FR. Conceicao Rodrigues College Of Engineering

Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50

Department of Humanities & Sciences

S.E. (IT) (semester IV) (2018-2019)

Lesson Plan

Subject: Applied Mathematics IV (ITC401)

Credits-5

Syllabus:

Course Code	Course Name	Theory	Practical	Tutorial	Theory	Oral & Practical	Tutorial	Total
ITC401	Applied Mathematics IV	04	--	01	04	--	--	05

Course Code	Course Name	Examination Scheme							
		Theory Marks				Term Work	Oral & Practical	Oral	Total
		Internal assessment			End Sem. Exam				
		Test1	Test2	Avg. of Two Tests					
ITC401	Applied Mathematics IV	20	20	20	80	--	--	--	100

Course Objectives: Students will try to learn:

1. The concepts of Number Theory by using different theorem.
2. The concepts of probability and study PDF.
3. The concept of sampling theory and correlation.
4. The concept of graphs and trees.
5. The concept of groups theory.
6. The concept of Lattice theory.

Course Outcomes: Students will able to:

1. Apply the Number Theory to different applications using theorem.
2. Apply probability and understand PDF.
3. Understand sampling theory and correlation.
4. Apply the graphs and trees concepts to different applications.
5. Understand group's theory.
6. Understand the Lattice theory.

Prerequisite: Applied Mathematics III

Detailed syllabus:

Sr. No.	Module	Detailed Content	Hours	CO Mapping
0	Prerequisite	Basic of Set, Permutations, Combination and Probability .	02	
I	Elements of Number Theory I	Modular Arithmetic, Divisibility and Euclid Algorithm, Primes and the Sieve of Eratosthenes, Testing for primes, Prime Number Theorem	06	CO1

II	Elements of Number Theory II	Euler's, Fermat's Little theorems, Congruences, Computing Inverse in Congruences, Legendre and Jacobi Symbols, Chinese Remainder Theorem	06	CO1
III	Probability	Statistics: Formal concept, sample space, outcomes, events Random Variables: discrete & continuous random variables, expectation, Variance, Probability Density Function & Cumulative Density Function Moments, Moment Generating Function Probability distribution: binomial distribution, Poisson & normal distribution	08	CO2
IV	Sampling theory	Test of Hypothesis, Level of significance, Critical region, One Tailed and two Tailed test, Test of significant for Large Samples:- Means of the samples and test of significant of means of two large samples Test of significant of small samples:- Students t- distribution for dependent and independent samples Chi square test:- Test of goodness of fit and independence of attributes, Contingency table. Correlation Scattered diagrams Karl Pearson's coefficient of correlation Spearman's Rank correlation Regression Lines	10	CO3
V	Graph & Groups theory.	Introduction to graphs, graph terminology, representing graphs and graph isomorphism, connectivity, Euler and Hamilton paths, planar graphs, graph coloring, introduction to trees, application of trees. Groups, subgroups, generators and evaluation of powers, cosets and Lagrange's theorem, permutation groups and Burnside's theorem, isomorphism, automorphisms, homomorphism and normal	12	CO4 CO5

		subgroups, rings, integral domains and fields.		
VI	Lattice theory	Lattices and algebras systems, principles of duality, basic properties of algebraic systems defined by lattices, distributive and complimented lattices, Boolean lattices and Boolean algebras, uniqueness of finite Boolean expressions, prepositional calculus. Coding theory: Coding of binary information and error detection, decoding and error correction.	08	CO5

Text Books:

1. Cryptograph and Network Security by B. A. Forouzan & D. Mukhopadhyay, 11th edition, McGraw Hill Publication.
2. Network Security and Cryptograph byBernard Menezes, Cengage Learning Publication.
3. Higher Engineering Mathematics by Grewal B. S. 38th edition, Khanna Publication 2005.
4. Probability and Statistics for Engineering, Dr. J Ravichandran, Wiley-India.
5. Mathematical Statistics by H. C Saxena, S Chand & Co.
6. *C. L. Liu: Elements of Discrete Mathematics*, 2nd edition, TMH

References:

1. Elementary Number Theory and its applications by Kenneth H. Rosen, 5th edition, Addison Wesley Publication.
2. Abstract Algebra by I. N. Herstain, 3rd eition, John Wiley and Sons Publication.
3. Discrete Mathematics by Norman Biggs, 2nd edition, Oxford University Press.
4. Advanced Engg. Mathematics by C. Ray Wylie & Louis Barrett.TMH International Edition.
5. Mathematical Methods of Science and Engineering by Kanti B. Datta, Cengage Learning.
6. Advanced Engineering Mathematics by Kreyszig E. 9th edition, John Wiley.
7. Probability by Seymour Lipschutz, McGraw-Hill publication.

Assessment:

Internal Assessment for 20 marks:
Consisting of **Two Compulsory Class Tests**
Approximately 40% to 50% of syllabus content must be covered in First test and remaining 40% to 50% of syllabus contents must be covered in second test.

End Semester Examination: Some guidelines for setting the question papers are as:

- Weightage of each module in end semester examination is expected to be/will be proportional to number of respective lecture hours mentioned in the syllabus.
- Question paper will comprise of total **six questions**, **each carrying 20 marks.**
- **Q.1** will be **compulsory** and should **cover maximum contents of the syllabus**.

Course Outcomes:

Upon completion of this course students will be able to:

1. Study the trend between two aspects using correlation coefficient and able to obtain the best estimate using Regression Analysis*
2. Identify different algebriac structures & Construct different types of Graphs
3. Solve the practical problems using theoretical distributions (Binomial, Poisson and Normal)*
4. Understand elements (Modular Arithmetic, Divisibilityand Prime number theory) of Number theory.
5. Test the given hypothesis (small and large samples) using Chi-square and Students' t distribution*
6. Understand different types of lattices and their applications in Boolean Algebra

Mapping of CO and PO/PSO

Relationship of course outcomes with program outcomes: Indicate 1 (low importance), 2 (Moderate Importance) or 3 (High Importance) in respective mapping cell.

CO-PO MAPPING

Course	PO1	PO2	PO4	PO6	PO11
ITC401.1	3	3	3	2	3
ITC401.2	1	0	0	0	0
ITC401.3	2	3	3	3	3
ITC401.4	2	0	0	0	0
ITC401.5	1	3	3	2	3
ITC401.6	1	0	0	0	0
TOTAL	10	9	9	7	9
Direct Attainment	1.6(M)	1.5(M)	1.5(M)	1.16(L)	1.5(M)

Justification

PO1:A.M.-IV provides the complete basic mathematical knowledge required for identifying and analysing problems related to production engineering

PO1:Apply the basic Mathematical/Staistical concepts to problems to Itrelated problems.
PO2:Identify,formulate&analyze problems in data mining&Image processing
PO4:Interpret data&analyse it to provide valid conclusions.
PO11:Understand&apply the statistical knowledge to manage projects related to IT.

CO Assessment Tools:

ITC401.**1:** **Direct Methods(80%):** Test1+End Exam

CO1dm = 0.4test1+.6 end exam

InDirect Methods(20%): Course exit survey

CO1idm

Itc401.1 = 0.8*CO1dm + 0.2* CO1idm

ITC401.**2:** **Direct Methods(80%):** Test2 + end exam

CO2dm = 0.4 test2 + .6 end exam

InDirect Methods(20%): Course exit survey

CO2idm

ITC401.2 = 0.8*CO2dm + 0.2* CO2idm

ITC401**.3:** **Direct Methods(80%):** End Exam

CO3dm 1* end exam

InDirect Methods(20%): Course exit survey

CO3idm

ITC401.3 = 0.8*CO3dm + 0.2* CO3idm

ITC401**.4:** **Direct Methods(80%):**Test2+End Exam

CO4dm = 0.4test2+.6 end exam

InDirect Methods(20%): Course exit survey

CO4idm

ITC401.4 = 0.8*CO4dm + 0.2* CO4idm

ITC401**.5:** **Direct Methods(80%):** End Exam

CO5dm= 1*end exam

InDirect Methods(20%): Course exit survey

CO5idm

ITC401.5 = 0.8*CO5dm + 0.2* CO5idm

ITC401**.6:** **Direct Methods(80%):** End Exam

CO6dm = 1*end exam

InDirect Methods(20%): Course exit survey

CO6idm

ITC401.6 = 0.8*CO5dm + 0.2* CO5idm

Course Outcomes Target:

Upon completion of this course students will be able to:

ITC401.1 Study the trend between two aspects using correlation coefficient and able to obtain the best estimate using Regression Analysis*

TARGET RANGE : 2.5

ITC 401.2 Identify different algebriac structures & Construct different types of Graphs

TARGET RANGE : 2

ITC 401.3. Solve the practical problems using theoretical distributions (Binomial, Poisson and Normal)*

TARGET RANGE : 2.5

ITC401.4 Understand elements (Modular Arithmetic, Divisibilityand Prime number theory) of Number theory.

TARGET RANGE : 2.5

ITC401.5 Test the given hypothesis (small and large samples) using Chi-square and Students' t distribution*

TARGET RANGE : 2

ITC401.6 . Understand different types of lattices and their applications in Boolean Algebra

TARGET RANGE : 2.5

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Applied Mathematics 1V - Theory | **Academic Year: 2018-19**

IT | **Semester: IV**

Sr. No.	*Name of the Topic*	*Planned Date*	*Executed Date*	*Remark*
1	Introduction to correlation and Regression	1/1/2019	2/1/2019	On leave 1/1/2019
2	Definition ,formulae&properties(correlation)	2/1/2019	9/1/2019	
3	Introduction to Group	3/1/2019	3/1/2019	
4	Examples on Group	4/1/2019	4/1/2019	
5	Permutation Group	7/1/2019	7/1/2019	
6	Problems on correlation	8/1/2019	15/1/2019	On OD on 8/1/2019
7	Regression Analysis(theory)	9/1/2019	15/1/2019	
8	Examples on Permutation	10/1/2019	8/1/2019	
9	Homomorphism & Isomorphism of Groups	11/1/2019	10/1/2019	
10	Homomorphism & Isomorphism of Groups	14/1/2019	11/1/2019	
11	Problems on Regression type1	15/1/2019	16/1/2019	
12	Problems on Regression type2	16/1/2019	27/1/2019	
13	Subgroups	18/1/2019	14/1/2019	
14	Subgroups and Cosets	21/1/2019	18/1/2019	
15	Combined problems on correlation and Regression	22/1/2019	29/1/2019	
16	Rank Correlation	23/1/2019	29/1/2019	
17	Cosets , Rings	25/1/2019	21/1/2019	
18	Field and Integral Domain	28/1/2019	22/1/2019	
19	Problems on Rank correlation	29/1/2019	30/1/2019	
20	Revision of Question for UT1	30/1/2019	30/1/2019	
21	Problems on Field and Integral domain	1/2/2019	22/1/2019	
22	Lattices	8/2/2019	23/1/2019	4,5,6 feb unit test 1 12-15 Euphoria
23	Examples on above	11/2/2019	25/1/2019	
24	Types of lattices	18/2/2019	28/1/2019	
25	Introduction to Random Variables	20/2/2019	20/2/2019	
26	Examples on Lattices	22/2/2019	1/2/2019	19/2/2019 holiday
27	Isomorphism of Lattices	25/2/2019	8/2/2019	
28	Expectation ,Variance and covariance (theory)	26/2/2019	27/2/2019	On leave on 26/2/2019
29	m.g.f and moments	27/2/2019	5/3/2019	

30	Boolean Algebra	1/3/2019	11/2/2019		
31	Problems on Discrete Variable	5/3/2019	5/3/2019		
32	Problems on Continuous variable	6/3/2019	6/3/2019		
33	Boolean Algebra	8/3/2019	18/2/2019		
34	Modular Arithematic	11/3/2019	22/2/2019		
35	Problems on m.g.f	12/3/2019	12/3/2019	On 13/3/2019 lecture cancelled due to seminar	
36	Binomial distribution (theory)	13/3/2019	12/3/2019		
37	Examples on Boolean Algebra	15/3/2019	25/2/2019		
38	Examples on Boolean Algebra	18/3/2019	26/2/2019		
39	Poisson Distribution (theory)	19/3/2019	19/3/2019		
40	Problems on Binomial Distribution	20/3/2019	19/3/2019		
41	Euclid's algorithm	22/3/2019	1/3/2019		
42	Chinese remainder theorem	25/3/2019	8/3/2019		
43	Problems on Poisson Distribution	26/3/2019	20/3/2019		
44	Normal Distribution (theory)	27/3/2019	26/3/2019		
45	Fermat's Theorem & Euler's function	29/3/2019	18/3/2019		
46	Examples on above	1/4/2019	22/3/2019		
47	Problems on Normal Distribution(type 1 &2)	2/4/2019	26/3/2019		
48	Chi Square test (application 1 and 2)	3/4/2019	27/3/2019		
49	Legendre's symbol	5/4/2019	22/3/2019		
50	Graph theory		25/3/2019	8,9,19 April UT2 Extra lecture after submission(dates yet to be decided)	
51	Graph theory		1/4/2019		
52	Student’s t test and Normal test				