SACRED HEART COLLEGE (AUTONOMOUS)

Department of Mathematics

BACHELOR OF SCIENCE IN MATHEMATICS

Course plan

Academic Year 2018-19

Semester 5

COURSE PLAN

PROGRAMME	BACHELOR OF SCIENCE MATHEMATICS	SEMESTER	5
COURSE CODE AND TITLE	15U5CRMAT05: MATHEMATICAL ANALYSIS	CREDIT	4
HOURS/WEEK	5	HOURS/SEM	90
FACULTY NAME	PROF. M.P.SEBASTIAN, Dr.DIDIMOS K V, ANJU WILSON		

COURSE OBJECTIVES
Find the limit points, interior points and closure of a set.
Verify the convergence of sequences and series
Determine the limits of functions
Understand theorems on limits

SESSION	**TOPIC**	**LEARNING RESOURCES**	**VALUE ADDITIONS**	**REMARKS**
MODULE I				
1	Intervals	Lecture		
2	Intervals	Problem solving		
3	supremum, intimum.	Lecture		
4	supremum, infimum.	Problem solving		
5	supremum, infimum.	Lecture		
6	supremum, infimum.	Problem solving		
7	Order completeness in R. Archimedian property of real numbers.	Lecture		
8	Order completeness in R. Archimedian property of real numbers.	Lecture		
9	Order completeness in R. Archimedian property of real numbers.	Lecture		
10	Order completeness in R. Archimedian property of real numbers.	Lecture/Problem solving		
11	Order completeness in R. Archimedian property of real numbers.	Lecture		
12	Order completeness in R. Archimedian property of real numbers.	Lecture/Problem solving		
13	Dedekinds form of completeness property.	Lecture/Problem solving		

14	Dedekinds form of completeness property.	Lecture		
15	Dedekinds form of completeness property.	Lecture/Problem solving		
16	Dedekinds form of completeness property.	Lecture		
17	Dedekinds form of completeness property.	Lecture/Problem solving		
18	Dedekinds form of completeness property.	PPT/Lecture		
19	Neighbourhood of a point.	Lecture		
20	Neighbourhood of a point.			
21	Neighbourhood of a point.	Lecture		
22	Interior point of a set.	Lecture		
23	Interior point of a set.	Lecture/Problem solving		
24	Interior point of a set.	Lecture/Problem solving		
25	Open set. Limit point of a set.	Lecture/Problem solving		
26	Open set. Limit point of a set.	Lecture/Problem solving		
27	Open set. Limit point of a set.	Lecture/Problem solving		
28	Bolzano weierstrass theorem for sets. Closed sets,	Lecture/Problem solving		
29	Bolzano weierstrass theorem for sets. Closed sets,	Lecture/Problem solving		
30	Bolzano weierstrass theorem for sets. Closed sets,	Lecture/Problem solving		
	CIA-1			
31	closure of a set. Dense sets. Countable and uncountable sets.	Lecture		
32	closure of a set. Dense sets. Countable and uncountable sets.	Lecture/Problem solving		
33	closure of a set. Dense sets. Countable and uncountable sets.	Lecture/Problem solving		
34	Real sequences. The range, bounds of a sequence.	Lecture/Problem solving		
35	Real sequences. The range, bounds of a sequence.	Lecture		
36	Real sequences. The range, bounds of a sequence.	Lecture/Problem solving		
37	Convergence of sequences. Some theorems,	Lecture/Problem		

		solving		
38	Convergence of sequences. Some theorems,	Lecture/Problem solving		
39	Convergence of sequences. Some theorems,	Lecture/Problem solving		
40	Convergence of sequences. Some theorems,	Lecture/Problem solving		
41	Convergence of sequences. Some theorems,	Lecture/Problem solving		
42	Convergence of sequences. Some theorems,	Lecture/Problem solving		
43	Convergence of sequences. Some theorems,	Lecture/Problem solving		
44	limit points of a sequence. Bolzano weierstrass theorem for sequences. Limit interior and superior.	Lecture/Problem solving		
45	limit points of a sequence. Bolzano weierstrass theorem for sequences. Limit interior and superior.	Lecture/Problem solving		
46	limit points of a sequence. Bolzano weierstrass theorem for sequences. Limit interior and superior.	Lecture/Problem solving		
47	Convergent sequences. Cauchy's general principle of convergence. Cauchy's sequences. Statements of theorem without proof in algebra of sequences.	Lecture/Problem solving		
48	Convergent sequences. Cauchy's general principle of convergence. Cauchy's sequences. Statements of theorem without proof in algebra of sequences.	Lecture/Problem solving		
49	Convergent sequences. Cauchy's general principle of convergence. Cauchy's sequences. Statements of theorem without proof in algebra of sequences.	Lecture/Problem solving		
50	Convergent sequences. Cauchy's general principle of convergence. Cauchy's sequences. Statements of theorem without proof in algebra of sequences.	Lecture/Problem solving		
51	Convergent sequences. Cauchy's general principle of convergence. Cauchy's sequences. Statements of theorem without	Lecture/Problem solving		

	proof in algebra of sequences.			
52	Convergent sequences. Cauchy's general principle of convergence. Cauchy's sequences. Statements of theorem without proof in algebra of sequences.	Lecture/Problem solving		
53	Some important theorems and examples related to them. Monotonic sequences, subsequences.	Lecture/Problem solving		
54	Some important theorems and examples related to them. Monotonic sequences, subsequences.	Lecture/Problem solving		
55	Some important theorems and examples related to them. Monotonic sequences, subsequences.	Lecture/Problem solving		
56	Some important theorems and examples related to them. Monotonic sequences, subsequences.	Lecture/Problem solving		
57	Some important theorems and examples related to them. Monotonic sequences, subsequences.	Lecture/Problem solving		
58	Some important theorems and examples related to them. Monotonic sequences, subsequences.	Lecture/Problem solving		
59	Some important theorems and examples related to them. Monotonic sequences, subsequences.	Lecture/Problem solving		
60	Sums and products. Basic algebraic properties. Further properties. Vectors and moduli.	Lecture/Problem solving		
61	Sums and products. Basic algebraic properties. Further properties. Vectors and moduli.	Lecture/Problem solving		
62	Sums and products. Basic algebraic properties. Further properties. Vectors and moduli.	Lecture/Problem solving		
63	Sums and products. Basic algebraic properties. Further properties. Vectors and moduli.	Lecture/Problem solving		
64	Sums and products. Basic algebraic properties. Further properties. Vectors and	Lecture/Problem solving		

	moduli.			
CIA - II				
65	Sums and products. Basic algebraic properties. Further properties. Vectors and moduli.	Lecture/Problem solving		
66	Sums and products. Basic algebraic properties. Further properties. Vectors and moduli.	Lecture/Problem solving		
67	Different representations. Exponential forms. Arguments of products and quotients. Product and powers in exponential form.	Lecture/Problem solving		
68	Different representations. Exponential forms. Arguments of products and quotients. Product and powers in exponential form.	Problem solving		
69	Different representations. Exponential forms. Arguments of products and quotients. Product and powers in exponential form.	Problem solving		
70	Different representations. Exponential forms. Arguments of products and quotients. Product and powers in exponential form.	Problem solving		
71	Different representations. Exponential forms. Arguments of products and quotients. Product and powers in exponential form.	Problem solving		
72	Different representations. Exponential forms. Arguments of products and quotients. Product and powers in exponential form.	Problem solving		
73	Different representations. Exponential forms. Arguments of products and quotients. Product and powers in exponential form.	Lecture/Problem solving		
74	Roots of complex numbers.	Lecture/Problem solving		
75	Roots of complex numbers.	Lecture/Problem solving		

INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	12/9/2018	Convergence problems

Text Book

0 S.C.Malik, Savitha Arora _ Mathematical analysis. RevisedSecond edition.

J.W. Brown and Ruel.V.Churchill _ Complex variables and applications, 8th edition. Mc.Graw Hill.

a) Additional Reading Material:

- Robert G Bartle and Donald R Sherbert –Introduction to real analysis 3rd edition.Wiley
- Richard R Goldberg – Methods of real analysis 3rd edition , Oxford and IBM Publishing Co (1964)
- Shanti Narayan – A Course of mathematical analysis , S Chand and Co Ltd(2004)
- Elias Zako – Mathematical analysis Vol1, Overseas Press, New Delhi(2006)
- J. M .Howie – Real Analysis, Springer 2007
- K.A Ross - Elementary Real Analysis, Springer, Indian Reprint
- M.R Spiegel – Complex Variables, Schaum's Series

COURSE PLAN

PROGRAMME	BACHELOR OF SCIENCE MATHEMATICS	SEMESTER	5
COURSE CODE AND TITLE	15U5CRMAT06: DIFFERENTIAL EQUATIONS	CREDIT	4
HOURS/WEEK	6	HOURS/SEM	90
FACULTY NAME	DR JEENU KURIAN		

COURSE OBJECTIVES
Understand the method of solving ordinary differential equations
Understand linear differential equations and its solutions
Compute the solutions of second order linear differential equations using power series method
Understand partial differential equations and method of solving the same

SESSION	TOPIC	LEARNING RESOURCES	VALUE ADDITIONS	REMARKS
1	Bridge course – Introduction to differential equations and partial differential equations	PPT		
2	Module 1 - Exact differential equations	Problem solving		
3	Exact differential equations and integrating factors	Lecture		
4	Problems solving	Problem solving		
5	Problems	Lecture		
6	Separable equations	Problem solving		
7	Separable equations and problems	Lecture		
8	equations reducible to separable equations	Lecture		
9	Problems solving	Lecture		
10	Problems	Lecture/Problem solving		
11	linear equations and its solutions	Lecture		
12	Problems on linear equations	Lecture/Problem solving		
13	Bernoulli equations and its solution	Lecture/Problem solving		
14	Problems on Bernoulli equations	Lecture		
15	special integrating factors and	Lecture/Problem		

	transformations : case 1	solving		
16	special integrating factors and transformations : case 2	Lecture		
17	Problems	Lecture/Problem solving		
18	Problems	PPT/Lecture		
19	Orthogonal trajectories and its solution	Lecture		
20	Oblique trajectories and its solutions			
21	Problems	Lecture		
22	Revision of module 1	Lecture		
23	Test on module 1	Lecture/Problem solving		
24	Module 2 – Introduction- Basic theory of linear differential equations	Lecture/Problem solving		
25	Basic Definitions	Lecture/Problem solving		
26	Basic existence theorem	Lecture/Problem solving		
27	Objective type problems based on definitions and theorem	Lecture/Problem solving		
28	Basic theorems on linear homogeneous differential equations	Lecture/Problem solving		
29	Elementary problems on basic theorem	Lecture/Problem solving		
30	Method of reduction of order	Lecture/Problem solving		
31	Problems on reduction of order	Lecture		
32	Non homogeneous equations and theorems	Lecture/Problem solving		
33	Problems on non homogeneous equations	Lecture/Problem solving		
34	Homogeneous linear equations with constant coefficient - Introduction	Lecture/Problem solving		
35	Case I and Case II	Lecture		
36	Case III and Case IV Problems	Lecture/Problem solving		
37	Method of undetermined coefficients - Introduction and method A	Lecture/Problem solving		
38	Method B, definitions of UC functions and sets	Lecture/Problem solving		
39	Examples	Lecture/Problem solving		
40	Problems	Lecture/Problem		

		solving		
41	Variation of Parameters, method	Lecture/Problem solving		
42	Variation of parameters problem	Lecture/Problem solving		
43	Cauchy Euler Equation and the method of solution	Lecture/Problem solving		
44	Problems on CR equations	Lecture/Problem solving		
45	Problems	Lecture/Problem solving		
46	Revision	Lecture/Problem solving		
47	Revision	Lecture/Problem solving		
48	Test on module 2	Lecture/Problem solving		
49	Test Paper review	Lecture/Problem solving		
50	Introduction to second order linear homogeneous differential equations and examples.	Lecture/Problem solving		
51	Ordinary points of second order linear homogeneous equations and examples.Concept of power series and convergence of power series.	Lecture/Problem solving		
52	Theorem concerning power series solutions& The method of finding power series solutions.	Lecture/Problem solving		
53	Problems related to power series solutions.	Lecture/Problem solving		
54	Problems related to power series solutions.	Lecture/Problem solving		
55	Problems related to power series solutions.	Lecture/Problem solving		
56	Problems related to power series solutions.	Lecture/Problem solving		
57	Singular points of second order linear homogeneous equations. Classification into regular and irregular singular points.	Lecture/Problem solving		
58	Problems related to classification of singular points.	Lecture/Problem solving		
59	Theorems related to existence of Frobenius series solutions about regular singular points of second order linear homogeneous	Lecture/Problem solving		

	equations.			
60	Method of finding Frobenius series solutions about regular singular points.	Lecture/Problem solving		
61	Problems related to Frobenius series solutions	Lecture/Problem solving		
62	Problems related to Frobenius series solutions	Lecture/Problem solving		
63	Problems related to Frobenius series solutions	Lecture/Problem solving		
64	Problems related to Frobenius series solutions	Lecture/Problem solving		
65	Introducing the Bessel's equation of order zero and order p.	Lecture/Problem solving		
66	Solution of the Bessel's equation of order zero	Lecture/Problem solving		
67	Solution of the Bessel's equation of order zero(Contd.)	Lecture/Problem solving		
68	Solution of the Bessel's equation of order p	Problem solving		
69	Solution of the Bessel's equation of order p(Contd.)	Problem solving		
70	Bessel Fuctions and properties.	Problem solving		
71	CIA – I	Problem solving		
72	Introduction to systems of first order linear equations.	Problem solving		
73	Solving systems of first order linear equations-Elimination Method	Problem solving		
74	Solving systems of first order linear equations-Elimination Method(Contd.)	Problem solving		
75	Solving systems of first order linear equations-Operator Method	Problem solving		
76	Solving systems of first order linear equations-Operator Method(Contd.)	Problem solving		
77	Review of the 3rd Module	Problem solving		
78	Introduction to Partial Differential equations	Problem solving		
79	Origin of Partial Differential Equations	Problem solving		
80	. Forming Partial Differential equations by elimination of arbitrary constants	Problem solving		
81	Forming Partial Differential equations by elimination of arbitrary constants(Contd.)	Problem solving		
82	Forming Partial Differential equations by elimination of arbitrary functions.	Problem solving		
83	Forming Partial Differential equations by elimination of arbitrary functions.(Contd.)	Problem solving		
84	Surfaces and Curves in three dimensions.	Problem solving		

85	Surfaces and Curves in three dimensions.(Contd.)	Problem solving		
86	Method of solution of the differential equation $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ (Contd.	Problem solving		
87	Second CIA	Problem solving		
88	Lagrange's linear first order p.d.e. and solution.	Problem solving		
89	Problems related to Lagranges equation	Problem solving		
90	Problems related to Lagranges equation(Contd.)	Problem solving		

INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	12/9/2018	Problems on each methods discussed
2	15/10/2018	Power series solution problems.
3	15/11/2018	Frobenius series solution problems

Basic Reference

1. **Shepley L. Ross - Differential Equations, 3rd ed., (Wiley India).**
2. **Ian Sneddon – Elements of Partial Differential Equation (Tata Mc Graw Hill)**

Additional Reading List

1.Differential Equations - by G.F.Simmons.

COURSE PLAN

PROGRAMME	BACHELOR OF SCIENCE MATHEMATICS	SEMESTER	5
COURSE CODE AND TITLE	15U5CRMAT07: ABSTRACT ALGEBRA	CREDIT	4
HOURS/WEEK	5	HOURS/SEM	75
FACULTY NAME	JEET KURIAN MATTAM		

COURSE OBJECTIVES
Understand concepts of binary operations and groups
Understand the concepts of subgroups and cyclic group
Understand Lagrange's theorem and its applications.
Understand the concepts of homomorphism and factor groups.
Compute factor groups
Understand the concepts of Rings, Fields, Integral domains
Understand the concepts of prime and maximal ideals

SESSION	**TOPIC**	**LEARNING RESOURCES**	**VALUE ADDITIONS**	**REMARKS**
MODULE I				
1	Binary Operations: Introduction of the concept	PPT		
2	Examples of operations which are binary operations and counterexamples	Lecture		
3	Representation of Binary Operations using a table	Lecture		
4	Binary operations (Conclusion)	Lecture		
5	Group: Motivating the definition using an	Lecture		

	example (For example the set of Integers under addition			
6	Group (Introduction of the concept continued)	Lecture		
7	Group table of order 4.	Lecture		
8	Subgroups. The concept of subgroup is explained and examples are given.	Lecture		
9	The subgroups of Z_4 and V are determined.	Lecture		
10	Cyclic Subgroups -Concept is introduced	Lecture		
11	Permutations and permutation groups- Introduction of the concept.	Lecture		
12	Permutations continued. The group S_A	Lecture		
13	Group Tables of S_3 and D_4 and their subgroups and subgroup lattice diagrams	Lecture		
14	Cycles and cyclic Notation. Theorem 5.1 of the text and its proof.	Lecture		
15	Transpositions-definition. Corollary on page 52. Theorem 5.2-idea of proof explained	Lecture		
16	Theorem 5.2- Proof Completed.	Lecture		
17	The alternating Group	Lecture		
18	Selected Exercises on page 55,56 and 57	Lecture		
19	Cyclic Groups- Definition , Theorem 6.1,	Lecture		

	Lemma 6.1 and examples			
20	Theorem 6.2 and its Corollary	Lecture		
21	The Classification of Cyclic groups- Infinite Case	Lecture		
22	The Classification of Cyclic groups- Finite Case	Lecture		
23	Subgroups of Finite Cyclic groups. Theorem 6.4	Lecture		
24	Corollary of theorem 6.4 and applications.	Lecture		
25	Selected Exercises on pages 63 64 and 65	Lecture		
26	Isomorphism- Definition , Explanation of the concept and Theorem 7.1	Lecture		
27	How to show that to groups are isomorphic and Theorem 7.2 and Example 7.2	Lecture		
28	How to show that two groups are not isomorphic. Examples 7.5- 7.9 0f the text	Lecture		
29	Cayley's Theorem	Lecture		
30	Cayley's Theorem and proof continued.	Lecture		
31	Exercises on pages 74,75 and 76 of the text	Lecture		
32	Groups of Cosets- Introduction to the concept and Theorem 11.1.Definition of left and right cosets.Motivation using example	Lecture		

	11.2 and example 11.3.			
33	Theorem 11.2 example 11.1 and Theorem 11.3	Lecture		
34	Lagrange's Theorem, its corollary , theorem 11.5, Definition of index and Theorem 11.6.	Lecture		
35	Counterexample for the falsity of the theorem of Lagrange.	Lecture		
36	Selected Exercises on page 111, 112 and 113	Lecture		
37	Lemma 12.1 and Theorem 12.1	Lecture		
38	Definition of automorphism, theorem 12.2 , definition of a normal subgroup ,theorem 12.3,Example 12.1 and definition of conjugate subgroups.	Lecture		
39	Definition of Factor Group, example 12.2, Example 12.3 and example 12.4	Lecture		
40	Examples 12.5, 12.6 and 12.7	Lecture		
41	Definition of simple group, Statement of theorem 12.4 and Theorem 12.5	Lecture		
42	Theorem 12.6	Lecture		
43	Definition of Homomorphism and Elementary Properties.Example 13.1,Theorem 13.1and Example 13.2	Lecture		

44	Theorem 13.2	Lecture		
45	Theorem 13.3	Lecture		
46	Example 13.3, definition of maximal normal subgroup theorem 13.4 and theorem 13.5.	Lecture		
47	Motivation of the definition of a ring, The Definition and Examples.	Lecture		
48	Examples 23.1 and 23.2	Lecture		
49	Theorem 23.1, Definition of isomorphism and example 23.3	Lecture		
50	Definitions of commutative rings and examples . Definition of Ring with unity and examples, Theorem 23.2, Direct product of rings.	Lecture		
51	Definition of unit, division ring and field and examples.Examplw 23.4	Lecture		
52	Selected Exercises on pages 211,212 and 213.	Lecture		
53	Divisors of Zero, Theorem 24.1 and its corollary	Lecture		
54	Theorem 24.2 and definition of an integral domain and its examples	Lecture		
55	Theorems 24.3 and Theorem 24.4 and its	Lecture		

	corollary.			
56	Selected Exercises on pages 220,221 and 222.	Lecture		
57	Definition of characteristic of a ring and example 24.2 and theorem 24.5	Lecture		
58	Fermat's Theorem (Theorem 24.6,corollary, Example 24.3)	Lecture		
59	Theorem 24.7 and Theorem 24.8(Euler)	Lecture		
60	Theorem 28.2 and lemma 28.1	Lecture		
61	Theorem 28.3	Lecture		
62	Definition of Ideal,proper ideal,improper ideal,trivial ideal et al and examples 28.1-28.4	Lecture		
63	Theorem 28.4 and its corollary	Lecture		
64	Selected Exercises on Pages 252-253	Lecture/Problem solving		
65	**Moodle Objective Test 1**	Lecture/Problem solving		
66	**Moodle Objective Test 2**	Lecture/Problem solving		
67	**Moodle Objective Test 3**	Lecture/Problem solving		
68	**Moodle Objective Test 4**	Problem solving		
69	**REVISION MODULE 1**	Problem solving		
70	**REVISION MODULE 1**	Problem solving		
71	**REVISION MODULE 2**	Problem solving		

72	**REVISION MODULE 2**	Problem solving		
73	**REVISION MODULE 3**	Problem solving		
74	**REVISION MODULE 4**	Problem solving		
75	**REVISION MODULE 4**	Problem solving		

INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	12/9/2018	Problems on binary operations
2	15/10/2018	Problems on permutations

Text Book

1.A First Course in Abstract Algebra by John B Fraleigh 3rd Edition

Additional references

1) Contemporary Abstract Algebra by Joseph Gallian

2) Topics in Algebra by I.N.Herstein

3) Algebra by Michael Artin

4) Abstract Algebra by David S Dummit and Richard M Foote

OURSE PLAN

PROGRAMME	BACHELOR OF MATHEMATICS	SEMESTER	5
COURSE CODE AND TITLE	**15U5CRMAT8**: FUZZY MATHEMATICS	CREDIT	4
HOURS/WEEK	5	HOURS/SEM	75
FACULTY NAME	SANIL JOSE		

COURSE OBJECTIVES
Understand the concept of Fuzzy sets
Interpret the idea of Fuzzy sets to discuss various operations on fuzzy sets
Understand the concept fuzzy numbers
Understand the concept of fuzzy logic

SESSION	TOPIC	LEARNING RESOURCES	VALUE ADDITIONS	REMARKS
MODULE I				
1	Module 1 - Preliminaries - Introduction	PPT	video	
2	Crisp set an overview	Lecture		
3	Fuzzy sets	Lecture		
4	Basic types of fuzzy sets	Lecture		
5	Basic concepts of fuzzy sets	Lecture		
6	Properties of alpha cuts	Lecture		
7	Properties of alpha cuts	Lecture		
8	Theorems on alpha cuts	Lecture		
9	Problems	Lecture		
10	Representation of fuzzy sets	Lecture		
11	first decomposition theorem	Lecture		
12	second decomposition theorem	Lecture		
13	third decomposition theorem	Lecture		
14	Problems	Lecture		
MODULE II				
15	Module II – Operations on fuzzy sets	PPT/Lecture		
16	Types of fuzzy operations	Lecture		
17	Union	Lecture		
18	Intersection	Lecture		
19	Complements	Lecture		
20	Fuzzy complements	Lecture		

21	Problems	Lecture		
22	Theorems	Lecture		
23	Fuzzy t norms	Lecture		
24	De –morgans law	Lecture		
25	Dual triple	Lecture		
26	CIA-1			
27	De –morgans law	Lecture		
28	Dual triple	Lecture		
29	Theorems on dual triple 1	Lecture		
30	Theorems on dual triple 2	Lecture		
31	Theorems on dual triple 3	Lecture		
32	Theorems on combination of operations 1	Lecture		
33	Theorems on combination of operations 2	Lecture		
34	Theorems on combination of operations 3	Lecture		
35	Problems	Lecture/ group work		
36	Problems	Lecture/ group work	Quiz	
37	Problems	Lecture/ group work		
38	Problems	Lecture/ group work		
39	Problems	Lecture/ group work		
40	Problems	Lecture/ group work		
41	Revision and test	Lecture		
42	Seminar	Lecture		
43	Seminar	Lecture		
44	Seminar	Lecture		
45	Seminar	Lecture		
Module III				
47	Module III -Introduction	Lecture		
48	Fuzzy Numbers	Lecture		
49	Arithmetic operations on intervals	Lecture		
50	Addition	Lecture		
51	Subtraction	Lecture		
52	Multiplication	Lecture		
53	Division	Lecture		
54	Arithmetic operations on fuzzy	Lecture		

	numbers			
55	Addition	Lecture		
56	Subtraction	Lecture		
57	Multiplication	Lecture		
58	Division	Lecture		
59	Problems	Lecture		
60	Module III -Introduction	Lecture		
61	Fuzzy Numbers	Lecture		
62	Arithmetic operations on intervals	Lecture		
MODULE IV				
63	MAX and MIN of fuzzy numbers	Lecture		
64	Max and min of fuzzy numbers	Lecture		
65	Problems	Lecture		
66	Classical logic an overview	Lecture		
67	Classical logic an overview	Lecture		
68	Multivalued logics	Lecture		
69	Fuzzy propositions 1	Lecture		
70	Fuzzy propositions 2	Lecture		
71	Fuzzy propositions 3	Lecture		
CIA II				
72	Fuzzy Quantifiers	Lecture		
73	Fuzzy Quantifiers	Lecture		
74	Linguistic hedges	Lecture		
75	Linguistic hedges	Lecture		

INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	By October	Problems in fuzzy sets
2		Problems in fuzzy logic

Seminar – Details & Guidelines

	Date of completion	Topic of **Seminar** & Nature of **Seminar** (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	By October	Fuzzy numbers
2		

Text Book

Fuzzy Sets and Fuzzy Logic Theory and Applications by George J. Klir and BoYuan

Reference Books

1 H.J. Zimmermann, "Fuzzy set theory and its Applications "Allied Publishers Ltd., New Delhi
2 T.J. Ross, John Wiley & Sons, Fuzzy Logic with Engineering Applications", IInd Ed., 2005.
3 John Yen and Reza Langari, Fuzzy Logic: Intelligence, Control and information, Pearson Education
4 Abbasbandy, S.; Jafarian, A. Steepest descent method for system of fuzzy linear equations. Appl. Math. Comput. 2006, 175, 823–833. [CrossRef]
5 Ineirat, L. Numerical Methods for Solving Fuzzy System of Linear Equations. Master's Thesis, An-Najah National University, Nablus, Palestine, 2017.

COURSE PLAN

PROGRAMME	BACHELOR OF MATHEMATICS	SEMESTER	5
COURSE CODE AND TITLE	**15U5OCMAT1**: APPLICABLE MATHEMATICs	CREDIT	3
HOURS/WEEK	4	HOURS/SEM	60
FACULTY NAME	SANIL JOSE		

COURSE OBJECTIVES
Understand the concept of quadratic equations,logarithm, combinatorics
Understand the concepts of probability and differential calculus
Understand the concepts of LCM,HCF, Fractions,Ratio and Proportion and Percentage
Understand the concept of simple interest, compound interest and time and work and elementary algebra.

Text Books:

1 M. Tyra, & K. Kundan- CONCEPTS OF ARITHMETIC.

Sessions	Topic	Method	REMARKS
1	Introduction about the course	Lecture + Interaction	
2	Types of numbers	Lecture + Interaction	
3	Solution of quadratic equations with real	Lecture + Interaction	
	roots only		
4	Different methods of solution	Lecture + Interaction	
5	Logarithms	Lecture + Interaction	
6	Properties + problems	Group work	
7	Problems	Group work	
8	Evaluations of exponents	Lecture + Interaction	
9	Exponents laws	Lecture + Interaction	
10	Permuations	Lecture + Interaction	
11	Rules and explanations	Lecture + Interaction	
12	Problems	Lecture + Interaction	
13	Combinations	Lecture + Interaction	
14	Problems	Lecture + Interaction	
15	Trigonometry	Lecture + Interaction	
16	Simple equations	Group work	
17	- T - Values	Lecture + Interaction	
18	Heights and Distance - problems	Group work	
19	Two dimensional geometry	Lecture + Interaction	
20	Plotting of points	Lecture + Interaction	
21	Drawing graph of a straight line	Lecture + Interaction	
22	Probability	Lecture + Interaction	
23	Sample space	Lecture + Interaction	
24	Examples – events	Lecture + Interaction	
25	Differential calculus	Lecture + Interaction	
26	Formulas	Group work	
27	Simple problems	Group work	
28	Problems	Lecture	
29	Integral calculus	Lecture	
30	Simple problems	Group work	
31	Problems	Group work	
32	Hcf of nos	Lecture	
33	Lcm of nos	Lecture	
34	Fractions	Lecture	
35	Square and roots	Lecture	
36	Test		

37	Cube and cube roots	Lecture	
38	Problems	Lecture	
39	Ratio and proportion	Lecture	
40	Percentage	Lecture	
41	Profit and loss	Lecture	
42	problems	Group work	
43	Problems	Group work	
44	Simple interest	Lecture	
45	Compound interest	Lecture	
46	Time and work	Lecture	
47	Time and work	Lecture	
48	Work and wage	Lecture	
49	Work and wage	Lecture	
50	Time and distance	Lecture	
51	Elementary mensuration	Lecture	
52	Area and Perimeter	Lecture	
53	Problems on polygons	Lecture	
54	Problems on polygons	Lecture	
55	Test		
56	Problems	Group work	
57	Revision	Group work	
58	Revision	Group work	
59	Revision	Group work	
60	Problems	Group work	

Further Reading

1-RS Aggarwal, Quantitative Aptitude for Competitive Examinations, S Chand Publishing; Revised edition (21 February 2017)

2-Rajesh Verma, Fast Track Objective Arithmetic, Arihant Publications; Fourth edition (2018)

3-Objective Arithmetic (SSC and Railway Exam Special), S Chand Publishing; 2 Colour edition (2018)

4-Quantitative Aptitude & Data Interpretation Topic-wise Solved Papers for IBPS/ SBI Bank PO/ Clerk Prelim & Main Exam (2010-19) 3rd Edition

5-Bank PO Quantitative Aptitude Chapterwise Solved Papers 1999 Till Date 7500+ Objective Question - 2297