












CMRCET/H&S/MAT/BOS/2022/1

Date: 12.10.2022

DEPARTMENT OF MATHEMATICS

BOARD OF STUDIES AS PER UGC NORMS

S.No	Position	Composition	Name	Signature
1	Chairman	Associate Professor	DR M. SRIDEVI Head of the Department	
2	Member	Expert Nominated by Vice-Chancellor/University	DR B RAVINDRA REDDY Associate Professor, University College of Engineering, JNTUH, Hyderabad	
3	Member	Expert from Industry/ R&D	DR M NARESH KUMAR National Remote Sensing Centre (NRSC), Hyderabad	
4	Member	External Expert nominated by the Academic Council (1)	DR N KISHAN, Professor, Osmania University, Hyderabad	
5	Member	External Expert nominated by the Academic Council (2)	DR V NAGARAJU Professor, Osmania University, Hyderabad	
6	Member	Senior Faculty of the Department	Dr. T. VIDYANATH, Associate Professor	
7	Member	Senior Faculty of the Department	Dr. M.CHANDRASHEKAR REDDY, Associate Professor	
8	Member	Senior Faculty of the Department	Ms. P. KAMALA, Associate Professor	
9	Member	Senior Faculty of the Department	Mr. M. PRASANANJANEYULU, Associate Professor	
10	Member	Senior Faculty of the Department	Mr. S. NARESH KUMAR Assistant Professor	
11	Member	Senior Faculty of the Department	Mr.M RAJ KUMAR Assistant Professor	


HEAD OF THE DEPARTMENT

Minutes of Board of studies Meeting of Department of Mathematics held on 12.10.2022 at 02:00PM :

1. Matrix Algebra And Calculus (A400001) offered for all branches of B.Tech.
2. Ordinary Differential Equations And Vector Calculus (A400002) offered to EEE, ECE, CSE, CSD, CSM, INF, CSC & AIM branches.
3. Advanced Calculus And Numerical Methods (A400004) offered to CIVIL & Mechanical branches.
4. Numerical Techniques And Complex Variables (A400005) offered to EEE & ECE branches.
5. Probability & Statistics (A400006) offered to CIVIL & Mechanical branches.
6. Computer Oriented Statistical Methods (A400011) offered to CSE, CSC, INF, CSD branches.
7. Mathematical & Statistical Foundation (A400003) proposed for CSM & AIM branches, but BOS members proposed And suggested the same Computer Oriented Statistical Methods (A400011) to CSM & AIM branches.
8. The Mathematics syllabus of Sem-I, II and Sem-III, IV for all branches presented in the meeting approved with few corrections.

Arundh
(Dr. B. Ravindra Reddy)

Prof. V. KISHAN
(Prof. V. KISHAN)

1. Dr. M. Pradeep

2. BKS

3. MPA

4. M. Chandan

5. S. Sankar

6. P. K. S.

7. Raj

Prof. V. Naga Raju
(Prof. V. Naga Raju)

(A400001) MATRICES AND CALCULUS

(Common to EEE, ECE, CSE, IT, CSD, CSC, CSM, AIM, CIVIL & MECH)

B.Tech (ECE): I Semester

L	T	P	C
3	1	0	4

UNIT-I

Matrices: Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous equations and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

UNIT-II**Eigen values and Eigen vectors:**

Linear Transformation and Orthogonal transformation: Eigen values, Eigen vectors and their properties, Diagonalization of a square matrix, Cayley-Hamilton theorem (without proof) -Inverse and power of a matrix by Cayley-Hamilton theorem, Quadratic forms and nature of the quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformations.

UNIT-III**Calculus:**

Mean value theorems: Rolle's theorem, Lagrange's mean value theorem with their geometrical interpretation and applications, Cauchy's mean value theorem, Taylor's series, Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (only in Cartesian coordinates),

Improper Integral: Beta, Gamma functions and their applications.

UNIT-IV**Multivariable calculus (Partial Differentiation and applications):**

Partial differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V**Multivariable Calculus (Integration):**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

TEXT BOOKS:

1. Higher Engineering Mathematics, (36th Edition), B.S. Grewal, Khanna Publishers, 2010.
2. Advanced Engineering Mathematics, (5th Edition), R.K. Jain and S.R.K Iyengar, Narosa Publications, 2016.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, (9th Edition), Erwin kreyszig, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry, (9th Edition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.
3. A text book of Engineering Mathematics, (10th Edition), N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2019.
4. Higher Engineering Mathematics, (11th Reprint), Ramana B.V., Tata McGraw Hill New Delhi, 2010.

COURSE OUTCOMES:.

On completion of the course students will be able to

1. Solve linear system of equations represented by matrices
2. Obtain eigen values, eigen vectors and perform diagonalization of a square matrix.
3. Verify mean value theorems & evaluation of improper integrals by using Beta and Gamma functions.
4. Develop the skill of determining optimal values of multivariable functions using classical methods.
5. Evaluate the multiple integrals and apply the concept to find areas, volumes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										2
CO2	3	3										2
CO3	3	3										2
CO4	3	3										2
CO5	3	3										2

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 B.S. Grewal
 B.S. Grewal
 P. H. K.
 M.P.S.
 M. Chakraborty
 Raj

(A400002) ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to EEE, ECE, CSE, IT, MECH, CIVIL, CSD, CSC, CSM & AIM)

B.Tech. I Year II Semester

L T P C
3 1 0 4

UNIT-I

First Order ODE:

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's differential equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay, Orthogonal Trajectories

UNIT-II

Ordinary Differential Equations of Higher Order:

Second and higher order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax}V(x)$ and $x V(x)$, method of variation of parameters.

UNIT-III

Laplace transforms:

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem and Second shifting theorem. Orthogonal Trajectories (only in Cartesian Coordinates). Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't'. Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions. Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method..

UNIT-IV

Vector Differentiation:

Vector point functions and scalar point functions, Gradient, Tangent plane and normal line, Directional derivatives, Divergence and Curl, Solenoidal and Irrotational vectors, Scalar potential functions, Vector Identities.

UNIT-V

Vector Integration:

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stoke's (without proofs) and their applications.

TEXT BOOKS:

1. Higher Engineering Mathematics, (36th Edition), B.S. Grewal, Khanna Publishers, 2010.
2. Advanced Engineering Mathematics, (5th Edition), R.K. Jain and S.R.K. Iyengar, Narosa Publications, 2016.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, (9th Edition), Erwin kreyszig, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry, (9th Edition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.
3. A text book of Engineering Mathematics, (10th Edition), N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2019.
4. Higher Engineering Mathematics, (9th Edition), H. K. Dass and Er. Rajnish Verma, S Chand and company Limited, New Delhi, 2011.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Determine first order differential equations and obtain solutions.
2. Solve the Higher order differential equations and apply the differential equation concepts to real world problems.
3. Use the Laplace transforms techniques for solving ODE's.
4. Evaluate Gradient – Divergence – Curl, Directional derivatives.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										2
CO2	3	3										2
CO3	3	3										2
CO4	3	3										2
CO5	3	3										2

Handwritten signatures and notes:
 - Blue scribbles at the bottom left.
 - Green signature: "Bhuvan"
 - Blue signature: "P. K. ..."
 - Blue signature: "M. Chandra ..."
 - Blue signature: "Raj ..."

(A400007) NUMERICAL METHODS AND COMPLEX VARIABLES**(Common to EEE and ECE)****B.Tech. II Year**

L	T	P	C
3	1	0	4

UNIT-I**NUMERICAL METHODS-I:**

Solution of polynomial and transcendental equations: Bisection method, Iteration method, Newton-Raphson method and Regula-False method.

Interpolation: Finite differences, Forward differences, Backward differences, Central differences, Symbolic relations and separation of symbols, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation, Gauss's forward and backward formulae, Lagrange's method of interpolation.

UNIT-II**NUMERICAL METHODS-II:**

Numerical integration : Trapezoidal rule, Simpson's 1/3rd and 3/8 rules.

Numerical Solutions of Ordinary Differential Equations -Taylor's series, Picard's method, Euler and modified Euler's methods, Runge-Kutta method of fourth order.

UNIT-III**COMPLEX VARIABLES: DIFFERENTIATION**

Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne-Thomson's methods, Analytic function, Harmonic function, Finding harmonic conjugate, Conformal mapping and Mobius transformations.

UNIT-IV**COMPLEX VARIABLES: INTEGRATION**

Line integrals, Cauchy's theorem, Cauchy's Integral formula, Liouville's theorem, Maximum-Modulus theorem (All theorems without proof), Zeros of analytic functions, singularities.

Complex Power series: Taylor's series, Laurent's series, Residues, Cauchy Residue theorem (without proof)

UNIT-V**FOURIER SERIES & FOURIER TRANSFORMS:**

Fourier series - Dirichlet's Conditions - Half-range Fourier series - Fourier Transforms: Fourier Sine and cosine transforms - Inverse Fourier transforms.

TEXT BOOKS:

1. Higher Engineering Mathematics, (36th Edition), B.S. Grewal, Khanna Publishers, 2010.
2. Advanced Engineering Mathematics, (5th Edition), R.K. Jain and S.R.K. Iyengar, Narosa Publications, 2016.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, (9th Edition), Erwin kreyszig, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry, (9th Edition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.
3. Introductory methods of Numerical Analysis, (4th Edition), S.S. Sastry, PHI, 2005.
4. Complex Variables and Applications, (7th Edition), J. W. Brown and R. V. Churchill, Mc-Graw Hill, 2004.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Find the root of given equation and estimate unknown value using interpolation.
2. Find numerical solutions of ordinary differential equations.
3. Analyze the complex function with reference to their analyticity.
4. Evaluate integrals using Cauchy's integral and residue theorems, Taylor's and Laurent's series expansions of complex function.
5. Express any periodic function in terms of sine and cosine.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Apply the concepts of probability and Random variables to case studies.
2. Formulate and solve problems involving random variables and discrete distributions.
3. Apply sampling techniques for analyzing experimental data.
4. Apply concept of estimation and testing of hypothesis to case studies.
5. Analyze the data using Stochastic process and Markov chains.

Handwritten signatures and marks in green and blue ink, including the name "Bhramar" and "M. Chandra" with arrows pointing to them.

(A400005) PROBABILITY AND STATISTICS

(CIVIL)

B.Tech. II Year

L	T	P	C
3	1	0	4

UNIT-I**Probability:**

Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence and the Product Rule, Baye's Rule.

Random Variables: Concept of a Random Variable, Discrete and Continuous random Variables.

UNIT-II**Expectation and discrete distributions:**

Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem.

Discrete Probability Distributions: Binomial Distribution, Poisson distribution.

UNIT-III**Continuous Distributions and Sampling Distributions:**

Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial Distribution.

Fundamental Sampling Distributions: Random Sampling, Some Important Statistics, Sampling Distribution: Sampling Distribution of Means and the Central Limit Theorem, t - Distribution, F- Distribution.

UNIT-IV**Estimation & Tests of Hypotheses:**

Introduction, Classical Methods of Estimation, Single Sample: Estimating the mean, standard error of a point estimate. Two samples: Estimating the difference between two means, Single sample: Estimating a proportion, Two samples: Estimating the difference between two proportions.

Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis, Single sample: Tests concerning single mean, Two samples: tests on two means, One sample: test on single proportion. Two samples: tests on two proportions, Two- sample tests concerning variances.

UNIT-V**Curve fitting, Correlation and regression:**

Curve fitting by the method of least squares, fitting of straight lines, second degree parabolas and more general curves, Correlation and regression, Rank correlation.

TEXT BOOKS:

1. Probability & Statistics For Engineers & Scientists, (9th Edition), Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Pearson Publishers, 2011.
2. Fundamentals of Mathematical statistics, S C Gupta and V K Kapoor Khanna publications.

REFERENCE BOOKS:

1. Fundamentals of Probability and Statistics For Engineers, T.T. Soong, John Wiley & Sons, Ltd, 2004.
2. Probability and statistics for Engineers and scientists, (5th Edition), Sheldon M Ross, Academic press, 2014.
3. Probability and Statistics for Engineers, (8th Edition), Miller and Freund's, Pearson Educations, 2015.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Apply the concepts of probability and random variables to some case studies.
2. Evaluate random processes which occur in engineering applications governed by the Binomial, Poisson.
3. Obtain the areas under the normal curve and apply the sampling theory.
4. Estimate the population parameters and test the hypothesis for large and small samples.
5. Acquire the knowledge of curve fitting and correlation regression.

M. Chandra

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Probability

Ans

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Shresh

P. K. S.

Raj

MPS

(A400003) MATHEMATICAL AND STATISTICAL FOUNDATION
(Common to CSM and AIM)

B.Tech. II Year

L	T	P	C
3	1	0	4

UNIT-I

Greatest Common Divisors and Prime Factorization: Greatest common divisors, The Euclidean algorithm, The fundamental theorem of arithmetic, Factorization of integers and the Fermat numbers.

Congruences: Introduction to congruences, Linear congruences, The Chinese remainder theorem, Systems of linear congruences.

UNIT-II

Simple Linear Regression and Correlation: Introduction to Linear Regression, The Simple Linear Regression Model, Least Squares and the Fitted Model, Properties of the Least Squares Estimators, Inferences Concerning the Regression Coefficients, Prediction, Simple Linear Regression Case Study.

Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions.

Discrete Probability Distributions: Binomial Distribution, Poisson distribution.

UNIT-III

Continuous Probability Distributions: Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial.

Fundamental Sampling Distributions: Random Sampling, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Sampling Distributions: t-distribution, F-distribution, χ^2 distribution.

UNIT-IV

Estimation & Tests of Hypotheses: Introduction, Statistical Inference, Classical Methods of Estimation. Estimating the Mean, Standard Error of a Point Estimate, Estimating the Variance, Estimating a Proportion.

Tests of Hypotheses: Single mean, Difference between Two Means, Single Proportion, Difference between Two Proportions.

UNIT-V

Stochastic Processes and Markov Chains: Introduction to Stochastic processes - Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, n step transition probabilities, Markov chain, Steady state condition, Markov analysis.

TEXT BOOKS:

1. Elementary number theory & its applications, (6th Edition), Kenneth H. Rosen, Addison-Wesley, 2015.
2. Fundamentals of Mathematical statistics, S C Gupta and V K Kapoor Khanna publications.

REFERENCE BOOKS:

1. Fundamentals of Probability and Statistics For Engineers, T.T. Soong, John Wiley & Sons, Ltd, 2004.
2. Probability and statistics for Engineers and scientists, (5th Edition), Sheldon M Ross, academic press, 2014.
3. Probability and Statistics for Engineers, (8th Edition), Miller and Freund's, Pearson Educations, 2015.

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COURSE OUTCOMES:

On completion of the course students will be able to

1. Apply the number theory concepts to cryptography domain.
2. Fit the least squares Regression Model and solve problems involving random variables and discrete distributions
3. Apply sampling techniques for analyzing experimental data.
4. Apply concept of estimation and testing of hypothesis to case studies
5. Analyze the data using Stochastic process and Markov chains.

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Pranav

Y

Shreshth
Raj

J. S. S.

MPS

M. Chaudhary

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B. Tech- Mechanical Engineering

CBCS & OUTCOME BASED I-YEAR COURSE STRUCTURE & SYLLABUS
(Effective for the students admitted into I year from the Academic Year 2022-23)

(A400004) PROBABILITY, STATISTICS & COMPLEX VARIABLES

B.Tech (MECH): IV Semester

L	T	P	C
3	1	0	4

UNIT-I: Basic Probability

Probability spaces, conditional probability, independent events, and Baye's theorem.

Random variables: Discrete and continuous random variables, Expectation of Random Variables, Variance of random variables

UNIT-II: Probability distributions

Binomial, Poisson, evaluation of statistical parameters for these distributions, Poisson approximation to the binomial distribution, Continuous random variables and their properties, distribution functions and density functions,

Normal and exponential, evaluation of statistical parameters for these distributions

UNIT-III: Estimation & Tests of Hypotheses

Introduction, Statistical Inference, Classical Methods of Estimation.: Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Estimating a Proportion for single sample, Difference between Two Means, difference between two proportions for two Samples.

Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis, Tests Concerning a Single Mean, Tests on Two Means, Test on a Single Proportion, Two Samples: Tests on Two Proportions.

UNIT-IV: Complex Differentiation

Limit, Continuity and Differentiation of Complex functions, Analyticity, Cauchy-Riemann equations (without proof), finding harmonic conjugate, elementary analytic functions (exponential, trigonometric, logarithm) and their properties.

UNIT-V: Complex Integration

Line integral, Cauchy's theorem, Cauchy's Integral formula, Zeros of analytic functions, Singularities, Taylor's series, Laurent's series, Residues, Cauchy Residue theorem (All theorems without Proof).

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, (35th Edition), 2010.
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, keying Ye, Probability and statistics for engineers and scientists, (9th Edition), Pearson Publications.

REFERENCE BOOKS:

1. Fundamentals of Mathematical Statistics, Khanna Publications, S. C. Guptha and V. K. Kapoor.
2. Miller and Freund's, Probability and Statistics for Engineers, (8th Edition), Pearson Educations.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, (10th Edition), Laxmi Publications, Reprint, 2010.
4. J. W. Brown and R. V. Churchill, Complex Variables and Applications, (7th Edition), Mc-Graw Hill, 2004.

Course outcomes: After learning the contents of this paper the student must be able to

1. Apply the concepts of Probability and Random Variables to case studies.
2. Formulate and solve problems involving Random Variables and apply statistical methods for analyzing experimental data.
3. Apply concepts of estimation and testing of hypothesis to case studies.
4. Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.
5. Taylor's and Laurent's series expansions of complex function.

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

KANDLAKOYA, MEDCHAL ROAD, HYDERABAD

DEPARTMENT OF HUMANITIES & SCIENCES

Date: 03/01/2022

CMRCET/DEPT/A.Y. 2022/CIR/01

CIRCULAR

All the Mathematics faculty are here by informed that the pre-BOS meeting is scheduled on 05/01/2022 in Room No 204, Block-I at 2.20 P.M. The agenda of the meeting is to finalize I-B.Tech R-22 course structure and formulation of detailed syllabus related to Mathematics subjects under CBCS. Hence all are requested to attend the meeting.


Subject Co-Ordinator

Copy To

1. Principal
2. IQAC
3. HOD



CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

KANDLAKOYA, MEDCHAL ROAD, HYDERABAD

DEPARTMENT OF HUMANITIES & SCIENCES

Date: 26/09/2022

To

The Principal
CMRCET
Hyderabad

Through IQAC

Sub: Requisition letter to conduct BOS meeting.

Respected Sir,

As per the above mentioned subject, the Department of Mathematics of the institute planning to conduct a BOS meeting to revise the courses related to Mathematics for the new regulations R22 for B.Tech programs. So, I request you to give permission to conduct BOS.

Thanking you Sir,

Yours Sincerely,

(Dr M. Sridevi)



CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

KANDLAKOYA, MEDCHAL ROAD, HYDERABAD
DEPARTMENT OF HUMANITIES & SCIENCES

Date: 12/09/2022

CMRCET/DEPT/A.Y. 2022/CIR/02

CIRCULAR

All the Mathematics faculty are here by informed that the pre-BOS meeting is scheduled on 16/09/2022 in Room No 204, Block-I at 2.20 P.M. The agenda of the meeting is to finalize I-B.Tech R-22 course structure and formulation of detailed syllabus related to Mathematics subjects under CBCS. Hence all are requested to attend the meeting.


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CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

KANDLAKOYA, MEDCHAL ROAD, HYDERABAD
DEPARTMENT OF HUMANITIES & SCIENCES

Date: 12/09/2022

CMRCET/DEPT/A.Y. 2022/CIR/02

CIRCULAR

All the below mentioned Mathematics faculty are here by informed that the pre-BOS meeting is scheduled on 16/09/2022 in Room No 204, Block-I at 2.20 P.M.

Agenda of the Meeting

Discussion and formulation of final course structure and detailed syllabus of I B.Tech., for Regulation R-22 of Mathematics related subjects under CBCS. Hence the above mentioned members of the department are requested to present in the meeting.

Dr. M.Sridevi Asst. Prof.

Dr.Vidyanath Assoc.Prof

P.Kamala Assoc.Prof

S. Naresh Kumar Asst. Prof.

M. Raj Kumar Asst. Prof.

R.V.Surendra Mani Asst. Prof.

B. Meena Asst. Prof.


Subject Co-Ordinator

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1. Principal
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3. HOD



CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

KANDLAKOYA, MEDCHAL ROAD, HYDERABAD
DEPARTMENT OF HUMANITIES & SCIENCES

Date: 03/01/2022

CMRCET/DEPT/A.Y. 2022/CIR/01

CIRCULAR

All the below mentioned Mathematics faculty are here by informed that the pre-BOS meeting is scheduled on 05/01/2022 in Room No 108, Block-I at 12.15 P.M.

Agenda of the Meeting

Discussion and formulation of final course structure and detailed syllabus of I B.Tech., for regulation R-22 of Mathematics related subjects under CBCS. Hence the above mentioned members of the department are requested to present in the meeting.

Dr. M.Sridevi Asst. Prof.

Dr.Vidyanath Assoc. Prof.

P.Kamala Assoc. Prof.

S. Naresh Kumar Asst. Prof.

M.Raj Kumar Asst. Prof.

R.V.Surendra Mani Asst. Prof.

B.Meena Asst. Prof.


Subject Co-Ordinator

Copy To

1. Principal
2. IQAC
3. HOD

(A400001) MATRIX ALGEBRA AND CALCULUS
(Common to All Branches)

B.Tech. I Year

L	T	P	C
3	1	0	4

UNIT-I

Matrices: Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous equations and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

UNIT-II

Eigen values and Eigen vectors: Linear Transformation and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical form by Orthogonal Transformation.

UNIT-III**Calculus:**

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series.

Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates). Definition of Improper Integral, Beta and Gamma functions and their applications.

UNIT-IV**Multivariable Calculus (Partial Differentiation and applications):**

Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V**Multivariable Calculus (Integration)**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals, Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Triple (Cartesian, spherical and cylindrical)

TEXT BOOKS:

1. Higher Engineering Mathematics, (36th Edition), B.S. Grewal, Khanna Publishers, 2010
2. Advanced Engineering Mathematics, (5th Edition), R.K. Jain and S.R.K. Iyengar, Narosa Publications, 2016.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, (9th Edition), Erwin Kreyszig, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry, (9th Edition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.
3. A text book of Engineering Mathematics, (10th Edition), N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2019.
4. Higher Engineering Mathematics, (11th Reprint), Ramana B.V., Tata McGraw Hill New Delhi, 2010.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Solve linear system of equations represented by matrices.
2. Obtain eigen values, eigen vectors and perform diagonalization of a square matrix.
3. Verify mean value theorems & evaluation of improper integrals by using Beta and Gamma functions
4. Develop the skill of determining optimal values of multivariable functions using classical methods.
5. Evaluate the multiple integrals and apply the concept to find areas, volumes.

(A400002) ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(Common to EEE, ECE, CSE, CSD, CSM, INF, CSC, & AIM)

B.Tech. I Year II Semester

L	T	P	C
3	1	0	4

UNIT-I**First Order ODE:**

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's differential equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay. *orthogonal trajectories*

UNIT-II**Ordinary Differential Equations of Higher Order:**

Second and higher order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax}V(x)$ and $xV(x)$, method of variation of parameters, Applications: Electric Circuits.

UNIT-III**Laplace transforms:**

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't'. Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions. Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method. *second shifting theorem*

UNIT-IV**Vector Differentiation:**

Vector point functions and scalar point functions, Gradient, Tangent plane and normal line, Directional derivatives, Divergence and Curl, Solenoidal and Irrotational vectors, Scalar potential functions, Vector Identities.

UNIT-V**Vector Integration:**

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stoke's (without proofs) and their applications.

TEXT BOOKS:

1. Higher Engineering Mathematics, (36th Edition), B.S. Grewal, Khanna Publishers, 2010.
2. Advanced Engineering Mathematics, (5th Edition), R.K. Jain and S.R.K. Iyengar, Narosa Publications, 2016.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, (9th Edition), Erwin kreyszig, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry, (9th Edition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.
3. A text book of Engineering Mathematics, (10th Edition), N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2019.
4. Higher Engineering Mathematics, (9th Edition), H. K. Dass and Er. Rajnish Verma, S Chand and company Limited, New Delhi, 2011.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Determine first order differential equations and obtain solutions.
2. Solve the Higher order differential equations and apply the differential equation concepts to real world problems.
3. Use the Laplace transforms techniques for solving ODE's.
4. Evaluate Gradient – Divergence – Curl, Directional derivatives.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

(A400004) ADVANCED CALCULUS AND NUMERICAL METHODS
(Common to CIVIL and MECH)

B.Tech. I Year II Semester

L	T	P	C
3	1	0	4

UNIT-I

First Order ODE:

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's differential equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

UNIT-II

Ordinary Differential Equations of Higher Order:

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax}V(x)$ and $x V(x)$, method of variation of parameters, Applications: Electric Circuits, orthogonal trajectories

UNIT-III

NUMERICAL METHODS-I:

Solution of polynomial and transcendental equations: Bisection method, Iteration method, Newton-Raphson method and Regula-Falsi method.

Interpolation: Finite differences, Forward differences, Backward differences, Central differences, Symbolic relations and separation of symbols, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation, Gauss's forward and backward formulae, Lagrange's method of interpolation

UNIT-IV

NUMERICAL METHODS-II:

Numerical integration : Trapezoidal rule, Simpson's 1/3rd and 3/8 rules.

Numerical Solutions of Ordinary Differential Equations: Taylor's series, method Picard's method, Euler and modified Euler's methods, Runge-Kutta method of fourth order.

UNIT-V

Vector Differentiation:

Vector point functions and scalar point functions, Gradient, Directional derivatives, Divergence and Curl, Solenoidal and Irrotational vectors, Scalar potential functions.

Vector Integration:

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stoke's (without proofs) and their applications.

TEXT BOOKS:

1. Higher Engineering Mathematics, (36th Edition), B.S. Grewal, Khanna Publishers, 2010.
2. Advanced Engineering Mathematics, (5th Edition), R.K. Jain and S.R.K. Iyengar, Narosa Publications, 2016.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, (9th Edition), Erwin kreyszig, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry, (9th Edition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.
3. A text book of Engineering Mathematics, (10th Edition), N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2019.
4. Higher Engineering Mathematics, (11th Edition), Ramana B.V., Tata McGraw Hill New Delhi, 2010.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Determine first order differential equations and obtain solutions.
2. Solve the Higher order differential equations and apply the differential equation concepts to real world problems.
3. Find the root of given equation and estimate unknown value using interpolation.
4. Find numerical solutions of ordinary differential equations.
5. Evaluate Gradient – Divergence – Curl, Directional derivatives and evaluate the line, surface and volume integrals and converting them from one to another.

B.Tech. II Year

L	T	P	C
3	1	0	4

UNIT-I

Greatest Common Divisors and Prime Factorization: Greatest common divisors, The Euclidean algorithm, The fundamental theorem of arithmetic, Factorization of integers and the Fermat numbers.

Congruences: Introduction to congruences, Linear congruences, The Chinese remainder theorem, Systems of linear congruences.

UNIT-II

Simple Linear Regression and Correlation: Introduction to Linear Regression, The Simple Linear Regression Model, Least Squares and the Fitted Model, Properties of the Least Squares Estimators, Inferences Concerning the Regression Coefficients, Prediction, Simple Linear Regression Case Study.

Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions.

Discrete Probability Distributions: Binomial Distribution, Poisson distribution.

UNIT-III

Continuous Probability Distributions: Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial.

Fundamental Sampling Distributions: Random Sampling, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Sampling Distributions: t-distribution, F- distribution, χ^2 distribution.

UNIT-IV

Estimation & Tests of Hypotheses: Introduction, Statistical Inference, Classical Methods of Estimation. Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Estimating the Variance, Estimating a Proportion.

Tests of Hypotheses: Single mean, Difference between Two Means, Single Proportion, Difference between Two Proportions.

UNIT-V

Stochastic Processes and Markov Chains: Introduction to Stochastic processes - Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, n step transition probabilities; Markov chain, Steady state condition, Markov analysis.

TEXT BOOKS:

1. Elementary number theory & its applications, (6th Edition), Kenneth H. Rosen, Addison-Wesley, 2015.
2. Fundamentals of Mathematical statistics, S C Gupta and V K Kapoor Khanna publications.

REFERENCE BOOKS:

1. Fundamentals of Probability and Statistics For Engineers, T.T. Soong, John Wiley & Sons, Ltd, 2004.
2. Probability and statistics for Engineers and scientists, (5th Edition), Sheldon M Ross, academic press, 2014.
3. Probability and Statistics for Engineers, (8th Edition), Miller and Freund's, Pearson Educations, 2015.

(A400005) NUMERICAL TECHNIQUES AND COMPLEX VARIABLES

(Common to EEE and ECE)

B.Tech. II Year

L	T	P	C
3	1	0	4

UNIT-I**NUMERICAL METHODS-I:**

Solution of polynomial and transcendental equations: Bisection method, Iteration method, Newton-Raphson method and Regula-False method.

Interpolation: Finite differences, Forward differences, Backward differences, Central differences, Symbolic relations and separation of symbols, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation, Gauss's forward and backward formulae, Lagrange's method of interpolation.

UNIT-II**NUMERICAL METHODS-II:**

Numerical integration : Trapezoidal rule, Simpson's 1/3rd and 3/8 rules.

Numerical Solutions of Ordinary Differential Equations -Taylor's series, Picard's method, Euler and modified Euler's methods, Runge-Kutta method of fourth order.

UNIT-III**Complex Variables: Differentiation**

Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne-Thomson's methods, Analytic function, Harmonic function, Finding harmonic conjugate, Conformal mapping and Mobius transformations.

UNIT-IV**Complex Variables: Integration**

Line integrals, Cauchy's theorem, Cauchy's Integral formula, Liouville's theorem, Maximum-Modulus theorem (All theorems without proof), Zeros of analytic functions, singularities.

Complex Power series: Taylor's series, Laurent's series, Residues, Cauchy Residue theorem (without proof)

UNIT-V**Fourier Series & Fourier Transforms:**

Fourier series - Dirichlet's Conditions - Half-range Fourier series - Fourier Transforms: Fourier Sine and cosine transforms - Inverse Fourier transforms.

TEXT BOOKS:

1. Higher Engineering Mathematics, (36th Edition), B.S. Grewal, Khanna Publishers, 2010
2. Advanced Engineering Mathematics, (5th Edition), R.K. Jain and S.R.K. Iyengar, Narosa Publications, 2016.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, (9th Edition), Erwin kreyszig, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry, (9th Edition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.
3. Introductory methods of Numerical Analysis, (4th Edition), S.S. Sastry, PHI, 2005.
4. Complex Variables and Applications, (7th Edition), J. W. Brown and R. V. Churchill, Mc-Graw Hill, 2004.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Find the root of given equation and estimate unknown value using interpolation.
2. Find numerical solutions of ordinary differential equations.
3. Analyze the complex function with reference to their analyticity.
4. Evaluate integrals using Cauchy's integral and residue theorems, Taylor's and Laurent's series expansions of complex function.
5. Express any periodic function in terms of sine and cosine.

(A400006) PROBABILITY AND STATISTICS

(Common to CIVIL and MECH)

B.Tech. II Year

L	T	P	C
3	1	0	4

UNIT-I**Probability:**

Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence and the Product Rule, Baye's Rule.

Random Variables: Concept of a Random Variable, Discrete and Continuous random Variables.

UNIT-II**Expectation and discrete distributions:**

Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem.

Discrete Probability Distributions: Binomial Distribution, Poisson distribution.

UNIT-III**Continuous Distributions and Sampling Distributions:**

Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial Distribution.

Fundamental Sampling Distributions: Random Sampling, Some Important Statistics, Sampling Distribution: Sampling Distribution of Means and the Central Limit Theorem, t - Distribution, F- Distribution.

UNIT-IV**Estimation & Tests of Hypotheses:**

Introduction, Classical Methods of Estimation, Single Sample: Estimating the mean, standard error of a point estimate. Two samples: Estimating the difference between two means, Single sample: Estimating a proportion, Two samples: Estimating the difference between two proportions.

Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis, Single sample: Tests concerning single mean, Two samples: tests on two means, One sample: test on single proportion. Two samples: tests on two proportions, Two- sample tests concerning variances.

UNIT-V**Curve fitting, Correlation and regression:**

Curve fitting by the method of least squares, fitting of straight lines, second degree parabolas and more general curves, Correlation and regression, Rank correlation.

TEXT BOOKS:

1. Probability & Statistics For Engineers & Scientists, (9th Edition), Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Pearson Publishers, 2011.
2. Fundamentals of Mathematical statistics, S C Gupta and V K Kapoor Khanna publications.

REFERENCE BOOKS:

1. Fundamentals of Probability and Statistics For Engineers, T.T. Soong, John Wiley & Sons, Ltd, 2004.
2. Probability and statistics for Engineers and scientists, (5th Edition), Sheldon M Ross, Academic press, 2014.
3. Probability and Statistics for Engineers, (8th Edition), Miller and Freund's, Pearson Educations, 2015.

(A40003) COMPUTER ORIENTED STATISTICAL METHODS
(Common to CSE, CSC, IT and CSD)

B.Tech. II Year

L	T	P	C
3	1	0	4

UNIT-I

Probability:

Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Baye's Rule.

Random Variables : Concept of a Random Variable, Discrete and Continuous random Variable.

UNIT-II

Expectation and Discrete Distributions:

Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem.

Discrete Probability Distributions: Binomial Distribution, Poisson distribution.

UNIT-III

Continuous Distributions and Sampling Distributions:

Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial Distributions.

Fundamental Sampling Distributions: Random Sampling, Some Important Statistics, Sampling Distributions: Sampling Distribution of Means and the Central Limit Theorem, t - Distribution, F- Distribution.

UNIT-IV

Sample Estimation & Tests of Hypotheses:

Introduction, Statistical Inference, Classical Methods of Estimation, Single Sample: Estimating the mean, standard error of a point estimate, prediction interval. Two sample: Estimating the difference between two means, Single sample: Estimating a proportion, Two samples: Estimating the difference between two proportions, Two samples: Estimating the ratio of two variances.

Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis, Single sample: Tests concerning single mean, Two samples: tests on two means, One sample: test on single proportion. Two samples: tests on two proportions, Two- sample tests concerning variances.

UNIT-V

Stochastic Processes and Markov Chains:

Introduction to Stochastic processes: Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, n-step transition probabilities, Markov chain, Steady state condition, Markov analysis.

TEXT BOOKS:

1. Probability & Statistics For Engineers & Scientists, (9th Edition), Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Pearson Publishers, 2011.
2. Fundamentals of Mathematical statistics, S C Gupta and V K Kapoor, Khanna publications.

REFERENCE BOOKS:

1. Fundamentals of Probability and Statistics For Engineers, T.T. Soong, John Wiley & Sons, Ltd, 2004.
2. Probability and statistics for Engineers and scientists, (5th Edition), Sheldon M Ross, Academic press, 2014.
3. Probability and Statistics for Engineers, (8th Edition), Miller and Freund's, Pearson Educations, 2015.

(A400004) PROBABILITY, STATISTICS & COMPLEX VARIABLES
(Mechanical Engineering)

B.Tech. II Year

L T P C
3 1 0 4

UNIT-I: Basic Probability

Probability spaces, conditional probability, independent events, and Baye's theorem.

Random variables: Discrete and continuous random variables, Expectation of Random Variables, Variance of random variables

UNIT-II: Probability distributions

Binomial, Poisson, evaluation of statistical parameters for these distributions, Poisson approximation to the binomial distribution, Continuous random variables and their properties, distribution functions and density functions, Normal and exponential, evaluation of statistical parameters for these distributions.

UNIT-III: Estimation & Tests of Hypotheses

Introduction, Statistical Inference, Classical Methods of Estimation.: Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Estimating a Proportion for single sample, Difference between Two Means, difference between two proportions for two Samples.

Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis, Tests Concerning a Single Mean, Tests on Two Means, Test on a Single Proportion, Two Samples: Tests on Two Proportions.

UNIT-IV: Complex Differentiation

Limit, Continuity and Differentiation of Complex functions, Analyticity, Cauchy-Riemann equations (without proof), finding harmonic conjugate, elementary analytic functions (exponential, trigonometric, logarithm) and their properties.

UNIT-V: Complex Integration

Line integral, Cauchy's theorem, Cauchy's Integral formula, Zeros of analytic functions, Singularities, Taylor's series, Laurent's series, Residues, Cauchy Residue theorem (All theorems without Proof).

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, (35th Edition), 2010.
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, keying Ye, Probability and statistics for engineers and scientists, (9th Edition), Pearson Publications.

REFERENCE BOOKS:

1. Fundamentals of Mathematical Statistics, Khanna Publications, S. C. Gupta and V. K. Kapoor.
2. Miller and Freund's, Probability and Statistics for Engineers, (8th Edition) Pearson Educations.
3. Probability and statistics for Engineers and scientists (5th Edition), Sheldon M Ross, Academic press, 2014.
4. J. W. Brown and R. V. Churchill, Complex Variables and Applications, (7th Edition), Mc-Graw Hill, 2004.

Course outcomes: After learning the contents of this paper the student must be able to

- Apply the concepts of probability and Random variables to case studies.
- Formulate and solve problems involving random variables and apply statistical methods for analyzing experimental data.
- Apply concept of estimation and testing of hypothesis to case studies.
- Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.
- Taylor's and Laurent's series expansions of complex function.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Apply the number theory concepts to cryptography domain.
2. Fit the least squares Regression Model and solve problems involving random variables and discrete distributions
3. Apply sampling techniques for analyzing experimental data.
4. Apply concept of estimation and testing of hypothesis to case studies
5. Analyze the data using Stochastic process and Markov chains.