FR. Conceicao Rodrigues College Of Engineering

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

Department of Humanities and Science

B.E. (Computer Engineering) (semester IV) (2018-2019)

Lecture Plan:

Subject: Applied Mathematics 4 (CSC401) **Credits-5**

Syllabus:

Course Code	Course Name	Credits
CSC401	**Applied Mathematics-IV**	**5**

Course Objectives: The objectives of this course are to teach the students:

1. Matrix theory, and it's application to find the matrix function. Present methods of computing and using Eigen values and Eigen vectors.
2. Set up and directly evaluate contour integrals Cauchy's integral theorem and formula in basic and extended form. Present Taylor and Laurent's series to find singularities zero's and poles also presents residues theory
3. Theory of probability, Baye's Theorem, Expectation and Moments and it's application.
4. Probability distribution such as Binomial, Poisson and Normal distribution with their properties.
5. Sampling theory and it's application for small and large sample and Optimization techniques.

Course Outcomes:

1. Students in this course will be able to apply the method of solving complex integration, computing residues & evaluate various contour integrals.
2. Demonstrate ability to manipulate matrices and compute Eigen values and Eigen vectors.
3. Apply the concept of probability distribution to the engineering problems.
4. Apply the concept of sampling theory to the engineering problems.
5. Use matrix algebra with its specific rules to solve the system of linear equation, using concept of Eigen value and Eigen vector to the engineering problems.
6. Apply the concept of Linear & Non-Linear Programming Problem to the engineering problems.

Module No.	Unit No.	Topics	Hrs.
1.0		**Complex Integration**	**10**
	1.1	Complex Integration – Line Integral, Cauchy's Integral theorem for simply connected regions, Cauchy's Integral formula(without proof)	
	1.2	Taylor's and Laurent's series (without proof)	
	1.3	Zeros, poles of f(z), Residues, Cauchy's Residue theorem.	
	1.4	Applications of Residue theorem to evaluate Integrals of the type $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$, $\int_{-\infty}^{\infty} f(x)dx$	
2.0		**Matrices**	**10**
	2.1	Eigen values and Eigen vectors.	
	2.2	Cayley-Hamilton theorem(without proof)	
	2.3	Similar matrices, diagonalisable matrix.	
	2.4	Derogatory and non-derogatory matrices, Functions of square matrix.	

3.0		**Probability**	**10**
	3.1	Baye's Theorem	
	3.2	**Random Variables:** Discrete & continuous random variables, expectation, Variance, Probability Density Function & Cumulative Density Function.	
	3.3	Moments & Moment generating function.	
	3.4	**Probability distribution:** Binomial distribution, Poisson & Normal distribution. (For detail study)	
4.0		**Sampling Theory (Large Sample test)**	**06**
	4.1	Sampling Distribution, Test of Hypothesis, Level of significance, Critical region, One Tailed and Two Tailed test,	
	4.2	Test of significant for Large Samples:-Means of the samples and test of significant of means of two large samples.	
5.0		**Sampling Theory (Small Sample test)**	**06**
	5.1	Test of significant for small samples:- Students t- distribution for dependent and independent samples	
	5.2	Chi square test:- Test of goodness of fit and independence of attributes,Contingency table.	
6.0		**Mathematical Programming**	**10**
	6.1	Types of solution, Standard and Canonical form of LPP, Basic and feasible solutions, simplex method.	
	6.2	Artificial variables, Big –M method (method of penalty).	
	6.3	Duality and Dual simplex method.	
	6.4	Non Linear Programming Problems with equality constrains and inequality Constrains (two or three variables with one constrains) (No formulation, No Graphical method).	
		Total	**52**

Text Books:

1. Higher Engineering Mathematics by Grewal B. S. 38th edition, Khanna Publication 2005.
2. Operation Research by Hira & Gupta,S Chand.
3. A Text Book of Applied Mathematics Vol. I & II by P.N.Wartilar &
4. J.N.Wartikar, Pune, Vidyarthi Griha Prakashan., Pune.
5. Probability and Statistics for Engineering, Dr. J Ravichandran, Wiley-India.

Course Outcomes:

Upon completion of this course students will be able to:

CSC401.1 Apply probability theory and random variables concepts to practical problems (Bayes' theorem)
CSC402.2 Able to solve the practical problems using theoretical distributions (Binomial, Poisson and Normal)
CSC402.3 Analyze problems based on small samples and large samples using Chi square test, Student's t test and Normal test
CSC401.4 Able to diagonalize the given matrix using eigen values and eigen vectors
CSC401.5 Able to optimize the given function using LPP/NLPP
CSC401.6 Evaluate real integrals using Cauchy's Residue theorem

CO-PO Mapping

	PO1	
CSC401.1	3	**PO1:** Engineering graduates will be able to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
CSC401.2	3	
CSC401.3	3	
CSC401.4	3	
CSC401.5	3	
CSC401.6	3	

CO Assessment Tools:

CSC401.**1:** **Direct Methods (80%):** Test1+ End Exam

CO1 dm = 0.5*Test1+0.5*End Exam

Indirect Methods(20%): Course Exit Survey(CES)

CO1 idm =1xCES

MEC401.1 = (0.8 x CO1 dm) + (0.2 x CO1 idm)

CSC401.**2:** **Direct Methods (80%):** Test 1+End Exam

CO2dm = 0.5*Test 2+0.5* End Exam

Indirect Methods(20%): Course Exit Survey(CES)

CO2 idm=1xCES

ITC401.2 = (0.8 x CO2 dm) + (0.2x CO2 idm)

CSC401.**3:** **Direct Methods(80%):** End Exam

CO3 dm=1* End Exam

Indirect Methods(20%): Course exit survey(CES)

CO3 idm=1xCES

ITC401.3 = (0.8 x CO3 dm) + (0.2 x CO3 idm)

CSC401.**4:** **Direct Methods (80%):** Test 2**+** End Exam

CO4 dm = 0.5*Test 2+0.5* End Exam

Indirect Methods(20%): Course Exit Survey(CES)

CO4 idm =1xCES

ITC401.4 = 0.8xCO4dm + 0.2* CO4idm

CSC401.**5:** **Direct Methods (80%):** Test 1**+** End Exam

CO4 dm = 0.5*Test 1+0.5* End Exam

Indirect Methods(20%): Course Exit Survey(CES)

CO4 idm =1xCES

ITC401.4 = 0.8xCO4dm + 0.2* CO4idm

CSC401.**6:** **Direct Methods (80%):** End Exam

CO4 dm = 1* End Exam

Indirect Methods(20%): Course Exit Survey(CES)

CO4 idm =1xCES

ITC401.4 = 0.8xCO4dm + 0.2* CO4idm

Curriculum Gap/Content beyond syllabus (if any): Nil

Lecture Plan:

Sr. No.	*Name of the Topic*	*Planned Date*	*Executed Date*	*Remark*
1	Introduction to OR	01/01/2019	01/01/2019	
2	Probability Theory (Definition and Theorems)	02/01/2019	02/01/2019	
3	Addition, Multiplication and Bayes' Theorem	03/01/2019	03/01/2019	
4	Students' t test	04/04/2019	04/04/2019	
5	Normal test	10/01/2019	05/04/2019	

6	Types of solution to LPP	07/01/2019	08/01/2019	
7	Problems on unconditional probability	11/01/2019	09/01/2019	
8	Problems on Bayes' theorem	17/01/2019	10/01/2019	
9	Trial and Error Method	08/01/2019	11/01/2019	
10	Simplex Method	09/01/2019	14/01/2019	
11	Simplex Method (alternative optima)	14/01/2019	15/01/2019	
12	Simplex Method (unbounded optima)	16/01/2019	16/01/2019	
13	Random variables (DRV) Definitions	18/01/2019	18/01/2019	
14	Big M Method	21/01/2019	21/01/2019	
15	Big M Method	23/01/2019	23/01/2019	
16	Random variables (CRV) Definitions	28/01/2019	24/01/2019	Tutorial 1
17	Problems on Discrete Random Variables (DRV)	24/01/2019	25/01/2019	31 Jan Sports Day
18	Principal of Duality	30/01/2019	28/01/2019	
19	Problems on Continuous Random Variables (CRV)	25/01/2019	01/02/2019	
20	Moment Generating Function and moments	01/02/2019	01/02/2019	
21	Problems on Moment Generating Function and moments	07/02/2019	07/02/2019	04-06 UT 1
22	Binomial distribution (definition and derivation)	08/02/2019	07/02/2019	8 Feb
23	Principal of Duality	11/02/2019	11/02/2019	Tutorial 2
24	Dual Simplex Method	18/02/2019	18/02/2019	11-15 Feb Euphoria
25	Dual Simplex Method	20/02/2019	20/02/2019	
26	Poisson distribution (definition and derivation)	21/02/2019	21/02/2019	
27	Problems on Binomial distribution	22/02/2019	22/02/2019	22 Feb Tutorial 3
28	Non-linear optimization with no constraints	25/02/2019	25/02/2019	
29	NLPP: Lagrange Method	27/02/2019	27/02/2019	
30	Problems on Poisson distribution	28/02/2019	01/03/2019	
31	NLPP: Kuhn-Tucker Method	06/03/2019	05/03/2019	
32	Eigen values and Eigen vectors	11/03/2019	06/03/2019	
33	Normal distribution (definition, problems, normal curve)	01/03/2019	07/03/2019	
34	Problems on Normal distribution (type 1)	07/03/2019	08/03/2019	
35	Eigen values and Eigen vectors (properties)	13/03/2019	12/03/2019	
36	Similarity of Matrices and Diagonalisation	18/03/2019	13/03/2019	
37	Problems on Normal distribution (type 2)	14/03/2019	14/03/2019	Tutorial 3
38	Derogatory and Non-derogatory Matrices	20/03/2019	18/03/2019	15 Mar Crescendo
49	Chi Square Test (Theory, type 1 problems)	22/03/2019	22/03/2019	
40	Functions of a square matrix	25/03/2019	25/03/2019	21 Mar Holiday
41	Line integral	27/03/2019	27/03/2019	
42	Chi Square Test (Type 2 and 3)	28/03/2019	27/03/2019	Adjusted class
43	Cauchy's integral theorem and integral formula	01/04/2019	01/04/2019	
44	Taylor and Laurent Series	02/04/2019	02/04/2019	
45	Taylor and Laurent Series	03/04/2019	03/04/2019	
46	Students' t test	29/03/2019	04/04/2019	

47	Normal test	04/04/2019	05/04/2019	
48	Singular Points and Residues	11/04/2019	ND	
49	Cauchy's Residue Theorem	12/04/2019	ND	
50	Evaluation of some real integrals using Complex Integration	05/04/2019	ND	

ND: Not decided

Teacher-in-charge: (1) Prof. Sundary S. Prabavathy
(2) Prof. Prasad Lalit