DON BOSCO ARTS & SCIENCE COLLEGE

ANGADIKADAVU

(Affiliated to Kannur University Approved by Government of Kerala)

ANGADIKADAVU P.O., IRITTY, KANNUR – 670706

COURSE PLAN

B Sc Mathematics

(2018 – 21)

SEMESTER -VI

ACADEMIC YEAR- (2020-21)

VI Semester B Sc Mathematics (2018 - 21)			
SL. No.	Name of Subjects with Code	Name of the Teacher	Duty Hours per week
1.	6B10MAT Linear Algebra	Prija V	5
2.	6B11MAT Numerical Methods and Partial Differential Equations	Athulya P	5
3.	6B12MAT Complex Analysis	Ajeena Joseph	5
4.	6B13MAT Mathematical Analysis and Topology	Anil M V	5
5.	6B14MAT Operations Research	Riya Baby	4
6.	6B15MAT Project	Athulya P	1
	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	6B11MAT Numerical Methods and Partial Differential Equations	6B10MAT Linear Algebra	6B12MAT Complex Analysis	6B14MAT Operations Research	6B13MAT Mathematical Analysis and Topology
2	6B12MAT Complex Analysis	6B13MAT Mathematical Analysis and Topology	6B10MAT Linear Algebra	6B11MAT Numerical Methods and Partial Differential Equations	6B14MAT Operations Research
3	6B10MAT Linear Algebra	6B12MAT Complex Analysis	6B14MAT Operations Research	6B13MAT Mathematical Analysis and Topology	6B11MAT Numerical Methods and Partial Differential Equations

4	**6B14MAT Operations Research**	**6B12MAT Complex Analysis**	**6B13MAT Mathematical Analysis and Topology**	**6B10MAT Linear Algebra**	**6B11MAT Numerical Methods and Partial Differential Equations**
5	**6B15MAT Project**	**6B13MAT Mathematical Analysis and Topology**	**6B11MAT Numerical Methods and Partial Differential Equations**	**6B12MAT Complex Analysis**	**6B10MAT Linear Algebra**

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**

6B10 MAT: Linear Algebra

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)

Text:
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.

References:

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	16-11-2020 To 20-11-2020	1	**Unit I-Vector Spaces Introduction,Definitions**.
		2	Vector spaces,Examples
		3	Theorems
		4	Theorems, Corollory.
		5	Subspaces
2	23-11-2020 To 27-11-2020	6	Class Test
		7	Theorems, Corollory.
		8	Linear Combinations and Systems of LinearEquations
		9	Exercise questions.
		10	Theorems, Corollory.
3	30-11-2020 To 04-12-2020	11	Exercise questions
		12	Linear Dependence and Linear Independence
		13	Theorems
		14	Class Test
		15	Bases and Dimension
4	07-12-2020 To 11-12-2020	16	Exercise questions
		17	Theorems, Corollory.
		18	Exercise questions
		19	Examples,Theorem.
		20	Max TheoremsimalLinearly Independent Subsets.
5	14-12-2020 To 18-12-2020	21	Corollory.
		22	Theorems
		23	Class Test

No of Weeks	Dates	Session	Topic
		24	**Unit II-Introduction**
6	21-12-2020 To 25-12-2020	21 December	**Christmas Vacation**
		22 December	**Christmas Vacation**
		23 December	**Christmas Vacation**
		24 December	**Christmas Vacation**
		25 December	**Christmas**
7	28-12-2020 To 01-01-2021	25	Linear Transformations- Definition,Examples.
		26	Theorems, Corollory.
		27	Theorems, Corollory.
		28	Null Spaces and Ranges- Definition,Examples.
		29	Rank-Nullity Theorem, Corollory.
8	04-01-2021 To 08-01-2021	30	Exercise questions.
		31	Class Test.
		32	The Matrix Representation of a LinearTransformation- Definition,Examples.
		33	Theorems, Corollory.
		34	Exercise questions.
9	11-01-2021 To 15-01-2021	35	Exercise questions.
		36	Assignment questions.
		37	Theorems, Corollory.
		38	Composition of Linear Transformations and Matrix Multiplication- Definition,Examples.
		39	Theorems, Corollory.
10	18-01-2021 To 22-01-2021	40	Theorems, Corollory.
		41	Exercise questions.
		42	Class Test
		43	Unit III – System of Linear Equations, Introduction**.**
		44	System of linear homogeneous equations.
11	25-01-2021 To 29-01-2021	45	Definition,Examples.
		26 January	Republic Day - Holiday
		46	Null space and nullity of matrix, Definition,Examples.
		47	Theorems, Corollory.
		48	Sylvester's lawof nullity,
12	01-02-2021 To 05-02-2021	49	Theorems, Corollory.
		50	Range of a matrix, Definition,Examples.
		51	Class Test
		52	Systems of linear non homogeneous equations, Definition,Examples.

No of Weeks	Dates	Session	Topic
		53	Theorems, Corollory.
13	08-02-2021 To 12-02-2021	54	Characteristic roots and characteristic vectors of a square matrix, Definition,Examples.
		55	Theorems, Corollory.
		56	Exercise questions.
		57	Exercise questions.
		58	Class Test
14	15-02-2021 To 19-02-2021	59	Theorems, Corollory.
		60	Characteristic roots of Hermitian, Definition,Examples.
		61	Characteristic roots of Skew Hermitian matrices , Definition,Examples.
		62	Some fundamental theorems.
		63	Characteristic equation of a matrix,
15	22-02-2021 To 26-02-2021	64	Characteristic roots of Unitary matrices, Definition,Examples.
		65	Exercise questions.
		66	Theorems, Corollory.
		67	Cayley-Hamilton theorem.
		68	Exercise questions.
16	01-03-2021 To 05-03-2021	69	Theorems, Corollory.
		70	Assignment questions.
		71	Class Test
		72	Unit - IV Numerical methods for linear system of equations.
		73	Definition,Examples.
17	08-03-2021 To 12-03-2021	74	Theorems, Corollory.
		75	Exercise questions.
		76	Gauss elimination,
		77	Class Test.
		11 March	Maha Sivarathri - Holiday
18	15-03-2021 To 19-03-2021	78	Gauss-Jordan Method
			VI Semester UG Internal Exam
			VI Semester UG Internal Exam
			VI Semester UG Internal Exam
		79	Exercise questions.
19	22-03-2021 To 26-03-2021	80	Theorems, Corollory.
		81	Modification of Gauss method to compute the inverse.
		82	Diagonolization.

No of Weeks	Dates	Session	Topic
		83	Exercise questions.
		84	Theorems, Corollory.
20	22-03-2021 To 26-03-2021	85	Diagonalizability
		86	Exercise questions.
		87	Exercise questions.
		88	Class Test.
		89	Revision.
21	29-03-2021 To 02-04-2021	29 March	**Talent Hunt**
		90	Revision.
		31 March	**Easter vacation**
		01 April	**Easter vacation**
		02 April	**Easter vacation**
22	05-04-2021 To 09-04-2021	05 April	**Easter vacation**
		06 April	**Easter vacation**
		07 April	**Easter vacation**
			Study Leave
			Study Leave
23	05-04-2021 To 09-04-2021		**Study Leave**
			Study Leave
			Study Leave
			Study Leave
			Study Leave
24	12-04-2021		**VI Semester UG University Exam Begin**

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**

Syllabus:

6B11MAT: Numerical Methods and Partial Differential Equations

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)

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

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	16-11-2020 To 20-11-2020	1	Solution of Algebraic and Transcendental Equation: Introduction to solution of algebraic and transcendental equation, Initial approximations,
		2	Bisection method
		3	Problems
		4	Problems
		5	Regula-falsi method,
2	23-11-2020 To 27-11-2020	6	Problems
		7	Problems
		8	Newton-Raphson method
		9	Problems
		10	Problems
3	30-11-2020 To 04-12-2020	11	Problems
		12	General Iteration Method
		13	Problems
		14	Problems
		15	Class Test
4	07-12-2020 To 11-12-2020	16	Interpolation with unevenly spaced points, Langrange interpolation
		17	Problems
		18	Problems
		19	Newton's divided differences interpolation
		20	Problems
5	14-12-2020 To 18-12-2020	21	Problems
		22	Problems
		23	Finite difference operators and finite difference
		24	Finite difference operators and finite difference
6	21-12-2020 To 25-12-2020	21 December	**Christmas Vacation**
		22 December	**Christmas Vacation**
		23 December	**Christmas Vacation**
		24 December	**Christmas Vacation**
		25 December	**Christmas**
7	28-12-2020 To	25	Problems
		26	Problems

No of Weeks	Dates	Session	Topic
	01-01-2021	27	Problems
		28	Newton's interpolation formula
		29	Newton's interpolation formula
8	04-01-2021 To 08-01-2021	30	Problems
		31	Problems
		32	Problems
		33	Central difference interpolation.
		34	Central difference interpolation.
9	11-01-2021 To 15-01-2021	35	Problems
		36	Problems
		37	Problems
		38	Class Test
		39	Numerical Differentiation and Integration:Introduction
10	18-01-2021 To 22-01-2021	40	Numerical differentiation
		41	Numerical differentiation using difference formula
		42	Numerical differentiation using difference formula
		43	Problems
		44	Problems
11	25-01-2021 To 29-01-2021	45	Problems
		26 January	Republic Day - Holiday
		46	Numerical integration : Trapezoidal rule
		47	Trapezoidal rule
		48	Problems
12	01-02-2021 To 05-02-2021	49	Problems
		50	Simpson's rule
		51	Simpson's rule
		52	Problems
		53	Problems
13	08-02-2021 To 12-02-2021	54	Problems
		55	Exam
		56	Numerical Solutions of Ordinary Differential Equations Introduction
		57	Picard's method
		58	Problems
14	15-02-2021	59	Problems

No of Weeks	Dates	Session	Topic
	To 19-02-2021	60	Solution by Taylor series method
		61	Solution by Taylor series method
		62	Problems
		63	Problems
15	22-02-2021 To 26-02-2021	64	Euler method,
		65	Euler method,
		66	Problems
		67	Problems
		68	Runge- Kutta methods.
16	01-03-2021 To 05-03-2021	69	Problems
		70	Problems
		71	Exam
		72	Partial Differential Equations: Basic concepts,
		73	Separation of variables
17	08-03-2021 To 12-03-2021	74	Separation of variables
		75	Problems
		76	Problems
		77	Use of Fourier series, D'Alembert's solution of the wave equation
		11 March	Maha Sivarathri - Holiday
18	15-03-2021 To 19-03-2021	78	Use of Fourier series, D'Alembert's solution of the wave equation
			VI Semester UG Internal Exam
			VI Semester UG Internal Exam
			VI Semester UG Internal Exam
		79	Use of Fourier series, D'Alembert's solution of the wave equation
19	22-03-2021 To 26-03-2021	80	Problems
		81	Heat equation- Solution by Fourier series
		82	Heat equation- Solution by Fourier series
		83	Problems
		84	Problems
20	22-03-2021 To 26-03-2021	85	Problems
		86	Laplacian in polar coordinates.
		87	Revision
		88	Revision

No of Weeks	Dates	Session	Topic
		89	Revision
21	29-03-2021 To 02-04-2021	29 March	**Talent Hunt**
		90	Revision
		31 March	**Easter vacation**
		01 April	**Easter vacation**
		02 April	**Easter vacation**
22	05-04-2021 To 09-04-2021	05 April	**Easter vacation**
		06 April	**Easter vacation**
		07 April	**Easter vacation**
			Study Leave
			Study Leave
23	05-04-2021 To 09-04-2021		**Study Leave**
			Study Leave
			Study Leave
			Study Leave
			Study Leave
24	12-04-2021		**VI Semester UG University Exam Begin**

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

Syllabus

Module I: Complex numbers and functions (25 hours)

Complex numbers, Complex plane, Polar form of complex numbers, Powers and roots, Derivative, Analytic functions, 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 integrals 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 and 14.4).

Module IV: Laurent series, Residue Integration (20 hours)

Laurent series, Laurent theorem (without proof), Singularities and zeros, zeros of analytic functions, singularity at infinity, Residue Integration method, Residue theorem (sections 15.1 to 15.3)

Text: E Kreyzig , Advanced Engineering Mathematics, 8th edition, John Wiley, 1993

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	16-11-2020 To 20-11-2020	1	Introduction to complex numbers
		2	Different operations of complex numbers
		3	Problems
		4	Complex plane
		5	Problems
2	23-11-2020 To 27-11-2020	6	Polar form of complex numbers
		7	Problems to find polar form
		8	Powers and roots
		9	Powers and roots
		10	Limit, Continuity, Derivative
3	30-11-2020 To 04-12-2020	11	Problems
		12	Class test
		13	Analytic functions
		14	Problems to check a function is analytic or not
		15	Cauchy- Riemann equations
4	07-12-2020 To 11-12-2020	16	Analytic functions and Cauchy- Reimann equations
		17	Exponential functions
		18	Trigonometric functions
		19	Various Trigonometric Identities
		20	Hyperbolic functions
5	14-12-2020 To 18-12-2020	21	Assignment
		22	Problems
		23	Logarithmic functions
		24	Problems
6	21-12-2020 To 25-12-2020	21 December	**Christmas Vacation**
		22 December	**Christmas Vacation**
		23 December	**Christmas Vacation**
		24 December	**Christmas Vacation**
		25 December	**Christmas**
7	28-12-2020 To 01-01-2021	25	Class test
		26	Introduction to complex integrals
		27	Problems to evaluate integrals
		28	Problems
		29	Theorem
8	04-01-2021 To 08-01-2021	30	ML inequality
		31	Problems
		32	Cauchy's integral theorem

No of Weeks	Dates	Session	Topic
		33	Problems using Cauchy's integral theorem
		34	Problems
9	11-01-2021 To 15-01-2021	35	Assignment
		36	Seminar
		37	Seminar
		38	Seminar
		39	Class test
10	18-01-2021 To 22-01-2021	40	Cauchy's integral formula
		41	Problems
		42	Problems
		43	Derivatives of analytic functions
		44	Derivatives of analytic functions
11	25-01-2021 To 29-01-2021	45	Cauchy's inequality
		26 January	Republic Day - Holiday
		46	Liouville's theorem and Moreras theorem
		47	Problems
		48	Assignment
12	01-02-2021 To 05-02-2021	49	Class test
		50	Sequences of complex numbers
		51	Theorems
		52	Seminar
		53	Seminar
13	08-02-2021 To 12-02-2021	54	Series of complex numbers
		55	Problems
		56	Ratio test
		57	Problems
		58	Root test
14	15-02-2021 To 19-02-2021	59	Problems
		60	Power series
		61	Problems to find power series of different functions
		62	Problems
		63	Radius of convergence
15	22-02-2021 To 26-02-2021	64	Radius of convergence
		65	Class test
		66	Taylor series
		67	Taylor series
		68	Maclaurin series
16	01-03-2021	69	Maclaurin series

No of Weeks	Dates	Session	Topic
	To 05-03-2021	70	Problems
		71	Problems
		72	Laurent series
		73	Laurent series
17	08-03-2021 To 12-03-2021	74	Laurent theorem
		75	Problems
		76	Problems
		77	Zeros and singularities
		11 March	MahaSivarathri - Holiday
18	15-03-2021 To 19-03-2021	78	Problems
			VI Semester UG Internal Exam
			VI Semester UG Internal Exam
			VI Semester UG Internal Exam
		79	Classification of singularities
19	22-03-2021 To 26-03-2021	80	Problems
		81	Problems
		82	Class test
		83	Singularity at infinity
		84	Residue theorem
20	22-03-2021 To 26-03-2021	85	Residue Integration
		86	Residue Integration
		87	Problems to find residue of different functions
		88	Revision
		89	Revision
21	29-03-2021 To 02-04-2021	29 March	**Talent Hunt**
		90	Revision
		31 March	**Easter vacation**
		01 April	**Easter vacation**
		02 April	**Easter vacation**
22	05-04-2021 To 09-04-2021	05 April	**Easter vacation**
		06 April	**Easter vacation**
		07 April	**Easter vacation**
			Study Leave
			Study Leave
23	05-04-2021 To 09-04-2021		**Study Leave**
			Study Leave
			Study Leave
			Study Leave
24	12-04-2021		**VI Semester UG University Exam Begin**

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:	**Anil M V**

Syllabus:

6B13MAT: Mathematical Analysis and Topology

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)

Texts : 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.

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	16-11-2020 To 20-11-2020	1	Upper sum and Lower sum
		2	Theorem
		3	Theorem
		4	Upper integral and Lower integral
		5	Examples
2	23-11-2020 To 27-11-2020	6	Examples
		7	Riemann criteria for integrability
		8	Examples
		9	Integrability of monotone & continuous functions
		10	Properties of Riemann integrals
3	30-11-2020 To 04-12-2020	11	Properties of Riemann integrals
		12	Theorem
		13	Theorem
		14	Theorem
		15	Composition theorem
4	07-12-2020 To 11-12-2020	16	Corollary
		17	Product theorem
		18	Examples
		19	Fundamental theorem of calculus 1st form
		20	Fundamental theorem of calculus 2nd form
5	14-12-2020 To 18-12-2020	21	Fundamental theorem of calculus combined form
		22	Integration by parts theorem
		23	Mean value theorem for integrals
		24	Substitution theorems
6	21-12-2020 To 25-12-2020	21 December	**Christmas Vacation**
		22 December	**Christmas Vacation**
		23 December	**Christmas Vacation**
		24 December	**Christmas Vacation**
		25 December	**Christmas**
7	28-12-2020 To 01-01-2021	25	Substitution in integrals
		26	Sequence of functions
		27	Point wise convergence
		28	Examples
		29	Examples
8	04-01-2021 To 08-01-2021	30	Uniform convergence
		31	Examples
		32	Uniform norm

No of Weeks	Dates	Session	Topic
		33	Cauchy criteria for uniform convergence
		34	Interchange of limit
9	11-01-2021 To 15-01-2021	35	Interchange of limit and continuity
		36	Interchange of limit and integrals
		37	Series of functions
		38	Cauchy criterion for uniform convergence
		39	Weierstrass M-test
10	18-01-2021 To 22-01-2021	40	Power series
		41	Radius of convergence
		42	Examples
		43	Cauchy Hadamard theorem
		44	Taylor's theorem
11	25-01-2021 To 29-01-2021	45	Differentiation theorem
		26 January	**Republic Day - Holiday**
		46	Metric spaces-definition and examples
		47	Discrete metric space
		48	Definitions
12	01-02-2021 To 05-02-2021	49	Open sphere and open sets
		50	Theorem
		51	Theorem
		52	Fundamental properties of open sets
		53	Interior point-definition and examples
13	08-02-2021 To 12-02-2021	54	Basic properties of interior of a set
		55	Theorem
		56	Examples
		57	Limit point-definition and examples
		58	Cosed sets
14	15-02-2021 To 19-02-2021	59	Theorem
		60	Theorem
		61	Closure of a set
		62	Properties of closure
		63	Convergence
15	22-02-2021 To 26-02-2021	64	Theorem
		65	Complete metric space
		66	Cantor's intersection theorem
		67	Baire's Theorem
		68	Topological Space-definition and examples
16	01-03-2021	69	Metrizable space

No of Weeks	Dates	Session	Topic
	To 05-03-2021	70	Open mapping and continuous mapping
		71	Homeomorphism
		72	Closed sets in a topological space
		73	Theorem
17	08-03-2021 To 12-03-2021	74	Definitions
		75	Theorem
		76	Isolated point and limit point
		77	Theorem
		11 March	Maha Sivarathri - Holiday
18	15-03-2021 To 19-03-2021	78	Examples
			VI Semester UG Internal Exam
			VI Semester UG Internal Exam
			VI Semester UG Internal Exam
		79	Interior of a set in a topological space
19	22-03-2021 To 26-03-2021	80	Closure of a set in a topological space
		81	Characterization of closure
		82	Boundary of a set
		83	Theorem
		84	Kuratowski's closure axioms
20	22-03-2021 To 26-03-2021	85	Examples
		86	Theorem
		87	Theorem
		88	Perfect set
		89	Theorem
21	29-03-2021 To 02-04-2021	29 March	**Talent Hunt**
		90	Revision
		31 March	**Easter vacation**
		01 April	**Easter vacation**
		02 April	**Easter vacation**
22	05-04-2021 To 09-04-2021	05 April	**Easter vacation**
		06 April	**Easter vacation**
		07 April	**Easter vacation**
			Study Leave
			Study Leave
23	05-04-2021 To 09-04-2021		**Study Leave**
			Study Leave
			Study Leave
			Study Leave
24	12-04-2021		**VI Semester UG University Exam Begin**

Subject Code:	**6B14AMAT**
Subject Name:	**Operations Research**
No. of Credits:	**3**
No. of Contact Hours:	**72**
Hours per Week:	**4**
Name of the Teacher:	**Riya Baby**

6B 14A MAT: Operations Research

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)

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

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	16-11-2020 To 20-11-2020	1	**Module 1 : Operations Research**
		2	An overview
		3	Convex sets
		4	Properties of convex sets
2	23-11-2020 To 27-11-2020	5	Convex function
		6	Local and global extreme
		7	Quadratic forms
		8	General linear programming problem
3	30-11-2020 To 04-12-2020	9	Canonical forms of LPP
		10	Standard forms of LPP
		11	Solutions of LPP
		12	Fundamental properties of solutions of LPP
4	07-12-2020 To 11-12-2020	13	Graphical solution method
		14	Problems
		15	Simplex method
		16	Problems
5	14-12-2020 To 18-12-2020	17	Duality in linear programming
		18	General Primal
		19	Dual Pair
		20	Formulating a dual problem
6	21-12-2020 To 25-12-2020	21 December	**Christmas Vacation**
		22 December	**Christmas Vacation**
		23 December	**Christmas Vacation**
		24 December	**Christmas Vacation**
		25 December	**Christmas**
7	28-12-2020 To 01-01-2021	21	Problems
		22	CALSS TEST MODULE 1
		23	**Module 2 : Transportation problem**
		24	General Transportation Problem
8	04-01-2021 To 08-01-2021	25	Problems
		26	The Transportation Tables
		27	Loops in Transportation Tables

No of Weeks	Dates	Session	Topic
		28	Solution of a Transportation Problem
9	11-01-2021 To 15-01-2021	29	Problems
		30	Finding an initial basic feasible solution
		31	Test for optimality
		32	Problems
10	18-01-2021 To 22-01-2021	33	Degeneracy in Transportation Problems
		34	Problems
		35	Transportation algorithm (MODI Method)
		36	Problems
11	25-01-2021 To 29-01-2021	37	Assignment problem
		26 January	Republic Day – Holiday
		38	Introduction
		39	Mathematical formulation
12	01-02-2021 To 05-02-2021	40	Problems
		41	Solution methods of Assignment Problem
		42	Problems
		43	Problems
13	08-02-2021 To 12-02-2021	44	CLASS TEST : MODULE 2
		45	**Module 3 : Sequencing Problem**
		46	Sequencing Problem
		47	Problem of Sequencing
14	15-02-2021 To 19-02-2021	48	Basic terms used in Sequencing
		49	Processing n job through two machines
		50	Problems
		51	Processing n jobs through K machines
15	22-02-2021 To 26-02-2021	52	Problems
		53	Processing 2 jobs through K machines
		54	Maintenance crew scheduling
		55	Games and strategies
16	01-03-2021 To 05-03-2021	56	Introduction
		57	Two – person zero- sum games
		58	Some basic terms
		59	The maximin - minmax Principle
17	08-03-2021 To 12-03-2021	60	Games without saddle points
		61	Mixed Strategies
		62	Graphic solution of 2xn and nx2 games
		11 March	Maha Sivarathri - Holiday
18	15-03-2021	63	Dominance property

No of Weeks	Dates	Session	Topic
	To 19-03-2021		**VI Semester UG Internal Exam**
			VI Semester UG Internal Exam
			VI Semester UG Internal Exam
19	22-03-2021 To 26-03-2021	64	Arithmetic method for nxn games
		65	Problems
		66	CLASS TEST : MODULE 3
		67	Revision Module 1
20	22-03-2021 To 26-03-2021	68	Revision Module 2
		69	Revision Module 3
		70	Previous Question paper Discussion
		71	Previous Question paper Discussion
21	29-03-2021 To 02-04-2021	29 March	**Talent Hunt**
		72	Previous Question paper Discussion
		31 March	**Easter vacation**
		01 April	**Easter vacation**
		02 April	**Easter vacation**
22	05-04-2021 To 09-04-2021	05 April	**Easter vacation**
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23	05-04-2021 To 09-04-2021		**Study Leave**
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			Study Leave
			Study Leave
24	12-04-2021		**VI Semester UG University Exam Begin**