		43	Sequences Definitions and Examples
		44	Problems
		45	Series
		02 Jan	Mannam Jayanthi – Holiday
		46	Problems
12	06-01-2020 To 10-01-2020	47	Convergence tests
		48	Definitions And Examples
		49	Problems
		50	Ratio test, Root test
		51	Examples & Problems
		52	Power series
		53	Problems
		54	Radius of convergence of a power series
13	13-01-2020 To 17-01-2020	55	Taylor series
		56	Discussion
		57	Maclaurin series
		58	Discussion
		59	Taylor's Theorem
		60	important special Taylor series
		61	Class Test
14	20-01-2020 To 24-01-2020	62	Laurent series
		63	Problems
		64	Laurent Theorem
		65	Problems
		66	Singularities and zeros
		67	Problems
		68	Problems
		69	Zeros of Analytic functions
		70	Problems
15	27-01-2020 To 31-01-2020	71	Analytic or Singular at Infinity
		72	Residue integration method
		73	Theorems
		74	Problems
		75	Class Test
		76	Discussion
		77	Assignment
16	03-02-2020	78	Problems

No of Weeks	Dates	Session	Topic
	To 07-02-2020	79	Problems
		80	Problems
		81	Question Paper Discussion
		82	Assignment
		83	residue theorem
		84	Problems
17	10-02-2020 To 14-02-2020	85	Problems
		86	Problems
		87	Problems
		88	Discussion
		89	Discussion
		90	Class Test
18	17-02-2020 To 22-02-2020	17 Feb	Second Internal VI Semester UG
			Second Internal VI Semester UG
			Second Internal VI Semester UG
			Second Internal VI Semester UG
		21 Feb	Mahasivaratri – Holiday
			Second Internal VI Semester UG
19	24-02-2020 To 28-02-2020	24 Feb	College Day
			Study Leave
			Study Leave
			Study Leave
			Study Leave
20	02-03-2020 To 06-03-2020		Study Leave
			Study Leave
		04 Mar	University Exam VI Semester UG

Subject Code:	**6B13 MAT**
Subject Name:	**Mathematical Analysis and Topology**
No. of Credits:	**4**
No. of Contact Hours:	**90**
Hours per Week:	**5**
Name of the Teacher:	**Sebin Abraham**

Module I: (25 Hours)
Riemann integral: The Riemann integrability, Properties of Riemann integral, The Fundamental theorem of calculus, The integral as a limit, Aproximate integration. (Sections: 7.1 to 7.5 of Text 1)

Module II : (20 Hours)
Sequence & series of functions: Point wise and uniform convergence – Interchange of limits – Series of Functions. (Sections: 8.1, 8.2, 9.4 of Text 1)

Module III: Metric Spaces (22 Hours)
The definition and some examples, open sets, closed sets, convergence, completeness and Baire's theorem. (Chapter 2, sections 9, 10, 11, 12 from Text 2)

Module IV: Topological Spaces (23 Hours)
The definition and some examples, Elementary concepts. (Chapter 3, sections 16, 17 of Text 2)

Prescribed Textbook

1. G. Bartle, D. R. Sherbert, Introduction to Real Analysis. 2nd Edition.
2. G. F. Simmons, Introduction to Topology and Modern Analysis, McGraw-Hill. International Student Edition.

Books for Reference

1. J. V. Deshpande, Mathematical Analysis and Applications, Narosa Pub. House.
2. K. A. Ross, Elementary Real Analysis, Theory of Calculus, Springer.
3. K. G. Binmore, Mathematical Analysis, CUP.
4. S. Kumaresan, Topology of Metric Spaces, Alpha Science Intl. Ltd, 20055.
5. G. L. Cain, Introduction to General Topology, Pearson Company.
6. M. A. Armstrong , Basic Topology, Springer Verlag New York 1983.
7. J. R. Munkres, Topology- a First Course, PHI.

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	21-10-2019 To 25-10-2019	1	Introduction to analysis and topology, syllabus, reference books
		2	Reimann integral: Partition, L(P,f), U(P,f), Lemma
		3	Refinement of partition, lemma
		4	Reimann integrability
		5	Examples, problems
		6	Theorem
		7	Reimann criterion for inegrability
		8	Corollary of Reimann criterion
2	28-10-2019 To 01-11-2019	9	Properties of integral
		10	Theorem: Integrability of monotone function and continuous function.
		11	Theorem
		12	Theorem
		13	Theorem
		14	Class test
		15	Composition theorem
3	04-11-2019 To 08-11-2019	16	Product theorem
		17	Fundamental theorem of calculus first form
		18	Fundamental theorem of calculus second form
		19	Combined form of Fundamental theorem of calculus
		20	Integration by parts
		21	First substitution theorem
4	11-11-2019 To 15-11-2019	22	Second substitution theorem
		23	Mean value theorem, Taylor's theorem
		24	Norm, Reimann sum, approximate integration
		25	Class test
		26	Sequence of functions : point wise convergence
		27	Convergence of sequence of functions and examples
		28	Uniform convergence and examples
5	18-11-2019 To 23-11-2019	29	Uniform norm, lemma
		19 Nov	Union Inauguration
		30	Cauchy criterion for uniform convergence
		31	Problems
		32	Class test

No of Weeks	Dates	Session	Topic
		33	Interchange of limit examples
		34	Interchange of limit and continuity
		23 Nov	Sports Day
6	25-11-2019 To 29-11-2019		Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
7	01-12-2019 To 05-12-2019		Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
8	09-12-2019 To 13-12-2019	35	Interchange of limit and derivative
		36	Interchange of limit and integral
		37	Bounded convergence theorem
		38	Series of functions- definition, examples
		39	Class test
		12 Dec	Arts Day
		13 Dec	Arts Day
9	16-12-2019 To 20-12-2019	16 Dec	First Internal VI Semester UG
		17 Dec	First Internal VI Semester UG
		18 Dec	First Internal VI Semester UG
		40	Tests for uniform convergence-examples
		41	Cauchy criterion, Weistrass M-test
		20 Dec	Christmas Celebration
10	23-12-2019 To 28-12-2019		Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday

No of Weeks	Dates	Session	Topic
			Christmas – Holiday
			Christmas – Holiday
11	**30-12-2019 To 03-01-2020**	42	Convergence examples
		43	Power series, Radius of convergence, problems
		44	Cauchy Hadmard theorem, differentiation theorem,
		45	Uniquiness theorem, Taylor series
		02 Jan	**Mannam Jayanthi – Holiday**
		46	Metric space: introduction, definition
12	**06-01-2020 To 10-01-2020**	47	Metric space examples
		48	Problems on Metric space
		49	Norm, subspace of metric space
		50	Distance from point to set, diameter, distance between sets
		51	Open set: open sphere definition, examples
		52	Open set definition, examples
		53	Theorem
		54	Interior of a set
13	**13-01-2020 To 17-01-2020**	55	Theorem
		56	Closed sets, examples, problems
		57	Limit point, closed set, closure
		58	Theorem
		59	Class test
		60	Cantor set
		61	Boundary point, dense set
14	**20-01-2020 To 24-01-2020**	62	Convergence
		63	Cauchy sequence , Complete metric space
		64	Cantor’s intersection theorem
		65	Nowhere dense sets
		66	Baire’s theorem
		67	Class test
		68	Topological space: introduction, definition
		69	Examples of topological spaces
		70	Topological spaces concepts
15	**27-01-2020 To 31-01-2020**	71	Metrizable space
		72	Continuous mapping
		73	Open mapping
		74	Homeomorphism, closed set
		75	Theorem
		76	Closure, neighbourhood

No of Weeks	Dates	Session	Topic
		77	Open base , examples
16	03-02-2020 To 07-02-2020	78	Isolated point, limit point, derived set, perfect set
		79	Problems
		80	Problems
		81	theorem
		82	Class test
		83	Theorem
		84	Theorem
17	10-02-2020 To 14-02-2020	85	Kurtoswski axioms
		86	Topological properties
		87	Problems
		88	Class test
		89	Revision and previous year question paper discussion
		90	Revision and previous year question paper discusision
18	17-02-2020 To 22-02-2020	17 Feb	Second Internal VI Semester UG
			Second Internal VI Semester UG
			Second Internal VI Semester UG
			Second Internal VI Semester UG
		21 Feb	Mahasivaratri – Holiday
			Second Internal VI Semester UG
19	24-02-2020 To 28-02-2020	24 Feb	College Day
			Study Leave
			Study Leave
			Study Leave
			Study Leave
20	02-03-2020 To 06-03-2020		Study Leave
			Study Leave
		04 Mar	University Exam VI Semester UG

Subject Code:	**6B 14A MAT**
Subject Name:	**Operations Research**
No. of Credits:	**3**
No. of Contact Hours:	**90**
Hours per Week:	**5**
Name of the Teacher:	**Ajeena Joseph**

Module –I: (30 hours)

Operations Research – An overview (Chapter – 1) Convex sets and their properties (section 0.13, proof of theorem 0.4 omitted), Convex function, Local and global extreme, Quadratic forms (Section 0.15 to 0.17).
General linear programming problem – canonical and standard forms of L.P.P (sections 3.4. 3.5), Solutions and fundamental properties of solutions of LPP (sections 4.1. 4.2 theorems without proof), Graphical solution method (section 3.2), Simplex method (section 4.3), Duality in linear programming – General primal – dual pair, Formulating a dual problem. (Sections 5.1 to 5.3)

Module – II (30 hours)

Transportation problem: General transportation problem, the transportation tables, Loops in transportation table solution of a transportation problem, Finding an initial basic feasible solution, Test for optimality, Degeneracy in transportation problem, Transportation algorithm (MODI method). (Sections 10.1, 10.2, 10.3, 10.5, 10.8, 10.9, 10.10, 10.11, 10.12)
Assignment Problem: Introduction, Mathematical formulation, Solution methods of Assignment problem (Ssections 11.1 to 11.3).

Module – III (30 hours)

Sequencing problem: Problem of sequencing, Basic terms used in sequencing, Processing n job through two machines, Processing n jobs through k machines, Processing 2 jobs through k machines, maintenance crew scheduling. (Sections 12.1 to 12.7)
Games and strategies: Introduction, Two- person zero-sum games, Some basic terms, The maximin – minimax principle, Games without saddle points – mixed strategies, Graphic solution of 2xn and nx2 games, Dominance property, Arithmetic method for nxn games. (Section 17.1 to 17.8)

Prescribed Textbook

K. Swarup, P.K. Gupta and M. Mohan, Operations Research (12th Edition), Sulthan Chand.

Books for Reference

1. J. K. Sharma, Operations Research Theory and Applications. McMillan, New Delhi.
2. G. Hadley, Linear Programming,Oxford & IBH Publishing Company, New Delhi.
3. H. A. Thaha, Operations Research, An Introduction, 8th Edition , Prentice Hall.

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	21-10-2019 To 25-10-2019	1	Operations Research – An overview
		2	Convex sets and their properties
		3	Examples
		4	Examples
		5	Convex function
		6	Theorems
		7	Local and global extreme
		8	Quadratic forms
2	28-10-2019 To 01-11-2019	9	General linear programming problem
		10	Canonical and standard forms of L.P.P
		11	Class Test
		12	Solutions and fundamental properties of solutions of LPP
		13	Graphical solution method
		14	Graphical solution method
		15	Graphical solution method
3	04-11-2019 To 08-11-2019	16	Simplex method
		17	Problems
		18	Problems
		19	problems
		20	Duality in linear programming
		21	Duality in linear programming
4	11-11-2019 To 15-11-2019	22	Examples
		23	Examples
		24	Class Test
		25	Examples
		26	Dual pair
		27	Dual pair
		28	Simplex method
5	18-11-2019 To 23-11-2019	29	Previous year question paper discussion
		19 Nov	Union Inauguration
		30	General transportation problem
		31	The transportation tables
		32	Loops in transportation table
		33	Solution of a transportation problem
		34	Problems

No of Weeks	Dates	Session	Topic
		23 Nov	Sports Day
6	25-11-2019 To 29-11-2019		Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
7	01-12-2019 To 05-12-2019		Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
			Semester Break
8	09-12-2019 To 13-12-2019	35	Problems
		36	Class Test
		37	Finding an initial basic feasible solution
		38	Transportation Problems
		39	Transportation Problems
		12 Dec	Arts Day
		13 Dec	Arts Day
9	16-12-2019 To 20-12-2019	16 Dec	First Internal VI Semester UG
		17 Dec	First Internal VI Semester UG
		18 Dec	First Internal VI Semester UG
		40	Problems
		41	Problems
		20 Dec	Christmas Celebration
10	23-12-2019 To 28-12-2019		Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday
			Christmas – Holiday

No of Weeks	Dates	Session	Topic
11	30-12-2019 To 03-01-2020	42	Test for optimality
		43	Class Test
		44	Problems
		45	Problems
		02 Jan	Mannam Jayanthi – Holiday
		46	Degeneracy in transportation table
12	06-01-2020 To 10-01-2020	47	Degeneracy in transportation table
		48	Problems
		49	Theorem
		50	Theorem
		51	Transportation algorithm (MODI method).
		52	Problems
		53	Problems
		54	Problems
13	13-01-2020 To 17-01-2020	55	Assignment problem
		56	Problems
		57	Mathematical formulation
		58	Class Test
		59	Problem
		60	Problems
		61	Assignment
14	20-01-2020 To 24-01-2020	62	Previous year question paper discussion
		63	Problem of sequencing, Basic terms used in sequencing
		64	Processing n job through two machines
		65	Problems
		66	Processing n jobs through k machines
		67	Problems
		68	Problems
		69	Processing 2 jobs through k machines
		70	Problems
15	27-01-2020 To 31-01-2020	71	Maintenance crew schedule
		72	Games and strategies: Introduction, Two- person zero-sum games
		73	Problems
		74	Problems
		75	Games without saddle points – mixed strategies
		76	Problems

No of Weeks	Dates	Session	Topic
		77	Problems
16	03-02-2020 To 07-02-2020	78	Assignment
		79	Class Test
		80	Graphic solution of 2xn and nx2 games
		81	Problems
		82	Problems
		83	Dominance property
		84	Problems
17	10-02-2020 To 14-02-2020	85	Arithmetic method for nxn games.
		86	Problems
		87	Class Test
		88	Previous year discussion
		89	Revision
		90	Revision
18	17-02-2020 To 22-02-2020	17 Feb	Second Internal VI Semester UG
			Second Internal VI Semester UG
			Second Internal VI Semester UG
			Second Internal VI Semester UG
		21 Feb	Mahasivaratri – Holiday
			Second Internal VI Semester UG
19	24-02-2020 To 28-02-2020	24 Feb	College Day
			Study Leave
			Study Leave
			Study Leave
			Study Leave
20	02-03-2020 To 06-03-2020		Study Leave
			Study Leave
		04 Mar	University Exam VI Semester UG