



PSGR Krishnammal College for Women



**B.Sc Mathematics (Aided & Self Supporting)
Choice Based Credit System and
Outcome Based Education Syllabus**

2020- 2023 Batch onwards

SEMESTER I & II

PSGR Krishnammal College For Women

Department of Mathematics

Programme :B.Sc. Mathematics

2020 - 2023 Batch Onwards

Programme Educational Objectives

Program Educational Objectives of **B.Sc. Mathematics** Programme is to enable the students to possess the following knowledge and skills

1. Mathematical knowledge

- ❖ The ability to demonstrate an understanding of the foundations of calculus, analysis and linear algebra and the ability to think logically and critically.
- ❖ The ability to explore the new emerging areas of science and engineering like Nonlinear Dynamics, Computational Mathematics and Cryptography.
- ❖ The ability to abstract general principles from examples.

2. Problem solving skills

- ❖ The ability to formulate, analyses, and solve problems through analytical and computational techniques and apply them to other disciplines when appropriate.
- ❖ The ability to plan, analyse and investigate industrial and societal problems using simulation tools and scientific computing

3. Research skills

- ❖ The ability to search for, locate, extract, organise, evaluate and use or present information that is relevant to a particular topic.
- ❖ The ability to carry out interdisciplinary research among the various basic sciences and engineering disciplines

4. Communication skills

- ❖ The ability to Display competence in oral, written, and visual communication with the help of relevant current technology

5. IT skills

- ❖ The ability to acquire necessary computer skills and knowledge to excel in their professional career in related disciplines

6. Employable skills.

- ❖ The ability to translate their degree into a viable career path with the using their mathematical and statistical skills
- ❖ The ability to become leaders in their associated organization with team building and managing capabilities

PSGR Krishnammal College For Women

Department of Mathematics

Programme : B.Sc. Mathematics

Programme Outcomes

B.Sc. Mathematics will enable the students to be successful in

- A career that uses Mathematics in business, industry or government
- Teaching Mathematics at all levels
- Carrying out research in Mathematics or fields related to Mathematics.
- Competitive examinations like GATE, GRE, SET/NET, TNPSC, UPSC etc.

On the successful completion of the Programme, the following are the expected outcomes.

PO Number	PO Statement
PO1.	Students will acquire critical thinking skills to solve problems that can be modelled mathematically.
PO2.	Students will be able to read and construct mathematical arguments and proofs
PO3.	Gain proficiency in using computer technology appropriately to solve problems and to promote understanding
PO4.	Will be able to apply mathematical knowledge to a career related to mathematical sciences in post graduate cum research studies
PO5.	Students should see a number of contrasting but complementary points of view in the topics (continuous and discrete), techniques (algebraic and geometric), and approaches (theoretical and applied) to mathematics
PO6.	Communicate mathematics to others in both oral and written form with precision, clarity and organization
PO7.	Study at least one area of mathematics in depth, drawing on ideas and tools from previous coursework to extend their understanding e.g. Real analysis and Complex analysis, Number theory and Abstract Algebra, Statics and Dynamics, Statistics and Applied statistics or Calculus and Differential Equations and Advanced Modelling

PSGR Krishnammal College For Women

College of Excellence

(An Autonomous Institution Affiliated to Bharathiar University)

Reaccredited with 'A' Grade by NAAC

An ISO 9001:2015 Certified Institution)

Programme & Branch : B.Sc. Mathematics

Scheme of Examinations

(Applicable to students admitted during the academic year 2020-23 and onwards)

Semester	Part	Subject Code	Title of the Paper	Instruction hours per week	Contact Hours	Tutorial Hours	Duration of Examination (in hours)	Examination Marks			Credits
								CA	ESE	TOTAL	
I	I	TAM2001/ HIN2001/ FRE2001	Language Paper I	6	86	4	3	40	60	100	3
	II	ENG2001/ ENG20F1	Language through Literature level I/ Language through Literature Functional Level I	6	86	4	3	40	60	100	3
	III	TH20C01	Advanced Calculus with SCILAB	5	71	4	3	40	60	100	4
		TH20C02	Differential Equations and Vector Analysis with SCILAB	5	71	4	3	40	60	100	4
		TH20A01/ HI20A01/ ES20A01/ ES20A02/ EG20A01	Allied Mathematical Statistics – I with R/Principles of Modern Government/Indian Economic Development/International Marketing/English through Classics	6	86	4	3	40	60	100	5
	IV	NME16B1/ NME16A1/ NME12WS/ NME12GS/ NME12AS/ NME18ES	Basic Tamil/ Advanced Tamil / Women Studies/ Gandhian studies /Ambedkar studies/Introduction to Entrepreneurship	2	28/26	2/2	3	50/50	50/50	100/100	2
II	I	TAM2002/ HIN2002/ FRE2002	Language Paper II	6	86	4	3	40	60	100	3
	II	ENG2002/ ENG20F2	Language through Literature level II/ Language through Literature Functional Level II	6	86	4	3	40	60	100	3
	III	TH20C03	Calculus of transforms with SCILAB	5	71	4	3	40	60	100	4
		TH20C04	Number Theory And Summation of Series with MAPLE	5	71	4	3	40	60	100	4
		TH20A05/ ES20A03/ ES20A04/ ES20A05/ HI20A02/ EG20A02	Allied - Mathematical Statistics II /Economic Analysis/Econometrics/Monetary Economics/Indian Constitution/English through Classics II	6	86	4	3	40	60	100	5
		**	(Self-study- Online Course)	-	-	-	-	-	-	-	Grade
	IV	REG16EE	Effective English communication	2	26	4	2	50	50	100	2
		NME19B2/ NME19A2/ **	Basic Tamil /Advanced Tamil	2	28/29	2/4	3/3	50	50	100	

Bloom's Taxonomy based Assessment Pattern

CA I & II: (Theory & Accounts)

Bloom's Category	Section	Marks		Total
Remember (K ₁) Understand (K ₂) Apply, Analyse (K ₃ , K ₄)	A – 5x2 marks	10	1 or 2 sentences	50
	B- 4x5 marks	20	250 words	
	C – 2 out of 3x 10 marks	20	500 words	

UG – End Semester Examination Pattern

Bloom's Category	Section	Marks		Total
Remember (K ₁) Understand (K ₂) Apply, Analyse(K ₃ , K ₄)	A – 11 out of 13x2 marks	22	1 or 2 sentences	100
	B- 5 out of 7x6 marks	30	300 words	
	C – 4 out of 6x 12 marks	48	600-800 words	

WEIGHTAGE ASSIGNED TO VARIOUS COMPONENTS OF CONTINUOUS INTERNAL ASSESSMENT

Theory

	CI A I	CI A II	Mode l Exam	Assignmen t/ Class Notes	Semin ar	Qui z	Class Participati on	Librar y Usage	Attendan ce	Max. Mark s
Core / Allied	5	5	6	4	5	4	5	3	3	40
SBS	5	5	15	-	-	-	-	-	-	25
ALC		10	15	-	-	-	-	-	-	25
Informat ion Security	40	40		10		10				100

RUBRIC ASSESSMENT TOOL

Assignment Maximum - 20 Marks (converted to 4 marks) – Scale 4 to 1

Criteria	4 Marks	3 Marks	2 Marks	1 Mark
Focus Purpose	Clear	Shows awareness	Shows little awareness	No awareness
Main idea	Clearly presents a main idea.	Main idea supported throughout	Vague sense	No main idea
Organization: Overall	Well planned	Good overall organization	There is a sense of organization	No sense of organization
Content	Exceptionally well presented	Well presented	Content is sound	Not good
Style: Details and Examples	Large amounts of specific examples and detailed description	Some use of examples and detailed descriptions	Little use of specific examples and details	No use of examples

Seminar Maximum - 20 Marks (converted to 5 marks) – Scale 4 to 1

Criteria	4 Marks	3 Marks	2 Marks	1 Mark
Focus Purpose	Clear	Shows awareness	Shows little awareness	No awareness
Main idea	Clearly presents a main idea.	Main idea supported throughout	Vague sense	No main idea
Organization: Overall	Well planned	Good overall organization	There is a sense of organization	No sense of organization
Content	Exceptionally well presented	Well presented	Content is sound	Not good
Style Details and Examples	Large amounts of specific examples and detailed description	Some use of examples and detailed descriptions	Little use of specific examples and details	No use of examples

CLASS PARTICIPATION

Maximum - 20 Marks (converted to 5 marks) – Scaled from 5 to 1

Criteria	5 Marks	4 Marks	3 Marks	2 Marks	1 Mark
Level of Engagement in Class	Student proactively contributes to class by offering ideas and asks questions more than once per class.	Student proactively contributes to class by offering ideas and asks questions once per class.	Student contributes to class and asks questions occasionally.	Student rarely contribute to class by offering ideas and asking no questions.	Student never contributes to class by offering ideas.
Listening Skills	Student listens when others talk, both in groups and in class. Student incorporates or builds off of the ideas of others.	Student listens when others talk, both in groups and in class.	Student listens when others talk in groups and in class occasionally.	Student does not listen when others talk, both in groups and in class.	Student does not listen when others talk, both in groups and in class. Student often interrupts when others speak.
Behavior	Student almost never displays disruptive behavior during class.	Student rarely displays disruptive behavior during class.	Student occasionally displays disruptive behavior during class.	Student often displays disruptive behavior during class.	Student almost always displays disruptive behavior during class.
Preparation	Student is almost always prepared for class with required class materials.	Student is usually prepared for class with required class materials.	Student is occasionally prepared for class with required class materials.	Student is rarely prepared for class with required class materials.	Student is almost never prepared for class.

QUIZ

Maximum - 20 Marks (converted to 4 marks)

MAPPING OF POs WITH COs

COURSE	PROGRAMME OUTCOMES						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
COURSE – TH20C01							
CO1	S	S	M	S	S	S	S
CO2	S	S	M	S	S	S	S
CO3	S	S	M	S	S	S	S
CO4	S	S	M	S	S	S	S
CO5	S	S	M	S	S	S	S
CO6	S	S	S	S	S	S	S
COURSE – TH20C02							
CO1	S	M	S	S	S	S	S
CO2	S	M	S	S	S	S	S
CO3	S	M	S	S	S	S	S
CO4	S	M	S	S	S	S	S
CO5	S	M	S	S	S	S	S
CO6	S	S	S	S	S	S	S
COURSE – TH20A01							
CO1	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S
COURSE – TH20C03							
CO1	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S
COURSE – TH20C04							
CO1.	S	S	S	S	S	S	S
CO2.	S	M	S	S	S	S	S
CO3.	S	M	S	S	S	S	S

CO4.	S	S	S	S	S	S	S
CO5.	S	M	S	S	S	S	S
CO6.	S	S	S	S	S	S	S
COURSE – TH20A05							
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S
COURSE – TH20C05							
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S
COURSE – TH20C06							
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S
COURSE – TH20C07							
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S
CO6.	S	S	S	S	S	S	S
COURSE – TH20C08 DYNAMICS WITH GNU - FISICA LAB							
CO1	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S

TH20C01	CORE I ADVANCED CALCULUS WITH SCILAB SEMESTER I	Category	L	T	P	Credit
		Theory	71	4	-	4

Preamble

- To provide fundamentals of differentiation and integration and show their significant role in physical, economical and industrial world

Prerequisite

Knowledge of limits, Differential derivatives and related formulas

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Learn about curvature, evolutes, envelopes and asymptotes	K1
CO2.	Understand the properties of Laplace Transform	K2
CO3.	Apply derivative concepts to find tangent lines to level curves and to solve optimization problems	K3
CO4.	Apply special functions like Beta and Gamma to evaluate multiple integrals	K3
CO5.	Use computational tools like SciLab	K4

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1.	S	M	S	S	S	S	S
CO2.	S	M	S	S	S	S	S
CO3.	S	M	S	S	S	S	S
CO4.	S	M	S	S	S	S	S
CO5.	S	M	S	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

SEMESTER I CORE I

Advanced Calculus with SCILAB

Credits : 4

Hours: 71

Subject Code :TH20C01

UNIT I

14 hrs

Total differentiation – Euler’s theorem on homogeneous functions - Curvature – Radius of curvature in Cartesian and polar forms – Evolutes and envelopes – Pedal equations-linear asymptotes.

UNIT II

15 hrs

Multiple integrals- Definition- Change of order of integration in double integral – change of variables in double & triple integrals - Applications to calculations of areas and volumes – Surface areas – Areas in polar coordinates-Jacobians.

UNIT III

13 hrs

Beta and Gamma integrals – their properties & relation between them.-Simple problems – Applications of Gamma functions to multiple.

UNIT IV

15 hrs

Laplace Transform-Introduction-Definition-Working rule-Piecewise continuous function- functions of exponential order and class-sufficient condition for the existence-Linearity property –some elementary functions-first shifting theorems- unit step functions-Second shifting theorem-change of scale property-derivatives –multiplication by positive integral powers of t derivatives-Division by t theorems- Laplace transforms of integrals-Initial value and final value theorem-Periodic functions-Evaluation of integrals.

UNIT V

14 hrs

Inverse Laplace transforms-Introduction-Definition-Null function definition-Uniqueness of inverse Laplace transforms-Some elementary functions-Linearity property-method of partial fractions-Heaviside expansions theorems- First translation-Second translation theorem- Change of scale property-Inverse Laplace transforms of derivatives and integrals – Solving differential equations using Laplace transforms

Text Books

S. No	Author	Title of the book	Publishers	Year & Edition
1.	S. Narayanan and T.K. M Pillai Unit I	Calculus Volume I	S.Viswanathan(Printers&Publishers), PVT.,LTD	2010
2.	S. Narayanan and T.K. M Pillai Unit II & III	Calculus Volume II	S.Viswanathan(Printers&Publishers), PVT.,LTD	2012
3.	Dr. M.D. Raisinghania Unit IV & V	Advanced Differential Equations	S.Chand and Company	2016

4.	Er.HemaRamachandran and Achuthsankar S Nair (For SciLab experiments)	Scilab(A free Software to Matlab)	S.Chandand Company	1 st edition &2015
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Unit I : Chapter 8 :Section: 1.3-1.7 Chapter 10 :Section: 2.1-2.8 Chapter 11 :Section: 1-4

Unit II : Chapter 5 :Section: 1-7 Chapter 6 :Section: 1.1-2.4

Unit III : Chapter 7 :Section: 2.1-6

Unit IV : Part IV – A Chapter 1 Sections – 1.1 to 1.21

Unit V : Part IV – A Chapter 2Sections – 2.1 to2.12

Reference Books

S. No	Author	Title of the book	Publishers	Year & Edition
1	Hoffmann L.D. Bradley G.L	Calculus for Business, Economics and the social and Life Sciences	McGraw Hill Book company, India	4 th edition, 1989
2	Shahriari	Approximately Calculus	First Indian Edition, American Mathematical Society	2012
3	Omar Hijab	Introduction to Calculus and Classical Analysis	Second Edition, Springer Private Ltd	2012
4	Johnny Heikell	Scilab for real Dummies	http://www.heikell.fi/download/scilab.pdf	
5	Stewart	Calculus	Brooks/Cole cengage learning	2010

Digital Demonstration using SCILAB

http://cajael.com/eng/control/LaplaceT/LaplaceT-1_Example_2_6_OGATA_4editio.php

❖ Laplace Transforms with partial fraction

http://cajael.com/eng/control/LaplaceT/LaplaceT-10_Problem_B2_3_OGATA_4ed_L.php

❖ Laplace Transforms of some functions

http://cajael.com/eng/control/LaplaceT/LaplaceT-7_Example_2_17_OGATA_4ed_La.php

❖ Solving differential equation with SciLab

MOOC learning

<https://nptel.ac.in/courses/111/105/111105122/>

(6 Lectures by Prof. HarishankarMahato, IIT, Kharagpur)

- Lecture 10 Improper integrals
- Lecture 11 Improper integrals

- Lecture 13 Beta Gamma functions
- Lecture 14 Beta Gamma functions
- Lecture 22 Triple integrals
- Lecture 23 Triple integrals

Note

Question paper setters to confine to the above text books only.

Pedagogy

Chalk and Talk, Seminar, Group Discussion, online courses.

Course Designers

1. Dr. (Mrs.) K. Sumathi, Associate Professor, Department of Mathematics
2. Dr.(Mrs.)D.Sasikala, Assistant Professor, Department of Mathematics

TH20C02	CORE II DIFFERENTIAL EQUATIONS AND VECTOR ANALYSIS WITH SCILAB SEMESTER I	Category	L	T	P	Credit
		Theory	71	4	-	4

Preamble

- To learn the basics of differential equations and various techniques of solving differential equations
- To expose the practical applications of differential equations and introduce students to the fundamentals of vector calculus
- To show that differential equations are powerful tools in solving problems of physical, social and managerial sciences.

Prerequisite

- Understanding of the concepts of a function and the relationship between a function and its graph
- Understanding of differential derivatives (ordinary and partial)
- Knowledge of Functions and angles, Vector Algebra

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Solve differential equations of first order using graphical, numerical and analytical methods,	K1
CO2.	Solve and apply linear differential equations of second order (and higher)	K2
CO3.	Calculate vector scalar and vector products	K2
CO4.	Solve partial differential equations using Lagrange's method and Charpit's method	K3
CO5.	Develop the ability to apply differential equations to significant applied and/or theoretical problems.	K3
CO6.	Understand the various integral theorems relating line, surface and volume integrals	K4

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1.	S	S	M	S	S	S	S
CO2.	S	S	M	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	M	S	S	S	S	S
CO5.	S	S	M	S	S	S	S
CO6.	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

SEMESTER II - CORE II DIFFERENTIAL EQUATIONS AND VECTOR ANALYSIS WITH SCILAB

Credits: 4

Hours: 71

Subject Code :TH20C02

UNIT I

14 hrs

Solution of Differential Equations of the first order and First Degree – Linear Equations with Constant Co-efficient – Application to Geometry and Mechanics. Solving simple problems using Sci Lab.

UNIT II

14 hrs

Homogeneous Linear Equations – Trajectories - Equations of the First Order but not of the First Degree. Solving simple problems using Sci Lab.

UNIT III

14 hrs

Linear Equations of Second Order – Simultaneous Differential Equations. Solving simple problems using Sci Lab.

UNIT IV

15hrs

Vector-Valued Functions, Vector Fields: An Introduction, Gradient, Divergence, Curl and the Del Operator

UNIT V

14hrs

Line integrals, Surface integrals and vector analysis

Text Books

S. No	Author	Title of the book	Publishers	Year & Edition
1	N.P.Bali Unit I – III	Differential Equations	Firewall Media, An imprint of Laxmi Publications Pvt, Ltd, New Delhi	10 th Edition, 2006
2.	Susan Jane Colley Unit IV – V	Vector Calculus	Pearson Education, Inc	4 th Edition, 2012
2	Dr.HemaRamachandran &Dr.AchuthsankarS.Nair	Scilab (A free Software to Matlab)	S Chand and company	1 st Edition, 2015
3	Lecture notes/Lab manual/Tutorials on Sci Lab			

Unit I : Chapter 2, 3, 4

Unit II : Chapter 5, 6, 7

Unit III : Chapter 8, 9

Unit IV : Chapter 3 Sections – 3.3 to 3.5

Unit V : Chapter 6 Sections 6.1 to 6.3

Chapter 7 Sections – 7.1 to 7.3

Reference Books

S. No	Author	Title of the book	Publishers	Year & Edition
1	N.M Kapur	A text book of Differential equations	Pitambar Publishing Company Educational Publishers, New Delhi - 110005.	2008
2	M.D Raisinghania	Advanced differential equations	S.Chand& Co New Delhi	2009
3	George F.Simmons& Steven G.Krantz	Differential Equations Theory, Technique and Practice	Tata McGraw Hill Education Private Ltd	Tenth reprint 2011
4	Nathaniel Coburn	Vector and Tensor Analysis	The Macmillan Company, New York	
5	Erwin Kreyszig	Advanced Engineering Mathematics	Wiley Plus	Tenth Edition

Digital Demonstration using SciLab

- ❖ https://help.scilab.org/docs/6.0.0/en_US/ode.html
- ❖ Evaluation of ordinary differential equations
https://help.scilab.org/docs/6.0.0/en_US/odeoptions.html
- ❖ setting options for ODE solver
http://www.tf.uns.ac.rs/~omorr/radovan_omorjan_003_prII/s_examples/Scilab/Gilbert_o/scilab04.pdf
- ❖ Vector operations in SciLab
MOOC learning
<https://nptel.ac.in/courses/111/106/111106100/>
(2 Lectures by Prof..Srinivasamanam, IIT, Madras)

- Lesson 1 Introduction to Ordinary differential equations
- Lesson 13 Second order ODE with constant co-efficient
<https://nptel.ac.in/courses/111/105/111105122/>

(4 Lessons by Prof Hari Shankar mahata, IIT Kharagpur)

- Lesson 36 Gradient Lesson 37 Curl and divergence
- Lesson 41 Directional derivatives Lesson 44 Applications to Mechanics

Note

Question paper setters to confine to the above text books only.

Pedagogy

Chalk and Talk, Seminar, Group Discussion and Numerical Exercises.

Course Designers

1. Dr. K. Sumathi, Associate Professor, Department of Mathematics
2. Mrs. R. Sakthikala, Assistant Professor, Department of Mathematics
- 3.

TH20A01	MATHEMATICAL STATISTICS – I WITH R	Category	L	T	P	Credit
		Theory	86	4	-	5

Preamble

- To introduce the basic statistical concepts and help the students to know the need for statistics and statistical analysis.
- To describe the types of data and to discuss random variables and their distributions.

Prerequisite

Knowledge of population, sample, events and outcome.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Explain and apply basic concepts of probability	K1
CO2.	Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.	K2
CO3.	Critically evaluate the design, including sampling techniques, of a statistical study	K2
CO4.	Effectively use statistical software (e.g. MiniTab, Excel) to perform statistical computations and display numerical and graphical summaries of data sets	K3
CO5.	Compute and interpret the coefficient of correlation and the "line of best fit" for bivariate data	K4

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
C01.	S	S	S	S	S	S	S

CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

SEMESTER I – ALLIED I ALLIED – MATHEMATICAL STATISTICS – I WITH R

Credits : 5

Hours: 86

Subject Code : TH20A01

UNIT I

17 hrs

Probability and Distributions: Introduction - Set Theory -The Probability Set Function - Conditional Probability and Independence - Random Variables of the Discrete Type - Random Variables of the Continuous Type.

UNIT II

17 hrs

Properties of the Distribution Function- Expectation of a Random Variable --Some Special Expectations - Chebyshev's Inequality.
Multivariate Distributions: Distributions of Two Random Variables-Conditional Distributions and Expectations -The Correlation Coefficient - Independent Random Variables.

UNIT III

17 hrs

Some Special Distributions: The Binomial and Related Distributions - The Poisson Distribution- The Gamma and Chi-Square Distributions -The Normal Distribution - The Bivariate Normal Distribution.

UNIT IV

17 hrs

Limiting Distributions: Convergence in Distribution - Convergence in Probability - Limiting Moment-Generating Functions - The Central Limit Theorem.

UNIT V

18 hrs

Theory of Statistical Tests: Certain Best Tests - Uniformly Most Powerful Tests - Likelihood Ratio Tests - The Sequential Probability Ratio Test - Minimax, Bayesian, and Classification Procedures

Text Book

S. No	Author	Title of the book	Publishers	Year & Edition
1	Robert V. Hogg , Joseph W. McKean and Allen T. Craig	Introduction toMathematical Statistics	Pearson Education	8 th Edition, 2019

Unit I : Chapter 1: 1.1 to 1.7

Unit II :Chapter 2:1.8 -1.10 , 2.1 – 2.5

Unit III: Chapter 3: 3.1-3.2,3.4,3.5,3.5.1

Unit IV :Chapter 5: 5.1-5.4

Unit V :Chapter 8: 8.1- 8.2,8.5

Reference Books

S. No	Author	Title of the book	Publishers	Year & Edition
1	B.L.Agarwal	Basic Statistics	New Age International Publishers	4 th Edition, 2006
2	A.K.Goon, M.K.Gupta, Das Gupta	Fundamentals of Statistics Vol – I	Sultan Chand and sons, New Delhi	11 th Edition, 2009.
3	Murray R.Spiegel, Larry J.Stephens	Theory and Problems of Statistics	Tata McGraw Hill Publishing Company Ltd	3 rd Edition, 2009

Digital Demonstration using R

<http://www.r-tutor.com/elementary-statistics/numerical-measures/mean>

- ❖ Finding mean

<http://www.r-tutor.com/elementary-statistics/numerical-measures/median>

- ❖ Finding median

<http://www.r-tutor.com/elementary-statistics/probability-distributions/binomial-distribution>

- ❖ Binomial distribution

<http://www.r-tutor.com/elementary-statistics/probability-distributions/poisson-distribution>

- ❖ Poisson distribution

<http://www.r-tutor.com/elementary-statistics/hypothesis-testing>

- ❖ Hypothesis testing

MOOC learning

<https://nptel.ac.in/courses/111/106/111106112/>

(6 Lectures by Prof.. G.Srinivasan, IIT, Madras)

- Probability
- Rules of probability
- Conditional probability
- Binomial distribution
- Poisson distribution

Note

Question paper setters to confine to the above text books only.

Pedagogy

Chalk and Talk, Seminar, Group Discussion, Numerical Exercises and Demonstration.

Course Designers

1. Ms.A.Karpagam, Associate Professor, Department of Mathematics
2. Dr.(Mrs) C.R.Parvathy, Associate Professor, Department of Mathematics

TH20C03	CALCULUS OF TRANSFORMS WITH SCILAB	Category	L	T	P	Credit
		Theory	71	4	-	4

Preamble

- To understand the practical applications of Integral transforms in solving problems of signal processing, differential and integral equations.
- To use SCILAB effectively to solve problems involving Integral transform.

Prerequisite

- Knowledge in differential and integral calculus

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the basics of Integral transforms	K1
CO2	Understand the properties of Fourier,Hankel and Mellin transforms	K2
CO3	Understand the formation of difference equations	K2
CO4	Solve simple differential and integral equations using the Fourier Laplace, Hankel and Mellin transforms	K3
CO5	Learn to use SCILAB to solve Integral equations involving Integral transforms.	K4

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S

S – Strong; M – Medium; L – Low

Syllabus

**SEMESTER II - CORE PAPER III
Calculus of Transforms with SCILAB**

Credits : 4

Subject Code :TH20C03

UNIT I

Hours: 71

14 Hrs

Applications of Laplace Transforms: Introduction-Solutions of Ordinary Differential Equations-Partial Differential Equations, Initial and Boundary value problems-Solutions of Integral Equations-Solutions of Boundary value problems- Evaluations of Definite integrals.

UNIT II **14Hrs**

Fourier Transforms and their Applications: Introduction- The Fourier integral formulas-Definition of the Fourier Transforms and Examples-Fourier Transforms of Generalized Functions-Basic Properties of Fourier Transforms-Applications of Fourier Transforms to Ordinary Differential Equations-Solutions of Integral Equations-Solutions of Partial Differential Equations.

UNIT III **14Hrs**

Hankel Transforms and Their Applications: Introduction- TheHankel transforms and examples-Operational properties of the Hankel Transform-Applications of Hankel transforms to Partial Differential Equations.

UNIT IV **14Hrs**

Mellin Transforms and their Applications- Introduction-Definitions of the Mellin Transforms and examples-Basic operational properties of Mellin transforms- Applications of Mellin Transforms-Application of Mellin Transforms to summation of series-Generalized Mellin Transforms.

UNIT V **15Hrs**

Difference Equations: Introduction-Order of Difference Equation-Degree of Difference Equation-Solution to Difference Equation-Formation of Difference Equations-Linear Difference Equations-Linear Homogeneous Difference equations with constant coefficients -Non-Homogeneous Linear Difference Equations with constant coefficients.

Text Books

S. No	Author	Title of the book	Publishers	Year & Edition
1.	LokenathDebnath and DambaruBhatta Unit I- IV	Integral Transforms and their Applications	Chapman & Hall/CRC	2 nd Edition, 2010
2.	Dr. V.N. Vedamurthy and Dr. N. Ch. S. N. Iyengar Unit V	Numerical Methods	Vikas Publishing House Pvt. Ltd.	2000
3	Lecture notes/Lab manual/Tutorials on SciLab			

UNIT I: Chapter 4: 4.1 -4.6

UNIT II : Chapter 2 : 2.1 – 2.5 and 2.10-2.12

UNIT III: Chapter 7: 7.1 – 7.4

UNIT IV : Chapter 8: 8.1-8.4 and 8.6, 8.7

UNIT V : Chapter 10: 10.1 to 10.8

Reference Books

S. No	Author	Title of the book	Publishers	Year & Edition
1	B.S. Grewal	Higher Engineering Mathematics	Khanna Publishers, New Delhi.	39 th Edition, 2007
2	Veerarajan. T	Engineering Mathematics	Tata McGraw Hill, New Delhi.	3 rd Edition, 2004
3	Kreyszig. E	Advanced Engineering Mathematics	John wiley and sons, (Asia) Pvt. Ltd., Singapore.	2006
4	J. K. Goyal and K.P.	Integral Transform	PragatiPrakashanEducational	2015

	Gupta		publishers, Meerut	
5	M.K.Venkataraman	Numerical Methods in Science & Engineering	National Publishing Company	1990

Digital Demonstration using SciLab https://help.scilab.org/docs/6.0.0/en_US/intg.htm

- ❖ Evaluation of definite integrals
https://help.scilab.org/docs/5.5.2/en_US/fft.html
- ❖ Fast Fourier transforms
<https://www.bragitoff.com/2016/03/fourier-series-and-scilab/>
- ❖ Fourier series and scilab
<https://www.bragitoff.com/2016/03/calculating-fourier-series-and-plotting-it-scilab/>
- ❖ Fourier series and plotting
<https://www.bragitoff.com/2016/03/polynomial-fitting-scilab/>
- ❖ polynomial fitting using scilab

MOOC learning

<https://nptel.ac.in/courses/111/102/111102129/>

(6 Lectures by Prof..Sarthoksircar IIT, Delhi)

- Introduction to Fourier transforms Part I
- Introduction to Fourier transforms Part II
- Applications of Fourier transforms Part I
- Introduction to Laplace Transforms Part I
- Introduction to Laplace Transforms Part II
- Applications of Laplace Transforms Part I

Note

Question paper setters to confine to the above text books only.

Pedagogy

Chalk and Talk, Seminar, Group Discussion and Numerical Exercises.

Course Designers

1. Dr. (Mrs.) K. Sumathi, Associate Professor, Department of Mathematics
2. Dr.(Mrs) G. Arthi, Assistant Professor, Department of Mathematics

TH20C04	NUMBER THEORY AND SUMMATION OF SERIES WITH MAPLE SEMESTER II	Category	L	T	P	Credit
		Theory	71	4	-	4

Preamble

- To orient the students to learn about the real and complex number systems and also some of the basic notation of set theory.
- To enable the students to learn about the convergence and divergence of the series and develop problem solving skills.

Prerequisite

Knowledge in basic properties of the real numbers that lead to the formal development of real analysis and various methods in terms of convergence and divergences.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Knowing the concept of convergence and limits that are applicable to sequences, series, differentiation and integration	K1
CO2.	Determine the convergence or divergence of sequences and series	K2
CO3.	Analyse the precise proofs of results that arise in the context of real analysis	K2
CO4.	Apply convergence tests to infinite series	K2
CO5.	Solve the problems related to convergence / divergence.	K3
CO6.	Analyse how abstract ideas and rigorous methods in real analysis can be applied to practical problems	K4

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1.	S	S	S	S	S	S	S
CO2.	S	M	S	S	S	S	S
CO3.	S	M	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	M	S	S	S	S	S
CO6.	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

SEMESTER II - CORE IV

NUMBER THEORY AND SUMMATION OF SERIES WITH MAPLE

Credits : 4

Hours: 71

Subject Code :TH20C04

UNIT I

14 hrs

The Real and Complex number systems: Introduction – The field axioms – The order axioms – Geometric representation of real numbers – intervals – integers- the unique factorization theorem for integers – rational numbers- irrational numbers – upper bounds, maximum element, least upper bound – the completeness axiom – some properties of supremum – properties of the integers deduced from completeness axiom – the Archimedean property of the real number system – rational number with finite decimal representation – Finite decimal approximation to real numbers -infinite decimal representation of real numbers – Absolute values and the triangular inequality – The Cauchy – Schwarz inequality – Plus and minus infinity and the extended real number system \mathbf{R}^* - Complex numbers – Geometric representation of complex number – The imaginary unit – Absolute value of a complex number – Impossibility of ordering the complex numbers – Complex exponentials – Further properties of complex exponentials – The argument of a complex number – Integral powers and roots of complex numbers – complex logarithms – complex powers – Complex sines and cosines – Infinity and the extended complex plane \mathbf{C}^*

UNIT II

14 hrs

Some Basic Notations of Set theory: Introduction – Notations – Ordered pairs – Cartesian product of two sets – Relations and functions – Further terminology concerning functions – One – to – one functions and inverses – Composite functions – Sequences – Similar sets – Finite and infinite sets – Countable and uncountable sets – Uncountability of the real number system – set algebra – Countable collections of countable sets

UNIT III

14 hrs

Convergence and divergence of series: Definitions – Elementary results – Comparison tests - Series of positive terms – Cauchy's condensation test – De Alembert's ratio test - Cauchy's root test - Raabe's test - Absolute convergence.

UNIT IV**14 hrs**

Theory of Equations: Remainder Theorem - Roots of an Equation - Relations connecting the Roots and Coefficients - Symmetric function of roots - Transformations of equations – Reciprocal equations – Removal of terms – Transformations in General - Descarte’s rule of signs.

UNIT V**15 hrs**

Rolle’s Theorem - Multiple roots – Strum’s theorem (statement only) –Strum’s functions -Horner’s method.

Text Book

S. No	Author	Title of the book	Publishers	Year & Edition
1	Apostol Unit I & II	Mathematical Analysis	Narosa Publishing House	1974, 2 nd
2	T.K.ManicavachagomPillai, T. Natarajan&K.S.Ganapathy Unit III – V	Algebra Vol I	S.Viswanathan (Printers&Publishers)PVT.,LTD	2011

UNIT I : Chapter 1 – Sections 1.1 -1.33

UNIT II : Chapter 2 – Sections 2.1 – 2.15

UNIT III : Chapter 2 - Sections 8 - 19, 21 - 24

UNIT IV : Chapter 6-Sections 1 to 12, 15 to 19, 21& 24

UNIT V : Chapter6-Sections 25,26, 27, 30

Reference Books

S. No	Author	Title of the book	Publishers	Year & Edition
1.	R.R.Goldberg	Methods of Real Analysis	Oxford and IBH Publishing Co. Pvt. Ltd.2017	2017
2	Walter Rudin	Principles of Mathematical Analysis	McGraw – Hill 1976	1976
3.	P.N. Chatterjee	<i>Algebra</i>	Rajhans Agencies, Meerut	2010
4.	S.Barnard &J.M.Child	Higher Algebra	Enlarged Edition, A.I.T.B.S Publishers & Distributors	2004
5.	Hall & Knights, R Knight	Higher Algebra	ArihantPrakashan, Meerut	2008

Digital Demonstration using maple

<https://www.maplesoft.com/applications/view.aspx?sid=3981&view=html>

- ❖ Convergence of series
- ❖ Radius of convergence
- ❖ Cauchy’s root test
- ❖ Ratio test

- ❖ Integral test

<https://www.maplesoft.com/support/help/Maple/view.aspx?path=convert/base>

- ❖ Conversion of numbers with various bases

MOOC learning

https://www.academia.edu/5241092/VISUALIZING_THE_BEHAVIOR_OF_INFINITE_SERIES_AND_COMPLEX_POWER_SERIES_WITH_THE_GEOGEBRA

<https://nptel.ac.in/courses/111/101/111101134/>

(6 Lectures by Prof I.K. Rana, IIT Bombay)

- Real Numbers and sequences Part I
- Real Numbers and sequences Part II
- Real Numbers and sequences Part III
- Convergence of sequences Part I
- Convergence of sequences Part II
- Convergence of sequences Part III

Note

Question paper setters to confine to the above text books only.

Pedagogy

Chalk and Talk, Seminar, Group Discussion, online courses.

Course Designer

1. Mrs.M.Mohanapriya, Assistant Professor, Department of Mathematics
2. Dr.(Mrs). R. Sasirekha, Assistant Professor, Department of Mathematics

TH20A05	MATHEMATICAL STATISTICS – II (Problems in Applied statistics using R)	Category	L	T	P	Credit
		Theory	86	4	-	

Preamble

- To introduce statistical techniques of analysis and inference that are useful in many areas of scientific research.
- To present descriptive statistics and utilize the probability distributions to perform statistical inference.

Prerequisite

- Critically evaluate the design, including sampling techniques, of a statistical study,

- Effectively use statistical software R to perform statistical computations and display numerical and graphical summaries of data sets

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Construct and interpret deviations and proportions for populations,	K2
CO2.	Explain and successfully apply all aspects of parametric testing techniques including single and multi-sample tests for mean and proportion	K2
CO3.	Explain and successfully apply all aspects of appropriate non-parametric tests.	K2
CO4.	Understand, apply and compute maximum likelihood estimation	K3
CO5.	Take up a career in statistical analysis	K4

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

SEMESTER II – ALLIED – II

ALLIED – MATHEMATICAL STATISTICS - II

(Problems in Applied statistics using R)

Credits : 5

Hours: 86

Subject Code :TH20A05

UNIT I

Linear Regression - Introduction - Simple Linear Regression Model – Problems- Estimating the Regression Parameters-Error Random Variable- Prediction Intervals for Future Responses –problems- Coefficient of Determination- Sample Correlation Coefficient.

UNIT II

Testing Statistical Hypotheses - Introduction - Hypothesis Tests and Significance Levels-Problems - Tests Concerning the Mean of a Normal Population-Case of Known Variance-Problems - One-Sided Tests - The *t* Test for the Mean of a Normal Population-Case of Unknown Variance -- Hypothesis Tests Concerning Population Proportions- Two-Sided Tests of *p*. Hypothesis Tests Concerning Two Populations: Introduction- Testing Equality of Means of Two Normal- Populations: Case of Known Variances-Problems.

UNIT III

Testing Equality of Means: Unknown Variances and Large Sample Sizes-Problems - Testing Equality of Means: Small-Sample Tests when the Unknown Population Variances Are Equal- Paired-Sample t Test -Testing Equality of Population Proportions – Problems.Analysis of Variance - Introduction - One-Factor Analysis of Variance- Remark on the Degrees of Freedom - Two-Factor Analysis of Variance: Introduction and Parameter Estimation- Two-Factor Analysis of Variance: Testing Hypotheses.

UNIT IV

Chi-Square Goodness-of-Fit Tests- Introduction -- Chi-Squared Goodness-of-Fit Tests - Testing for Independence in Populations Classified According to Two Characteristics. Quality Control - Introduction - The \bar{X} Control Chart for Detecting a Shift in the Mean - Problems - When the Mean and Variance Are Unknown- S *Control* Charts – Problems - Control Charts for Fraction Defective .

UNIT V

Vital Statistics-Definition-Utility of vital statistics-Measures of population and Vital statistics-Introduction-Measures of population - Measures of vital statistics - Mortality Rates –Fertility Rates.

Text Books

S. No	Author	Title of the book	Publishers	Year & Edition
1.	Sheldon M Ross	Introductory Statistics Unit – I to IV	Elsevier	3 rd Edition, 2010
2.	Veer BalaRastogi	Biostatistics Unit - V	Medtech	3 rd Edition, 2015

UNIT I :Chapter 12 - Sections: 12.1 - 12.3,12.7,12.8, 12.9

UNIT II :Chapter 9 - Sections: 9.1-9.5 Chapter 10 – Sections: 10.1-10.2

UNIT III:Chapter 10 - Sections: 10.3-10.6 Chapter 11 – Sections: 11.1-11.5

UNIT IV:Chapter 13 - Sections: 13.1-13.4, 15.1-15.3

UNIT V: Chapter 20 - Sections: 20.2., 20.2.1., 20.2.2 Chapter 21 – Sections: 21.1-21.5

Reference Books

S. No	Author	Title of the book	Publishers	
1.	Fundamentals of Mathematical Statistics	S.C.Gupta and V.K.Kapur	Sultan Chand & sons, New Delhi.	11 th Edition, 2014
2.	E.L.Lehmann Joseph P.Romano	Testing Statistical Hypotheses	Springer Private Ltd,	3 rd Edition, 2009
3.	Murray R.Spiegel Larry J.Stephens	Theory and problems of Statistics	Tata McGraw Hill Publishing Company Ltd	3 rd Edition, 2008

Digital Demonstration with R and MOOC learning

<https://nptel.ac.in/courses/111/104/111104120/>

(6 lessons by Prof. Shalalb, IIT Kanpur)

- Lesson 03 Calculation of Data vectors
- Lesson 04 Built in commands and Data Handling
- Lesson 10 Bar Diagram
- Lesson 11 Subdivided Bar diagram and Pie diagram
- Lesson 21 Co-efficient of variation and Boxplot
- Lesson 30 Rank correlation

Note

Question paper setters to confine to the above text books only.

Pedagogy

Chalk and Talk, Seminar, Group Discussion and Numerical Exercises.

Course Designers

1. Dr.(Mrs). C.R.Parvathy, Associate Professor, Department of Mathematics
2. Mrs. S.Lakshmi, Assistant Professor, Department of Mathematics

Allied Courses Offered to other Programs

For the Students Admitted During the Year 2020 -2021

Allied Courses Offered to other Programs

For the Students Admitted During the Year 2020 -2021

Semester I

B.SC (CS), BCA, B.SC (IT)- Semester I & B.SC (FPM)- Semester III

– Allied – Numerical and Statistical Techniques (TH20A03)

B.Com – Semester III & B.COM (CA, E-COM, FS, A & F) - Semester I

- Allied – Mathematics for Commerce – (TH20A07)

B.Com (BA) – Semester I – Allied - Statistics I (TH20A15)

BBA, BBA (IB & RM), BBA (BPM) – Allied - Mathematics for Management I (TH20A02)

Semester II

B.SC (CS), BCA, B.SC (IT) - Allied - Discrete Mathematics (TH20A06)

B.Com –Semester IV & B.COM (CA, E-COM, FS, A & F) - Semester II

Allied – Statistics for Commerce – (TH20A08)

B.Com (BA) – Semester II – Allied - Statistics II (TH20A16)

BBA, BBA (IB & RM), BBA (BPM) – Allied - Mathematics for Management II (TH20A24)

TH20A03	ALLIED - NUMERICAL AND STATISTICAL TECHNIQUES SEMESTER I	CATEGORY	L	T	P	CREDIT
		Theory	86	4	-	5

Preamble

- To present students the Basic concepts of Numerical Methods and Statistics.
- To enable the students to find the practical applications to the real world problems.

Course Outcomes

Upon the successful completion of the course, students will be able to

Course Outcomes

CO Number	CO Statement	Knowledge Level
CO1	Acquire knowledge of finite differences, interpolation, numerical differentiation and numerical integration.	K1
CO2	Apply interpolation technique for numerical differentiation and integration	K2
CO3	Analyse and evaluate the accuracy of common numerical methods.	K3
CO4	Applying the accuracy of common Statistical methods.	K3
CO5	Analyse and apply basic concepts of probability and theoretical probability distributions.	K4

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	S	M	S	S
CO3	S	S	S	M	S
CO4	S	S	S	S	M
CO5	M	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus**SEMESTER I / II****Numerical and Statistical Techniques***(Common to B.SC (CS), BCA, B.SC (IT)- Semester I B.Sc(FPM) Semester III)***Credits :4****Hours : 86****Subject Code :TH20A03****UnitI****17 Hrs**

Solution of Linear Simultaneous Equations: Gauss elimination - Gauss Jordan - Gauss Seidel and Gauss Jacobi methods -simple problems. Interpolation: Newton Forward and Backward Interpolation Formulae.

UnitII**16 Hrs**

Numerical Differentiation: Newton's Forward Difference - Newton's Backward Difference, Numerical Integration: Introduction, Newton-Cotes Quadrature formulas: trapezoidal rule, Simpson's 1/3 and 3/8 rules, Taylor's series method.

Unit III**17Hrs**

Skewness - Correlation analysis: Introduction - Significance of the study of correlation - correlation and causation - Types of correlation - Methods of studying correlation - Graphic method - Karl Pearson's coefficient of correlation - Coefficient of correlation and probable error - Coefficient of determination - Properties of the coefficient of the correlation - Rank correlation coefficient - Features of Spearman's correlation coefficient, Regression analysis.

Unit IV**17 Hrs**

Probability: Introduction - probability defined - Importance of the concept of probability - Calculation of probability - Theorems of probability (statements only) – Mathematical expectation-Simple problems.

Unit V**19 Hrs**

Theoretical Distributions: Binomial distribution - Poisson distribution and normal distribution (without derivations & proof).

Text Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	B.S. Grewal	Numerical Methods in Engineering and Science with Programs in C & C++	Khanna Publishers	2014
	Unit I :Chapter III &VII: 3.3:(3,4), 3.5:(1,2) &7.1-7.3 Unit II:Chapter VIII& X: 8.1, 8.2:(1,2),8.4,8.5:(I,II,III), 10.3			
2.	S.P.Gupta	Statistical methods	Sultan Chand & Sons Publications	2005
	Unit III:Volume I: Chapter 9(till measures of skewness),10,11.(pg: 329-341, 377-412,			

435-454)
Unit IV : Volume-II Chapter 1(till Baye's theorem) (pg: 751-771)
Unit V : Volume-II Chapter 2 (pg:805-824, 826-834, 836-856)

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	P.A.Navanitham	Business Mathematics And Statistics	Jai Publishing Company	2003
2.	S.C Gupta and V.K. Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand & Sons Publications	2001
3.	P.Kandasamy, K.Thilagavathy and K.Gunavathy	Numerical Methods	S.Chand and company LTD	Reprint 2007
4.	V.K.Kapoor	Fundamentals of Applied Statistics	Sultan Chand & Sons	2007

MOOC learning

<https://nptel.ac.in/courses/111/107/111107105/>

(Lectures by Prof. Ameeya Kumar Nayak and Prof. Sanjeev Kumar, Department of Mathematics, Indian Institution of Technology Roorkee)

Lecture 02 Gaussian elimination with partial pivoting

Lecture 04 Jacobi and Gauss Seidel methods

Lecture 20 Newton's Forward Difference & Newton's Backward Difference

Lecture 34 Simpsons 1/3rd rule and 3/8 rule

<https://nptel.ac.in/courses/111/106/111106112/>

(6 Lectures by Prof. G.Srinivasan, Department of Management Studies, Indian Institution of Technology Madras)

Lecture 12 Probability

Lecture 13 Rules of probability

Lecture 19 Binomial distribution

Lecture 20 Poisson distribution

Note

Question paper setters to confine to the above text books only

Pedagogy

Chalk and talk, ppt, Group discussion, Seminar, Quiz, Assignment

Course Designers

1.Ms.J.Rejulamercy, Assistant Professor, Department of Mathematics

2. Ms. S.Deepa, Assistant Professor, Department of Mathematics

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TH20A07	ALLIED MATHEMATICS FOR COMMERCE SEMESTER I	CATEGORY	L	T	P	CREDIT
		Theory	86	4	-	5

Preamble

- To present the basic concepts of Mathematics to the students.
- To enable the students to find the practical applications to the real world problems.

Course Outcomes

Upon the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate about the series and Mathematics of Finance	K1
CO2	Understand the limits of Algebraic functions and simple differentiation	K2
CO3	Applying the concepts of simple integration and its application in business	K2
CO4	Understand the linear programming problems and Transportation problem	K3
CO5	Understand the Assignment problems and travelling salesman problem	K4

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	M
CO2	M	S	M	S	S
CO3	M	S	S	M	S
CO4	S	M	M	S	S
CO5	M	S	M	S	M

S- Strong; M-Medium; L-Low

Syllabus

SEMESTER I / III

ALLIED - MATHEMATICS FOR COMMERCE

(COMMON TO SEMESTER I -B.COM (CA, E-COM, FS, A&F) & SEMESTER III

B.COM(Aided & SF))

Credits : 5

Hours : 86

Subject Code : TH20A07**Unit I****17 Hrs**

Sequence and Series: Sequence- Series – Progressions - Arithmetic Series - Geometric series –Harmonic Progression. Mathematics of Finance: Simple and compound interest - Effective rate of interest – Depreciation-Annuities.

Unit II**17 Hrs**

Variables - constants and functions - Limits of algebraic functions - Simple differentiation of algebraic function - Meaning of derivative - evaluation of first and second order derivatives for algebraic - Exponential - Logarithmic functions. Maxima and minima - applications to Business problems (Excluding Trigonometric functions).

Unit III**17Hrs**

Integration : Elementary integral calculus - Determine indefinite and definite integrals of simple functions - Method of substitution - Method of partial fractions - Integration by parts - Business applications (Excluding Trigonometric functions).

Unit IV**17 Hrs**

Linear Programming: Meaning and Formulation of LPP - Graphical Method - Simplex Method Transportation problem: Mathematical formulation of the problem - Initial Basic feasible solution (Matrix Minima Method - North – West Corner rule and VAM)- Simple problems only

Unit V**18 Hrs**

Assignment Problem: Introduction- Mathematical formulation of assignment problem- Assignment algorithm- unbalanced Assignment model- maximization case in assignment problems-Travelling Salesman Problem-Simple problems only.

Text books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	P.R.Vittal	Business Mathematics and Statistics	MarghamPublications	2002
	UNIT I : Chapter -6,7,8,9 &10 UNIT -II : Chapter -15 (Excluding Trigonometric functions) UNIT -III: Chapter -16 (Excluding Trigonometric functions)			
2.	V.Sunderesan K.S.GanapathySubramaniam, K.Ganesan	Operations research	A.R.Publications, 3rd Edition	2005
	UNIT IV : Chapter 2 session 2.1 -2.8, Chapter - 3 : session: 3.1.1 -3.1.4 UNIT -V :Chapter 6 section 6.1,6.2,6.5,6.6, 6.7, 6.9			

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	P.A. Navnitham	Business Mathematics and Statistics	Jai Publishers, Trichy.	2003
2.	P. Rama murthy	Operations research	New age international Publishers	2007
3.	Manmohan and Gupta P K	Operations Research	Sultan Chand & Sons	2011

MOOC learning

<https://nptel.ac.in/courses/111/107/111107128/>

(4 Lectures by Prof. Kusum Deep, Department of Mathematics, Indian Institution of Technology Roorkee)

Lecture 03 Graphical method
Lecture 05 Simplex method
Lecture 28 Transportation Problem
Lecture 29 Assignment Problem

Note

Question paper setters to confine to the above text books only

Pedagogy

Chalk and talk, PPT, Group discussion, Seminar, Quiz, Assignment

Course Designers

1. Ms.S.Narmadha, Assistant Professor, Department of Mathematics
2. Ms.R.Sakthikala, Assistant Professor, Department of Mathematics

TH20A15	ALLIED STATISTICS I SEMESTER I	CATEGORY	L	T	P	CREDIT
		Theory	86	4	-	5

Preamble

- To present students the Basic concepts of statistics in terms of theory and practical.
- To enable the students to find the practical applications to the real world problems using EXCEL

Course Outcomes

Upon the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics about collection of data and representation of data	K1
CO2	Obtain the approximate solutions in mathematical problems.	K2
CO3	Analyze and evaluate the accuracy of common Statistical methods or model in terms of excel.	K2
CO4	Understand about Index numbers, interpolation and extrapolation	K3
CO5	Implement the Statistical Techniques in various types of topics.	K3

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	M	S	M	S	M
CO3	S	M	S	M	S
CO4	M	S	M	S	S
CO5	S	S	S	M	S

S- Strong; M-Medium; L-Low

Syllabus

SEMESTER I ALLIED - - STATISTICS I (For B COM BUSINESS ANALYTICS)

Credits 5

Hours 86

Subject Code : TH20A15

UNIT I

16 Hrs

Introduction-Meaning and objectives of classification-Types of classification-Formation of a discrete and continuous frequency distribution-Tabulation of data- Parts of a table- General rules of tabulation- Types of tables. Diagrams and graphs. Introduction to statistical software (like Excel) and learning graphs and diagrams using Excel.

UNIT II

19 Hrs

Measures of central tendency - Measures of dispersion: Range, Quartile deviation, mean deviation, standard deviation, and coefficient of variation. Simple problems related to above mentioned concepts using Excel.

UNIT III

17 Hrs

Skewness - Correlation analysis: Introduction - Significance of the study of correlation - correlation and causation - Types of correlation - Methods of studying correlation - Graphic method - Karl Pearson's coefficient of correlation - Coefficient of correlation and probable error - Coefficient of determination - Properties of the coefficient of

the correlation - Rank correlation coefficient - Features of Spearman's correlation coefficient. Regression analysis.(Verification by excel)

UNIT IV

17 Hrs

Analysis of time Series -Introduction - Utility of time series - Components of time series - Preliminary adjustments before analyzing time series - Measurement of trend - Free hand graphic method - Method of semi averages - Moving average method - Measurement of seasonal variations - Method of simple averages only - Ratio-to-trend Method - Ratio-to - moving average method - Link relative method.

UNIT V

17 Hrs

Index Numbers: Introduction - Uses of index numbers - Classification of index numbers - Problems in construction of index numbers - Methods of constructing index numbers - Quantity of volume index numbers - Value index numbers - Tests of adequacy of index number formulae. Interpolation: Introduction - Significance of interpolation and extrapolation - Extrapolation - Assumptions of interpolation and extrapolation - Methods of interpolation - Binomial expansion methods - Newton's method - Lagrange's method.

Text book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	S P Gupta	Statistical Methods	Sultan Chand & Sons publishers	2004
Unit I :Volume I: Chapter: 5, 6 Unit II: Volume I: Chapter:7,8. UNIT III :Volume I: Chapter: 9 (Pg No.329-341) (till measures of skewness),10,11. UNIT IV: Volume I: Chapter: 14 (Up to Link relative Method) UNIT V :Volume I: Chapter: 13 & 15.				

Books for Reference

S. No	Author	Title of the book	Publishers	Year of Publication
1.	P.A. Navnitham	Business Mathematics and Statistics	Jai Publishers, Trichy.	2003
2.	V.K.Kapoor	Fundamentals of Applied Statistics	Sultan Chand & Sons	2007

Digital Demonstration using Excel

<https://www.vertex42.com/edu/charts-and-graphs-in-excel.html>

- Graphs and charts

<https://www.syncfusion.com/ebooks/statistics/descriptive-statistics>

- Measures of central tendency, Measures of dispersion

<https://www.excel-easy.com/examples/regression.html>

- Regression

MOOC learning

<https://www.youtube.com/watch?v=zlZaOnBbpUg>

(1 lesson by Prof. Arunkanda, Department of Mechanical Engineering, IIT ,Delhi)

- Lecture 35 - Analysis of Time Series

<https://www.youtube.com/watch?v=JT9o8b43Gk0>

- Index numbers

Note

- Question paper setters to confine to the above text books only

Pedagogy

Chalk and talk, ppt, Group discussion, Seminar, Quiz , Assignment and Demonstration.

Course Designers

1. Ms.M.Mohanapriya, Assistant Professor, Department of Mathematics
2. Ms.Dr.C.R.Parvathy, Associate Professor, Department of Mathematics

TH20A02	ALLIED -MATHEMATICS FOR MANAGEMENT I SEMESTER I	CATEGORY	L	T	P	CREDIT
		Theory	86	4	-	5

Preamble

- To inspire the students to get the knowledge in basic mathematical concepts
- Introducing the need for mathematics to recognize appropriate investigate and interpretive procedures in management

Course Outcomes

CO Number	CO Statement	Knowledge Level
CO1	Learn basic set theoretic concepts, matrices and statistics	K1
CO2	Apply mathematical results to find solutions in the real life like annuities and sampling theory	K2
CO3	Use statistical software (eg., Minitab, Excel)to perform statistical computations and display numerical and graphical summaries of data sets.	K2
CO4	Critically evaluate the design, including sampling techniques of a statistical study	K3
CO5	Solve simultaneous equations using matrices	K4

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	S	S	M	S	M
CO3	S	S	S	S	S
CO4	M	S	S	S	S

CO5	S	S	S	M	S
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S- Strong; M-Medium; L-Low

Syllabus

SEMESTER I ALLIED - MATHEMATICS FOR MANAGEMENT I (Common to BBA(Aided), BBA (IB & RM), BBA (BPM))

Credits 5

Hours 86

Subject Code :TH20A02

UNIT I

17 hrs

Arithmetic Progression-Geometric Progression-Matrices-Fundamental ideas about Matrices-operational Rules-Matrix Multiplication- Solving a system of linear equation by Cramer's rule and matrix inverse method , Inversion of Square Matrices of 3rd order, rank, simple problems.

UNIT II

17 hrs

Mathematics of Finance- Simple and Compound Interest, Depreciation, Annuities, Sinking Fund, Discount on Bills.

UNIT III

17 hrs

Meaning and scope, statistical survey, collection of data, classification and tabulation, diagrams and graphs. Introduction to statistical software (like Excel) and learning graphs and diagrams using Excel.

UNIT IV

17 hrs

Measure of central tendency, arithmetic mean, median and mode, geometric and harmonic mean. Measures of dispersion: Range, Quartile deviation, mean deviation, standard deviation, coefficient of variation. Simple problems related to above mentioned concepts using Excel.

UNIT V

18 hrs

Analysis of Time Series: Components of Time Series- Secular Trend- Moving Average Method-Method of Least Squares- Seasonal Variation- Method of Simple Average Index numbers: Weighted and unweighted indices, cost of living index.

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	P.R.Vittal	Business Mathematics and Statistics	Margham Publishers	2002
	UNIT I: Ch-6 & 7 UNIT II: Ch-8,9,10,11			
2.	P.A.Navnitham	Business Mathematics And Statistics	Jai Publishers	2003
	UNIT I : Vol I Ch-4 sections :1,2,3,4,5,6,7,9,10 UNIT III : Vol II Ch-1-6 UNIT IV : Vol II Ch-7, 8. Ch-12: (pg 503-521)			

Reference Books

S.No	Author	Title of Book	Publishers	Year of publication
1	S.P .Gupta	Statistical Method	Sultan Chand Publications	2002
2	Sundaresan , Jayaselan	An Introduction To Business Mathematics	Sultan Chand & Sons	2003

MOOC learning

<https://nptel.ac.in/courses/111/104/111104120/>

Prof Shalabh, Department of Mathematics, IIT Kanpur

Lecture 14 Arithmetic mean

Lecture 15 Median

Lecture 16 Quartiles

Lecture 17 Mode Geometric mean

Lecture 20 Mean and standard deviation

Lecture 21 coefficient of variation

<https://nptel.ac.in/courses/111/106/111106112/>

Prof G. Srinivasan,, Department of Mathematics, IIT Madras

Lecture 1 :Introduction to probability and statistics

Lecture 2 : Types of data

Lecture 4 : Data and diagram

Note

Question paper setters to confine to the above text books only

Pedagogy

Chalk and talk, PPT, Group discussion, Seminar, Quiz, Assignment

Course Designers

1. Ms.S.Lakshmi, Assistant Professor, Department of Mathematics

2. Ms.J.Rejulamerly, Assistant Professor, Department of Mathematics

TH20A06	ALLIED DISCRETE MATHEMATICS SEMESTER II	CATEGORY	L	T	P	CREDIT
		Theory	86	4	-	5

Preamble

- Principle of mathematical structures which are essential and related to the concepts of computer science. This help the students to approach any mathematical problem which arise in the field of computer science

Course Outcomes

Upon the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand and Apply Mathematical logic and definitions and well-formed formula . Apply the understanding of Tautology Equality relations	K1
CO2	Apply algebraic concepts in coding theory using group codes	K3
CO3	Understand and application of Formal languages - phrase structure grammar and simple derivations of grammars. Emphasis on the procedure of finite state automata- definitions- procedures – mappings. Conversions of NFSA into DFSA	K3
CO4	Analyse and understand the basic principles of lattices, distributive lattices – Applications of problems in Boolean algebra, Boolean function using K-map	K4
CO5	Understand the concepts of Graph theory, Basic definitions, Application and Emphasis on the problems.	K3

Mapping with Programme Outcomes

COs/POs	PO1	PO 2	PO 3	PO 4	PO 5
CO1	S	S	S	S	M
CO2	S	S	S	M	S
CO3	S	S	S	S	S
CO4	M	S	M	S	S
CO5	S	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus**SEMESTER – II****ALLIED - DISCRETE MATHEMATICS****Common to B.SC (CS), BCA, B.SC (IT)****Credits 5****Hours 86****Subject Code :TH20A06****Unit I****17 Hrs**

Mathematical Logic: Connectives– Conditional and Biconditional - Well formed formulas - Tautologies - Equivalence of Formulas -Duality law -Tautological implications - Normal forms –Predicate Calculus-Theory of inference for the statement calculus.

Unit II**17 Hrs**

Coding Theory : Introduction – Hamming distance – Encoding a message – Group codes – procedure for generating group codes – Decoding and error correction – An example of simple error correcting code.

Unit III**17 Hrs**

Formal languages and Automata: Grammar and Languages -Phrase - Structure grammar – Types of Phrase Structure Grammar – Backus-Naur form [BNF] - Finite state Automata : Deterministic finite automata-Non-Deterministic finite-State automata-Conversion of Non-Deterministic finite automata to finite state automata.

Unit IV**19 Hrs**

Lattice and Boolean Algebra:Partial ordering set-Poset-Lattices- Distributive lattices-Complemented Distributive Lattices-Boolean algebra-minimization of Boolean function using K-Map.

Unit V**17 Hrs**

Graph Theory: Directed and undirected graphs-Connected graphs-Path-Reachability-Circuits-Hamiltonian Paths-Euler paths-Matrix representation-Incidence matrix-Adjacency matrix-Tree and Binary tree-Theorems-Statement only(No Proof).

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	J.P.Tremblay and R.Manohar	Discrete mathematical Structures with Applications to Computer Science	McGraw Hill Publishing Company	Edition 1997, Reprint 2016
	Unit I : Section: 1.2.1 -1.2.4, 1.2.6 -1.2.11, 1.3.1 -1.3.4, 1.5.1 -1.5.4			
	Unit III : Section: 3.3.1 -3.3.3, 6.1.1			
	Unit IV : Section: 4.1.1 -4.3.1 ,4.4.1, 4.4.2			
	Unit V : Section: 5.1.1 -5.2.2			
2.	Dr. M.K.	Discrete	The National	First edition

	Venkataraman, Dr. N. Sridharan and N. Chandrasekaran	Mathematics	Publishing company, Chennai	Reprint 2003,
	Unit II: Chapter 8 Sections 8.1 – 8.8			

Reference books

S.NO	Author	Title of the book	Publishers	Year of publication
1	T.Veerarajan	Discrete Mathematics with Graph Theory and Combinatorics	Tata mcgraw-Hill publishing company Limited	2008
2	NarSingh Deo	Graph Theory with Applications to Engineering and Computer Science	PHI, India	2006
3	T. Santha and P. Radha	Discrete mathematics for Computer Science and Applications	Kalaikathir Publications	2002

MOOC learning

<https://nptel.ac.in/courses/111/107/111107058/>

(Lectures by Dr. Aditi Gangopadhyay, Dr. Sugata Gangopadhyay and Dr. Tanuja Srivastava, Department of Mathematics, IIT Roorkee)

Lecture 06 Logical Inferences

Lecture 32 Lattices

Lecture 33 Boolean algebra

Lecture 17 Basic definition

Lecture 18 Isomorphism and sub graphs

Lecture 19 Walks, paths and circuits operations on graphs

Lecture 20 Euler graphs, Hamiltonian circuits

Note

Question paper setters to confine to the above text books only

Pedagogy

Chalk and talk, ppt, Group discussion, Seminar, Quiz, Assignment

Course Designers

1. Ms.S.Sreeja, Assistant Professor, Department of Mathematics

2. Ms.S.Deepa, Assistant Professor, Department of Mathematics

TH20A08	ALLIED STATISTICS FOR COMMERCE SEMESTER II	CATEGORY	L	T	P	CREDIT
		Theory	86	4	-	5

Preamble

- To present students the Basic concepts of statistics.
- To enable the students to find the practical applications to the real world problems.

Course Outcomes

Upon the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Indicate the strength and direction of a <i>linear</i> relationship between two variables, <i>regression and time series</i> .	K1
CO2	Construct simple price, quantity, and value indexes.	K2
CO3	Understand the concepts of a random variable and a probability distribution.	K2
CO4	Hypothesize various advanced statistical techniques for exploring practical situations.	K4
CO5	To measure progress toward quality improvement and public health <i>goals</i> .	K3

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	M	S	M	S	M
CO3	S	M	S	M	S
CO4	M	S	M	S	S
CO5	S	S	S	M	S

S- Strong; M-Medium; L-Low

Syllabus

SEMESTER II/IV
Allied - Statistics for Commerce
COMMON TO B.COM(Aided & SF) - SEMESTER IV AND B.COM (CA, E-COM, FS, A&F) - SEMESTER II

Credits 5
Subject Code :TH20A08

Hours 86

UNIT I**16Hrs**

Correlation analysis: Introduction - Significance of the study of correlation - correlation and causation - Types of correlation - Methods of studying correlation - Graphic method - Karl Pearson's coefficient of correlation - Coefficient of correlation and probable error -Regression analysis. Analysis of time Series: Introduction - Utility of time series - Components of time series - Preliminary adjustments before analysing time series - Measurement of trend - Free hand graphic method - Method of semi averages - Moving average method - Measurement of seasonal variations - Method of simple averages - ratio to moving average – link relative method.

UNIT II**19 Hrs**

Index Numbers: Introduction - Uses of index numbers - Classification of index numbers - problems in construction of index numbers - Methods of constructing index numbers - Quantity or volume index numbers - Value index numbers - Tests of adequacy of index number formulae- Consumer price index numbers-meaning and need-method of constructing the index- Index number of industrial production.

UNIT III**17 Hrs**

Concepts of probability- Addition theorem-Multiplicative theorem – Conditional probability-Bayes theorem-Mathematical Expectation-Theoretical distributions-Binomial Distribution -Poisson distribution- Normal distribution.

UNIT IV**17 Hrs**

Statistical Inference-Tests of hypothesis-Introduction—Procedure-Types of errors-Two-tailed and one-tailed tests of hypothesis-standard error and sampling distribution-Tests of significance for large samples-Difference between small and large samples- Two tailed test and standard error of the difference between small and large samples-chi-square test and goodness of fit.

UNIT V**17 Hrs**

Vital Statistics-Definition-Utility of vital statistics-Measures of population and Vital statistics-Introduction-Measures of population - Measures of vital statistics - Mortality Rates –Fertility Rates.

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	S P Gupta	Statistical Methods	Sultan Chand & Sons publishers	2004
	Unit I :Volume I: Chapter: 10,11,14. Unit II: Volume I: Chapter: 13 Unit III: Volume II: Chapter: 1&2 Unit IV: Volume II: Chapter:3&4.			
2.	Veer Bala Rastogi	Biostatistics Third Revised Edition	MEDTECH	2015
	Unit V: Chapter20; Sections:20.2, 20.2.1.,20.2.2. Chapter21:21.1, 21.2, 21.2.1, 21.3,21.4,21.5			

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	P.A. Navnitham	Business Mathematics and Statistics	Jai Publishers, Trichy.	2003
2.	V.K.Kapoor	Fundamentals of Applied Statistics	Sultan Chand & Sons	2007
3.	P.N.ARORA SUMEET ARORA , S.ARORA	Comprehensive Statistical Methods	Sultan Chand & Sons	2008

MOOC learning

<https://www.youtube.com/watch?v=zIzaOnBbpUg>

(1 lesson by Prof. Arunkanda, Department of Mechanical Engineering, IIT ,Delhi)

Lecture 35 - Analysis of Time Series

<https://www.youtube.com/watch?v=JT9o8b43Gk0>

Index numbers

<https://nptel.ac.in/courses/102106051/>

26 Lessons by Prof. Mukesh Doble , IIT Madras

Lecture 1 – Introduction

Lecture 2 – Binomial Distribution

Lecture 3 – Poisson distribution

Lecture 4 – Normal Distribution

Lecture 5-10 – T- test

Lecture 22-24 – Chi-Square test

Note

Question paper setters to confine to the above text books only

Pedagogy

Chalk and talk, PPT, Group discussion, Seminar, Quiz, Assignment

Course Designers

1.Ms.M.Deepa, Assistant Professor, Department of Mathematics

2. Ms.S.Narmadha, Assistant Professor, Department of Mathematics

TH20A16	ALLIED STATISTICS II	CATEGORY	L	T	P	CREDIT
	SEMESTER II	Theory	86	4	-	5

Preamble

- To provide the use of mathematical process skills to identify, pose and solve problems creatively, critically and practically
- To make students to understand statistical principles with theoretical concepts and problems.
- To provide the wide knowledge of real time applications and to clear the competitive exams.

Course Outcomes

On the successful completion of the course students will be

CO Number	CO Statement	Knowledge Level
CO1	Acquires the basic concepts of data description and its representation	K1
CO2	Understand the basic principles of sampling theory	K1
CO3	Understand the role as well as the distinction between discrete and continuous data	K2
CO4	Apply the skills of data analysis and emphasis on understanding variation, collecting information in the face of uncertainty, checking distributional assumptions using SPSS	K2
CO5	Apply probability as a tool for anticipating the distribution of data and using appropriate method to draw conclusions.	K3

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	S	M	S	S
CO3	S	S	M	S	S
CO4	S	S	S	S	S
CO5	S	S	M	S	S

S- Strong; M-Medium; L-Low

Syllabus

SEMESTER II ALLIED – STATISTICS II (FOR B COM (BUSINESS ANALYTICS))

Credits 5

Total Hours 86

Subject Code : TH20A16

Unit I

17 Hrs

Brief History- meaning & usefulness-Mathematical properties- permutation & combination-Trail, event- sample space-mutually exclusive cases- exhaustive events-

independent events-dependent events, simple and compound events- measurement-classical, relative frequency – theory of probability-limitations- personalistic view of probability and axiomatic approach of probability- addition and multiplication theorems.

Unit II

17Hrs

Theoretical Distributions: Binomial Distributions - Poisson Distributions – Normal Distributions.

UNIT III

18 Hrs

Tests of hypotheses- Introduction- Standard error and Sampling Distribution- Estimation-Test of significance for large samples- Test of significance for small samples: Students t distribution- chi-square test and goodness of fit (Except Yates correction).Simple problems using SPSS.

UNIT IV

17 Hrs

F test – Analysis of variance: One way classification-two way classification. Simple problems SPSS.

UNIT V

17 Hrs

Experimental Design- Introduction-Randomized block design-Latin squares-Randomized blocks Vs Latin squares-Latin cubes.

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	R .S .N. Pillai, V. Bagavathi	Statistics	S. Chand & company Ltd.	2001
2.	S P Gupta	Statistical Methods	Sultan Chand & Sons publishers	2004

Reference Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	S.C. Gupta	Fundamentals of Mathematical Statistics	Sultan Chand & Sons publishers.	2002
2.	EelkoHuizingh	Applied Statistics with SPSS	Sage Publications	2007

Digital Demonstration using Excel

<https://academic.udayton.edu/gregelvers/psy216/spss/ttests.htm>

➤ T test

<https://statistics.laerd.com/spss-tutorials/one-way-anova-using-spss-statistics.php>

- One way ANOVA

<https://statistics.laerd.com/spss-tutorials/two-way-anova-using-spss-statistics.php>

- Two way ANOVA

MOOC learning

<https://nptel.ac.in/courses/102106051/>

(26 Lessons by Prof. Mukesh Doble , IIT Madras)

- Lecture 1 – Introduction
- Lecture 2 – Binomial Distribution
- Lecture 3 – Poisson Distribution
- Lecture 4 – Normal Distribution
- Lecture 5-10 – T- test
- Lecture 11-13 – F test
- Lecture 14-20 – ANOVA
- Lecture 22-24 – Chi-Square test
- Lecture 32- Design of Experiments (Introduction)

Note

Question paper setters to confine to the above text books only

Pedagogy

Chalk and talk, PPT, Group discussion, Seminar, Quiz, Assignment

Course Designers

1. Ms.M.Mohanapriya, Assistant Professor, Department of Mathematics
2. Ms.R.Sakthikala, Assistant Professor, Department of Mathematics

Preamble

TH20A24	MATHEMATICS FOR MANAGEMENT II SEMESTER II	CATEGORY	L	T	P	CREDIT
		Theory	86	4	-	5

To impart the students with knowledge in basic mathematical concepts.

Course Outcomes

Upon the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts and application of operation research in various fields.	K1
CO2	Understand and analyse managerial problems in industry so that they are able to use resources (capitals, materials, staffing, and machines) more effectively	K2
CO3	Recognize the importance and value of Operations Research and mathematical modelling in solving practical problems in industry	K2
CO4	Identify and develop operational research models from the verbal description of the real	K2

	system	
CO5	Solve network models like the shortest path, minimum spanning tree, and maximum flow problems	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	S	S	M	S	M
CO3	S	S	S	S	S
CO4	S	M	S	S	S
CO5	S	S	S	M	S

S- Strong; M-Medium; L-Low

Syllabus

SEMESTER II MATHEMATICS FOR MANAGEMENT II Common to BBA(Aided), BBA (IB & RM), BBA (BPM)

Credits 5

Hours 86

Subject Code :TH20A24

UNIT I

17 Hrs

Introduction to operation research: Meaning and Objective of OR – Scope of OR in Retail Business – Models in OR – Characteristics – Benefits – Limitations.

UNIT II

17 Hrs

Linear Programming: Meaning and Formulation of LPP - Graphical Method - Simplex Method.

UNIT III

17 Hrs

Transportation and Assignment Problem-- Travelling salesmen problem.

UNIT IV

17 Hrs

Game Theory: Useful Terminology - Rules for Game Theory - Pure Strategy - Mixed Strategy (2x2 games, 2 x n games or m x 2 games) - dominance property.

UNIT V

19 Hrs

Network Analysis: Network (Arrow diagram) Logic - Critical Path Method (CPM) - Programme Evaluation and Review Technique (PERT).

Text book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	V.Sunderesan K.S.GanapathySu bramaniam, K.Ganesan	Operations research	A.R.Publications, 3rd Edition	2005
UNIT I : Chapter 1 sections 1.1 - 1.9				

UNIT II : Chapter 2 sections 2.1 - 2.8 Chapter 3 sections 3.1.1 - 3.1.4. UNIT III : Chapter 5 sections 5.1 – 5.5 Chapter 6 sections 6.1 - 6.8. UNIT IV : Chapter 13 sections 13.1 – 13.7 UNIT V : Chapter 8 sections 8.1-8.7

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	S.Kalavathy	Operations Research	Vikas publishing house	2008
2	D.S.Cheema	Operations Research	LaxmiPublicatons	2010
3	Prem Kumar cuppta	Operations Research	S.Chand	2004
4	Michael W.carter	Operations Research	Crp press	2008

MOOC learning

<https://nptel.ac.in/courses/111/107/111107128/>

Prof Kusum Deep, Department of Mathematics, IIT Roorkee

Lecture 1 : Introduction to OR model

Lecture 3 : Graphical method for Linear programming problem

Lecture 15: simplex method

Lecture 8: Unbounded solution

Lecture 7 : Multiple solution

<https://nptel.ac.in/courses/112/106/112106134/>

Prof G. Srinivasan ,Department of Management Studies, IIT Madras

Lecture 1 : Introduction to LPP

Lecture 13 : Transportation problem

Lecture 16 : Assignment problem

Lecture 17 :Hungraian method.

Note

Question paper setters to confine to the above text books only

Pedagogy

Chalk and talk, ppt, Group discussion, Seminar, Quiz , Assignment

Course Designers

1.Ms.S.Lakshmi, Assistant Professor, Department of Mathematics

2.Ms.Dr.C.R.Parvathy, Associate Professor, Department of Mathematics

COURSE NUMBER TH20C06	COURSE NAME - CORE VI STATICS WITH GNU-FISICA LAB SEMESTER III	Category	L	T	P	Credit
		Theory	56	4	-	5

Preamble

- To promote conceptual understanding and problem solving skills, the course contains many interactive elements.

Prerequisite

- Knowledge in forces acting at a point, rigid body, vector algebra and centre of gravity.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Know the basic principles and to develop the ability to describe position, forces and moments	K1
CO2.	Select suitable reference coordinate axes, construct free body diagrams and understand the relation between constraints imposed by supportive forces	K2
CO3.	Analyze systems that include frictional forces	K2
CO4.	Gain ability to apply the results from physical models to create real target systems	K3
CO5.	Appreciate/Understand application of the resultant of forces, theorems in statics and their interpretations.	K3

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

SEMESTER III – CORE PAPER VI STATICS with GNU – FISICA Lab

Credits: 5

Hours: 56

Subject Code : TH20C06

UNIT I

11 Hrs

Forces acting at a point: Resultant and components – Parallelogram of forces – Triangle of forces – Polygon of forces – Lami's Theorem – An extended form of the parallelogram law of forces – Resolution of a force – Components of a force along two given directions – Theorem on Resolved parts – Resultant of any number of forces and coplanar forces acting at a point : Graphical and Analytical method – Condition of Equilibrium of any number of forces acting upon a particle - *Simple Problems using GNU - fisicaLab.*

UNIT II**11Hrs**

Parallel Forces and Moments: Introduction – The resultant of two like, unlike and unequal parallel forces acting on a rigid body – Moment of a force – Physical significance and Geometrical representation of a moment – Varignon’s theorem of moments – Generalised theorem of moments. Couples: Definition – Equilibrium and Equivalence of two couples – couples in parallel planes – Representation of a couple by a vector - Resultant of a Couple and a Force - *Simple Problems using GNU - fisicaLab.*

UNIT III**11 Hrs**

Equilibrium of Three Forces Acting on a Rigid body: Rigid body subjected to any three forces – Three coplanar forces – Procedure to be followed in solving any statistical problem – Two Trigonometrical theorems. Coplanar forces: Introduction – Reduction of any number of coplanar forces – Condition and Alternative condition for a system of forces to reduce to a single force or to a couple – Change of the base point – Equation to the line of action of the resultant - *Simple Problems using GNU– fisicaLab.*

UNIT IV**11 Hrs**

Friction: Introduction – Statical, Dynamical and limiting friction – coefficient of friction – Angle of friction – Cone of friction - Equilibrium of a particle on a rough inclined plane – Equilibrium of a body on a rough inclined plane under a force parallel to the plane – Equilibrium of a body on a rough inclined plane under any forces. Centre of gravity: Centre of Like Parallel Forces – Centre of mass or centre of Inertia – Distinction between centre of gravity and centre of mass – The centre of gravity of a body – Determination of uniqueness of the centre of gravity in simple cases – Centre of gravity by integration - *Simple Problems using GNU – fisicaLab.*

UNIT V**12 Hrs**

Stability of equilibrium: Stable, Unstable and Neutral equilibrium – Nature of equilibrium of a rigid body supported at one fixed point – conditions of stability for a body with one degree of freedom. Equilibrium of strings: Equation of the common catenary – Tension at any point – Geometrical properties of the common catenary - *Simple Problems using GNU - fisicaLab.*

Text Books

S. No	Author	Title of the book	Publishers
1.	Dr.M.K.Venkataraman	A Text Book of Statics	Agasthiar Publications – (Eleventh edition) (2014)
2	https://www.gnu.org/software/fiscalab/manual/en/fiscalab.pdf		

Reference Books

S. No	Author	Title of the book	Publishers
1.	K.ViswanathaNaik&M.S.Kasi	Statics	Emerald Publishers, 1992
2.	N.P. Bali	Statics	Golden Mathematics Series, Laxmi publications,1992

UNIT I	:	Chapter 2: Sections 1 to 16
UNIT II	:	Chapter 3: Sections 1 to 13 Chapter 4: Sections 1 to 10
UNIT III	:	Chapter 5: Sections 1 to 5 Chapter 6: Sections 1 to 9
UNIT IV	:	Chapter 7: Sections 1 to 12 Chapter 8: Sections 1 to 6 &18

UNIT V : Chapter 10: Sections 1 to 3
Chapter 11: Sections 1 to 6

MOOC Courses

- <https://nptel.ac.in/courses/122/102/122102004/#>
(6 Lectures by Prof. R. K. Mittal, IIT Delhi)
 - Lecture 1 Preliminary concepts
 - Lecture 2 Vector Analysis
 - Lecture 3 Analysis of forces
 - Lecture 4 Analysis of Equilibrium
 - Lecture 13 Moments and product of Inertia
 - Lecture 16 Stability of Equilibrium

- Equilibrium of a rigid body :
<https://www.mun.ca/physics/undergraduates/fylabs/p1020/experiment6.pdf>

- Forces acting at a point: <https://www.msuniv.ac.in/Download/Pdf/2c2167ab44cf4fc>

Pedagogy:

Chalk and talk seminar, group discussion, numerical exercises and quiz.

Course Designers:

1. Dr.K.Sumathi, Associate Professor, Department of Mathematics
2. Dr. G. Arthi, Assistant Professor, Department of Mathematics

TH20C05	ANALYTICAL GEOMETRY WITH GEOGEBRA	Category	L	T	P	Credit
		Theory	41	4	-	4

Preamble

- To provide a comprehensive and clear description of geometrical objects
- To introduce [equations](#) for various shapes used in [physics](#) and [engineering](#).

Prerequisite

Knowledge in Basic vector algebra, trigonometric functions and identities

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Identify and classify geometric shapes using correct mathematical language. Draw and label figures based on verbal descriptions	K1
CO2.	Graph lines and interrelate all of the following: slopes, intercepts, tables of values, and equations	K1
CO3.	Apply theorems involving vertical angles, complementary angles, supplementary angles, transversals, internal angle measure in triangles, circles and tangent lines to circles	K2
CO4.	Apply geometric concepts to solve problems	K2
CO5.	Solve geometrical problems using the software GEOGEBRA	K3
CO6.	Transform from polar co-ordinate system to rectangular co-ordinate system and vice versa	K3

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1.	S	M	S	S	S	S	S
CO2.	S	M	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S
CO6.	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

SEMESTER – CORE PAPER ANALYTICAL GEOMETRY WITH GEOGEBRA

Credits: 4

Hours: 41

UNIT I

8 hrs

Polar Coordinates: Introduction - Definition of Polar Coordinates - Relation between Cartesian Coordinates and Polar Coordinates – Polar Equation of a Straight Line - Polar Equation of a Straight Line in Normal form – Circle – Polar equation of a Conic – Simple Problems using Geogebra

UNIT II

8 hrs

Planes: Introduction – General Equation of a plane - General Equation of a plane passing through a given point - Equation of a plane in Intercept form - Equation of a plane in Normal form – Angle between two planes – Perpendicular distance from a point on a plane – Plane passing through three given points - To find the Ratio in which the plane joining the points (x_1, y_1, z_1) and (x_2, y_2, z_2) is Divided by the Plane $ax + by + cz + d = 0$ - Plane Passing through the intersection of two given planes – Equation of the planes which bisect the angle between two given planes – Condition for the Homogenous Equation of the Second Degree to Represent a pair of Planes- Illustrative examples – Simple Problems using Geogebra

UNIT III

8 hrs

Straight Line: Introduction – Equation of a Straight Line in Symmetrical Form - Equation of a Straight Line Passing Through the Two Given Points - Equation of a Straight Line Determined by a pair of planes in Symmetrical Form – Angle between a Plane and a Line – Condition for a line to be parallel to a Plane – Condition for a line to lie on the plane - To find the Length of the Perpendicular from a Given Point on a Line – Coplanar Lines –

Skew Lines – Equation of Two Non-intersecting Lines – Intersection of Three Planes – Conditions for Three Given Planes to form a Triangular Prism – Illustrative Examples – Simple Problems using Geogebra

UNIT IV

8 hrs

Sphere: Definition of Sphere – The Equation of a Sphere with centre at (a, b, c) and radius r – Equation of a sphere on the Line Joining the points (x_1, y_1, z_1) and (x_2, y_2, z_2) as Diameter – Length of the Tangent from P (x_1, y_1, z_1) to the Sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ - Equation of the Tangent Plane at (x_1, y_1, z_1) to the Sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ - Section of a Sphere by a Plane – Equation of a Circle – Intersection of Two Spheres – Equation of a Sphere Passing through a Given Circle – Condition for Orthogonality of Two Spheres – Radical Plane – Coaxal System – Illustrative Examples – Simple Problems using Geogebra.

UNIT V

9 hrs

Cone: Definition of Cone – Equation of a Cone with a given Vertex and a given guiding curve – Equation of a cone with its vertex at the origin – Condition for the General Equation of the Second Degree to Represent a Cone – Right Circular Cone – Tangent Plane – Reciprocal Cone.

Cylinder: Definition – Equation of a Cylinder with a Given Generator and a given guiding curve – Enveloping Cylinder – Right Circular Cylinder – Illustrative – Simple Problems using Geogebra.

Text Books

1.	P.R. VITAL	Analytical Geometry 2d and 3d (All Five Units)	Pearson Publication
2.	Department of Mathematics	Lab Manual on GEOGEBRA	
3.	Geogebra Manual – The Official Manual of Geogebra Research.shu.ac.uk/geogebra/GIF – Guides/official Geogebra manual.pdf(2011)		

Unit I: Chapter 9

Unit II: Chapter 12

Unit III: Chapter 13

Unit IV: Chapter 14

Unit V: Chapter 15 &16

Reference Books

1	V.V. Koney	Linear Algebra, Vector Algebra and Analytical Geometry	TPU Press, 2009
2	P.Duraipandian, LaxmiDuraipandian &D.Muhilan	Analytical Geometry – Three Dimensional	Emerald Publishers, 2010
3	D.Chatterjee	Analytical Geometry- Two and Three Dimensions	Narosa Publishing House,2011

4	George.F.Simmons	Calculus with Analytical Geometry	Second Edition
5	Shanti Narayan	Analytical Solid Geometry	Fifteenth Edition, S.Chand & Company Ltd, 2009

MOOC learning

Tangent, Normal : <https://nptel.ac.in/courses/111/104/111104095/>

Pedagogy:

Chalk and Talk, Seminar, Group Discussion, Numerical Exercises, Quiz.

Course Designers:

1. S. Narmatha, Assistant Professor, Department of Mathematics (UG-SF)
2. M.Deepa, Assistant Professor, Department of Mathematics (UG-SF)

TH19A12	ALLIED MATHEMATICS FOR PHYSICS I	Category	L	T	P	Credit
		Theory	101	4	-	5

Preamble

- To introduce the fundamentals concepts of vector calculus, matrices, Laplace transforms and tensors which acts as a tool for understanding basic theories in theoretical physics

Prerequisite

- Knowledge in basic concepts of calculus and matrices

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Understand the differential operators of classical vector Calculus: gradient, divergence and curl	K1
CO2.	Differentiate and integrate vector and scalar fields along contours in n –dimensional space. Appreciate and use Gauss’s, Green’s & Stokes theorems	K1
CO3.	Determine when a matrix has an inverse and find it when it exists	K2
CO4.	Apply the Laplace transform to differential equations	K2
CO5.	Demonstrate knowledge of tensors and operations of tensors	K3

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6
C01.	S	S	S	S	S	S
C02.	S	S	S	S	S	S
C03.	S	S	S	S	S	S
C04.	S	S	S	S	S	S
C05.	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus**SEMESTER III – ALLIED
MATHEMATICS FOR PHYSICS - I****Credits: 5****Hours: 101****Subject Code :TH19A12****UNIT I****20 hrs**

Vector Calculus: Scalar and vector point functions - Differentiation of vectors - Differential vector Operators - Directional derivative: Gradient, Divergence and curl - MAPLE Applications – Stepwise Solutions of Vector Calculus.

UNIT II**20 Hrs**

Integration for vectors: Line, Surface and Volume integrals - Theorems of Gauss, Green's and Stoke's (Statement only) - Verification of Simple problems - MAPLE Applications - Stoke's problem.

UNIT III**20 Hrs**

Laplace Transforms : Definition – Laplace Transform of e^{at} , $\cos at$, $\sin at$, $\cosh at$, $\sinh at$, t^n , n a positive integer – $L[f'(t)]$, $L[f''(t)]$,, $L[f^{(n)}(t)]$ – Laplace transform of $e^{at}\cos bt$, $e^{at}\sin bt$ and $e^{at}t^n$. Inverse Laplace transforms of standard functions. Solving differential equations of second order with constant coefficients using Laplace transform.

UNIT IV**20 Hrs**

Matrices: Eigen values and Eigen vectors - Cayley Hamilton theorem (without proof) – Verification – Using this theorem finding the inverse of a matrix – Partition of matrices – Diagonalisation of matrices - Power of matrices.

UNIT V**21 Hrs**

Tensor Analysis : Definition of Tensors – Contra variant - Covariant and mixed tensors - Addition and subtraction of Tensors - Summation convention - Symmetry and Axisymmetric Tensor - Contraction and direct product – Quotient Rule – MAPLE Application – Tensor Calculus with differential Geometry.

Text Books

S. No	Author	Title of the book	Publishers
1	P.Kandasamy&K.Thilagavathy	Allied Mathematics Volume II (For Unit I &II)	S.Chand& company LTD – First edition (2004)
2	T.K.ManicavachagamPillai and S. Narayanan	Ancillary Mathematics (For Unit III & IV) Volume - I &Volume - II	S.Viswanathan (Printers and Publishers) Pvt. Ltd. Vol. I - 2009 & Vol. II - 2008
3	A.W.Joshi	Matrices and Tensors in Physics(For unit V)	New Age International Publishers, Revised Edition,(2010)
4	http://www.maplesoft.com/applications/		

Reference Books

S. No	Author	Title of the book	Publishers
1	P.DuraiPandian and KayalalPachaiyappa	Vector Analysis	S Chand Publications (2014)
2	Shanthinarayan and P.K Mital	Vector Calculus	S Chand publications (2016)
3	P.C .Mathews	Vector Calculus	Springer Verlang London Ltd. (1998)
4	B. D. Gupta	Mathematical Physics	Vikas Publications(1993)

- Unit I & II : Chapters 1 to 3
 Unit III : Chapter 7 (Volume II)
 Unit IV : Chapter 3 (Volume I) 6.2, 14.0 to 17
 Unit V : Part II, Chapters 15, 16, 17

Pedagogy:

Chalk and Talk, Seminar, Group Discussion, Numerical Exercises and Demonstration

Course Designers:

1. Dr.B.TamilSelvi, Associate Professor and Head, Department of Mathematics
2. Ms. A. Karpagam, Associate Professor, Department of Mathematics

COURSE CODE TH19A09	COURSE NAME ALLIED – MATHEMATICS FOR SCIENCES I SEMESTER III	Category	L	T	P	Credit
		Theory	101	4	-	5

Preamble

- To inspire the students to use appropriate and relevant, fundamental and applied mathematical knowledge.
- To explore how Chemistry and Mathematics interact with other disciplines with industry and with wider society.

Prerequisite

- Knowledge in Calculus and Set theory.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Determine and apply the important quantities associated with vector fields such as divergence, curl and scalar potential.	K1
CO2.	Apply fundamental theorem of line integrals, Green's theorem, Stoke's theorem and Divergence theorem to evaluate integrals	K2
CO3.	Find the Laplace transform of one variable and solve an initial value problem for n^{th} order ordinary differential equation using Laplace transform	K2
CO4.	Determine when a matrix has an inverse and find it when it exists	K3
CO5.	Demonstrate knowledge of basic concepts such as Abelian groups, normal subgroups, quotient groups, cyclic groups, permutation groups and group actions	K3

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6
CO1.	S	S	S	M	S	S
CO2.	S	M	S	S	S	S
CO3.	S	S	S	M	S	S
CO4.	S	S	M	S	S	S
CO5.	S	S	S	S	M	S

S- Strong; M-Medium; L-Low

Syllabus**SEMESTER III
ALLIED - MATHEMATICS FOR SCIENCES I****Credits : 5****Hours: 101****Subject Code :TH19A09****UNIT I****20 Hrs**

Vector Calculus: Scalar and Vector point functions - Differentiation of vectors - Differential Operators - Directional derivative: Gradient - Divergence and curl - MAPLE Applications - Stepwise Solutions of Vector Calculus.

UNIT II**20 Hrs**

Integration for vectors : Line, surface and volume integrals – Theorems of Gauss, Green’s and Stoke’s (statements only) – *Verification of MAPLE Applications* – Stoke’s problem.

UNIT III**20 Hrs**

Laplace Transforms : Definition – Laplace Transform of e^{at} , $\cos at$, $\sin at$, $\cosh at$, $\sinh at$, t^n , n is a positive integer – $L[f'(t)]$, $L[f''(t)]$,, $L[f^n(t)]$ – Laplace transform of $e^{at}\cos bt$, $e^{at}\sin bt$ and $e^{at}t^n$ – Inverse Laplace Transforms of standard functions - Solving differential equations of second order with constant coefficients using Laplace transform.

UNIT IV**20 Hrs**

Matrices: Eigen values and eigen vectors - Cayley Hamilton theorem (without proof) – Verification – Finding the inverse of a matrix (Using Cayley Hamilton theorem).

UNIT V**21 Hrs**

Review of Set theory and equivalence relations – Group – Properties - Order of an element – Subgroups - Cyclic groups – Theorems – Permutation group - Symmetric group S_n .

Text Books

S. No	Author	Title of the book	Publishers
1	P.Kandasamy&K.Thilagavathy	Allied Mathematics Volume II (For Unit I &II)	S.Chand& company LTD – First edition (2004)
2	T.K.ManicavachagamPillai and S. Narayanan	Ancillary Mathematics (For Unit III & IV) Volume I & Volume II	S.Viswanathan (Printers and Publishers) Pvt. Ltd. Volume I – 2009 & Volume II – 2008
3	P.Kandasamy&K.Thilagavathy	Mathematics Volume II (For Unit V)	S Chand & Company LTD - First edition (2004)
4	http://www.maplesoft.com/applications/		

Reference Books

S. No	Author	Title of the book	Publishers
1	P.DuraiPandian and KayalalPachaiyappa	Vector Analysis	S Chand Publications (2014)
2	Shanthinarayan and P.K. Mital	Vector Calculus	S Chand publications (2016)
3	P.C. Mathews	Vector Calculus	Springer Verlang London Ltd. (1998)

4	G. Balaji	Transforms and Partial differential equations	G. Balaji publishers, Revised edition (2011)
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- Unit I & II** : Chapters – 1 to 3
Unit III : Chapter 7 Volume II
Unit IV : Chapter 3 Volume I
Unit V : Group Theory 1 – 4 (Volume II)

Note

Question paper setters to confine to the above text books only.

Pedagogy

Chalk and Talk, Seminar, Group Discussion, Demonstration and Numerical Exercises.

Course Designers

1. Dr.B.Tamilselvi, Associate Professor and Head, Department of Mathematics
2. Dr.R.Lakshmi, Assistant Professor, Department of Mathematics

TH20A07	ALLIED MATHEMATICS FOR COMMERCE SEMESTER I	CATEGORY	L	T	P	CREDIT
		ALLIED	86	4	-	5

Preamble

- To present the basic concepts of Mathematics to the students.
- To enable the students to find the practical applications to the real world problems.

Course Outcomes

Upon the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate about the series and Mathematics of Finance	K1
CO2	Understand the limits of Algebraic functions and simple differentiation	K2
CO3	Applying the concepts of simple integration and its application in business	K2
CO4	Understand the linear programming problems and Transportation problem	K3
CO5	Understand the Assignment problems and travelling salesman problem	K4

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	M
CO2	M	S	M	S	S
CO3	M	S	S	M	S
CO4	S	M	M	S	S

CO5	M	S	M	S	M
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S- Strong; M-Medium; L-Low

Syllabus

SEMESTER I / III
ALLIED - MATHEMATICS FOR COMMERCE
(COMMON TO SEMESTER I -B.COM (CA, E-COM, FS, A&F) & SEMESTER III
B.COM(Aided & SF))

Credits : 5

Hours : 86

Subject Code : TH20A07

Unit I

17 Hrs

Sequence and Series: Sequence- Series – Progressions - Arithmetic Series - Geometric series –Harmonic Progression. Mathematics of Finance: Simple and compound interest - Effective rate of interest – Depreciation-Annuities.

Unit II

17 Hrs

Variables - constants and functions - Limits of algebraic functions - Simple differentiation of algebraic function - Meaning of derivative - evaluation of first and second order derivatives for algebraic - Exponential - Logarithmic functions. Maxima and minima - applications to Business problems (Excluding Trigonometric functions).

Unit III

17Hrs

Integration : Elementary integral calculus - Determine indefinite and definite integrals of simple functions - Method of substitution - Method of partial fractions - Integration by parts - Business applications (Excluding Trigonometric functions).

Unit IV

17 Hrs

Linear Programming: Meaning and Formulation of LPP - Graphical Method - Simplex Method Transportation problem: Mathematical formulation of the problem - Initial Basic feasible solution (Matrix Minima Method - North – West Corner rule and VAM)- Simple problems only

Unit V

18 Hrs

Assignment Problem: Introduction- Mathematical formulation of assignment problem- Assignment algorithm- unbalanced Assignment model- maximization case in assignment problems-Travelling Salesman Problem-Simple problems only.

Text books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	P.R.Vittal	Business Mathematics and Statistics	MarghamPublications	2002
	UNIT I : Chapter -6,7,8,9 &10 UNIT -II : Chapter -15 (Excluding Trigonometric functions) UNIT -III: Chapter -16 (Excluding Trigonometric functions)			
2.	V.Sunderesan	Operations	A.R.Publications, 3rd	2005

	K.S.GanapathySubramaniam, K.Ganesan	research	Edition	
UNIT IV : Chapter 2 session 2.1 -2.8, Chapter - 3 : session: 3.1.1 -3.1.4 UNIT -V :Chapter 6 section 6.1,6.2,6.5,6.6, 6.7, 6.9				

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	P.A. Navnitham	Business Mathematics and Statistics	Jai Publishers, Trichy.	2003
2.	P. Rama murthy	Operations research	New age international Publishers	2007
3.	Manmohan and Gupta P K	Operations Research	Sultan Chand & Sons	2011

MOOC learning

<https://nptel.ac.in/courses/111/107/111107128/>

(4 Lectures by Prof. Kusum Deep, Department of Mathematics, Indian Institution of Technology Roorkee)

- Lecture 03 Graphical method
- Lecture 05 Simplex method
- Lecture 28 Transportation Problem
- Lecture 29 Assignment Problem

Pedagogy

1. Chalk and talk, PPT, Group discussion, Seminar, Quiz, Assignment

Course Designers

1. Ms.S.Narmadha, Assistant Professor, Department of Mathematics
2. Ms.R.Sakthikala, Assistant Professor, Department of Mathematics

TH20A13	OPTIMIZATION TECHNIQUES	CATEGORY	L	T	P	CREDIT
		Allied	86	4	-	5

Preamble

- To introduce the fundamental concepts of Optimization Techniques
- To make the learners aware of the importance of optimizations in real scenarios
- To learn about the managerial concepts like decision making, optimization,

Course Outcomes

Upon the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts and application of operation research in various fields.	K1
CO2	Understand and analyze managerial problems in industry so that they are able to use resources (capitals, materials, staffing and machines) more effectively.	K2
CO3	recognize the importance and value of Operations Research and mathematical modeling in solving practical problems in industry	K2
CO4	Identify and develop operational research models from the verbal description of the real system	K2
CO5	Apply the concepts of Optimization Techniques to solve the problems.	K3

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	S	M	S	S
CO3	S	S	S	S	M
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S-Strong;M-Medium; L-Low

Syllabus

COMMON TO B.Sc(CS/IT), B.Sc(CS with Cognitive Systems) & BCA ALLIED–OPTIMIZATION TECHNIQUES

UNIT I

16 hrs

Linear programming: Introduction-Mathematical formulation of the problem-Graphical solution –General LPP – Canonical & standard forms of LPP - Simplex method-Big- M method.

UNIT II

17 hrs

Transportation problem: Mathematical formulation of the problem-Initial Basic feasible solution (Matrix Minima Method - North – West Corner rule and VAM) – Moving towards optimality-Assignment problem- Travelling salesman.

UNIT III

18 hrs

Game theory: Concept of pure and mixed strategies - Solving 2 x 2 matrix with and without saddle point- Graphical method for 2x n – m x 2 games - Matrix oddment method. Dominance property.

UNIT IV

18 hrs

Queuing theory: Problems from single server, finite and infinite population. (Derivations not included). Sequencing Problems: Problems with N Jobs through 2 Machines

- Problems with N Jobs through 3 Machines.

UNIT V

17 hrs

Network scheduling by PERT / CPM: Introduction – basic terminologies - rules for constructing a project network-critical path method–floats –PERT-Cost considerations in PERT and CPM Crashing.

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	V.Sunderesan, K.S.Ganapathy Subramaniam, K.Ganesan	Operations research	A.R.Publications, 3 rd Edition	2005
UNIT I: Chapter 2 section 2.1-2.8, Chapter-3 :session: 3.1.1 -3.1.4,3.2,3.2.1 UNIT II: Chapter 5 section 5.1 -5.5, Chapter-6 :session 6.1-6.9 UNIT III: Chapter 13 section 13.1-13.5, 13.7. UNIT IV: Chapter 11 section11.1– 11.6(exclude 11.5) Chapter14 section14.1-14.4 UNITV: Chapter 8 session 8.1 -8.8				

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Billy E.Gillett	Introduction to Operations Research	Tata McGraw - Hill	2001
2	Kalavathy.S	Operations Research	Vikas publishing house	2008
3	Kanti Swarup et al.	Operations Research	Sultan Chand & Sons	2009
4	Manmohan and Gupta PK	Operations Research	Sultan Chand & Sons	2011
5	D.S.Cheema	Operations Research	Laxmi Publicatons	2010

MOOC learning

<https://nptel.ac.in/courses/111/107/111107128/>

(Lectures by Prof. Kusum Deep, IIT Roorkee)

- Graphical Method for LPP
- Simplex Method
- Big M Method
- Transportation Problem
- Assignment Problem
- Processing n Jobs on Two Machines
- Processing n Jobs through Three Machines

- Two Person Zero-Sum Game
- Solution of Mixed Strategy Games

Pedagogy:

Chalk and talk, ppt, Group discussion, Seminar, Quiz, Assignment

Course Designers:

1. Ms.R.Sakthikala, Assistant Professor, Department of Mathematics
2. Ms.J.Rejula Mercy, Assistant Professor, Department of Mathematics

TH20C07	CORE VII TRIGONOMETRY, FOURIER SERIES, Z- TRANSFORMS TENSORS AND MAPLE APPLICATIONS SEMESTER IV	Category	L	T	P	Credit
		Theory	41	4	-	4

Preamble

- To use Trigonometry concepts to solve applied problems
- To introduce students to the fundamentals of vector calculus and tensor analysis

Prerequisite

Knowledge of Functions and angles, Vector Algebra

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Find solutions of a Trigonometric equation	K1
CO2.	Work with the Trigonometric form of complex numbers	K1
CO3.	Calculate vector scalar and vector products	K2
CO4.	Recognise irrotational and solenoidal vector fields	K2
CO5.	Understand the various integral theorems relating line, surface and volume integrals	K3
CO6.	Formulate tensor representation for a vector	K3

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S
CO6.	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

SEMESTER IV - CORE PAPER VII
TRIGONOMETRY, FOURIER SERIES, Z- TRANSFORMS ,TENSORS AND
MAPLE APPLICATIONS

Credits: 4**Hours: 41****UNIT I****8 Hrs**

Solutions of simple trigonometric functions - Expansion of $\cos n\theta$, $\sin n\theta$, $\cos^n\theta$, $\sin^n\theta$ – Hyperbolic functions – Separation of real and imaginary parts of $\sin(\alpha+i\beta)$, $\cos(\alpha+i\beta)$, $\tan(\alpha+i\beta)$, $\sinh(\alpha+i\beta)$, $\cosh(\alpha+i\beta)$, $\tanh(\alpha+i\beta)$, $\tan^{-1}(\alpha+i\beta)$ – MAPLE Application for branches and branch cuts of inverse trigonometric and hyperbolic functions.

UNIT II**8 Hrs**

Logarithm of a complex number – Summation of trigonometric series – Simple problems.

UNIT III**8 Hrs**

Fourier series – Definition, finding Fourier coefficient for a given periodic function with period 2π , odd and even functions – half range series *Change of interval*.

UNIT IV**8 Hrs**

Z- Transforms: Linear Property – First Shifting Theorem – Differentiation in Z- Domain – Dumping Rule- Second Shifting theorem-Z- Transform of Unit impulse Function- initial value theorem- final value theorem- Inverse Z – Transform – Partial Fraction Method- Methods of Residues – Power Series Method.

UNIT V**9 Hrs**

Tensor Analysis - Definition of Tensors – Contra variant - Covariant and mixed tensors - Addition and subtraction of Tensors - Summation convention - Symmetry and Axisymmetry Tensor - Contraction and direct product - Quotient law - MAPLE Application - Tensor Calculus with differential Geometry.

Text Books

1	T.K.Manicavachagom Pillay and S. Narayanan	Trigonometry (For Unit I,II)	S. Viswanathan (Printers and Publishers) Pvt. Ltd. (2010)
2	T.K.Manicavachagom Pillay and S. Narayanan	<i>Fourier Series-</i> (For Unit III)	S.Viswanathan (Printers and Publishers) Pvt. Ltd. (2010)
3	Dr.A.Singaravelu	Transforms and Partial Differential Equations (For Unit IV)	Meenakshi Agency Chennai, (2014)
4	A.W.Joshi	Matrices and Tensors in Physics (Unit V)	New Age International Publishers, Revised Edition,(2010)
5	http://www.maplesoft.com/applications/		

Reference Books

1	Nathaniel Coburn	Vector and Tensor Analysis	The Macmillan Company, New York,
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2	Shaheer Khan	Tensor Analysis and Its Applications	Partridge India, 2015
3	http://www.intmath.com/		

UNIT I : Chapter 3-Sections1, 4, 5, 6, 9, 10.

UNIT II : Chapter 4-Sections 1,2,3,5,6,7,9.
Chapter 5 –Sections 1, 2, 3.

UNIT III : Chapter 6- Sections – 1 to 6

UNIT IV : Chapter 5 – Sections 5.1-5.84

UNIT V : Part II – Chapter - 15, 16,17

MOOC learning

<https://nptel.ac.in/courses/111/105/111105134/>

- Fourier Series –Evaluation
- Convergence of Fourier Series –I
- Convergence of Fourier Series –II
- Fourier Series for Even and Odd Functions
- Half Range Fourier Expansions
- Differentiation and Integration of Fourier Series

<https://nptel.ac.in/courses/111/102/111102129/>

- Introduction to Z-transform - Part 1
- Introduction to Z-transform - Part 2
- Introduction to Z-transform - Part 3

Pedagogy

Chalk and Talk, Seminar, Group Discussion and Numerical Exercises.

Course Designers:

1. Ms. A. Karpagam, Associate Professor , Department of Mathematics
2. Dr.C.R.Parvathy, Associate Professor and Head, Department of Mathematics

TH19C08	DYNAMICS WITH GNU - FISICA LAB SEMESTER IV	Category	L	T	P	Credit
		Theory	56	4	-	5

Preamble

- To develop an understanding of the principles of dynamics and the ability to analyze problems in a systematic and logical manner, including the ability to draw free-body diagrams
- To teach the students basic mathematical and computational tools for modeling and analysis of dynamic systems.

Prerequisite

- Knowledge in forces and Vector Algebra.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Know basic kinematic concepts and dynamic concepts	K1
CO2.	Understand and work with practical problems in dynamics	K2
CO3.	Study the kinematics and kinetics of particles and rigid bodies using force and acceleration, work and energy, and impulse and momentum principles	K2
CO4.	Apply physical principles to the analysis of particle and rigid body motion problems	K3
CO5	Solving dynamics problems and determine which concepts to apply, and choose an appropriate solution strategy.	K3

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

SEMESTER IV – CORE PAPER VIII DYNAMICS WITH GNU-FISICA LAB

Credits: 5

Hours: 56

UNIT I

11 Hrs

Kinematics: Composition of velocities – Parallelogram law – Components of a velocity along two given directions – Resultant of several simultaneous coplanar velocities of a particle – Relative velocity – Angular velocity – Angular velocity of a particle moving along a circle with uniform speed – Acceleration – Composition of accelerations – Relative acceleration - Motion in a straight line under uniform acceleration – Space described in any particular second – Motion in a straight line with variable acceleration – The equations of motion of a particle under constant acceleration: graphical method – Acceleration of falling bodies – Motion of a particle down a smooth inclined plane. **Laws of motion:** Introduction – Newton’s laws of motion – Composition of forces – Gravitational units of forces. Work function of a varying force– Tension in an elastic string – Power – Energy – Kinetic energy – Potential energy – Principle of conservation of energy. (simple problems only) - *Simple Problems using GNU - fisicaLab.*

UNIT II

11 Hrs

Projectiles: Introduction – Two fundamental principles – The path of a projectile is a parabola – Characteristics of a motion of a projectile – **Moment of inertia:** Theorem of parallel axes – Theorem of perpendicular axes – Moments of inertia in some particular cases. M.I of a thin uniform rod, rectangular lamina - Uniform rectangular parallelepiped of edges 2a, 2b, 2c - *Simple Problems using GNU - fisicaLab.*

UNIT III

11 Hrs

Motion under the action of Central forces : Introduction – Velocity and acceleration in polar coordinates –Equations of motion in polar coordinates – Note on the equiangular spiral – Motion under a central force – Differential Equations of central orbit – Pedal equation – Velocities in a central orbit – Apses and apsidal distances – Law of inverse square, inverse cube (simple problems only) – *Simple Problems using GNU-fisicaLab.*

UNIT IV**11 Hrs**

Simple Harmonic motion : Introduction – S.H.M in a straight line – General solution – Geometrical representation of a S.H.M – Change of origin – Composition of two S.H.M of the same period and in the same straight line – Composition of two S.H.M of the same period in two perpendicular directions – Units and Dimensions - *Simple Problems using GNU-fisicaLab.*

UNIT V**12 Hrs**

Impulsive forces: Impulse – Impulsive force – Impact of two bodies – Loss of kinetic energy in impact – Motion of a shot and gun – Impact of water on a surface. Collision of Elastic Bodies: Introduction – Fundamental laws of impact – Impact of a smooth sphere on a fixed smooth plane – Direct impact of two smooth spheres – Loss of kinetic energy due to direct impact of two smooth spheres - Oblique impact of two smooth spheres – Loss of kinetic energy due to oblique impact of two smooth spheres (simple problems only) – *Simple Problems using GNU - fisicaLab.*

Text Books

1	Dr.M.K.Venkataraman	A Text Book of Dynamics	Agasthiar Publications-(2014)
2	https://www.gnu.org/software/fisicalab/manual/en/fisicalab.pdf		

Reference Books

1.	K.ViswanathaNaik&M.S.Kasi	Dynamics	Emerald Publishers, 1992
2.	N.P. Bali	Dynamics	(Golden Mathematics series), Laxmi Publications, New edition 2011
3.	M L Khanna	Dynamics	Jai PrakashNath company, 15 th edition,1998

UNIT I	:	Chapter 3: Sections 3.1 to 3.12 & 3.17 to 3.29, 3.32 Chapter 4:Sections 4.1 to 4.9 & 4.24 to 4.35
UNIT II	:	Chapter 6: Sections 6.1 to 6.11 Chapter 12: Sections 12.1 to 12.4
UNIT III	:	Chapter 11: Sections 11.1 to 11.15
UNIT IV	:	Chapter 10: Sections 10.1 to 10.7 Chapter 14: Sections 14.1 to 14.5
UNIT V	:	Chapter 7: Sections 7.1 to 7.6 Chapter 8: Sections 8.1 to 8.8

MOOC learning

- <https://nptel.ac.in/courses/112/106/112106180/>
- <https://ocw.mit.edu/courses/mechanical-engineering/2-003sc-engineering-dynamics-fall-2011/>
- <http://cecs.wright.edu/~sthomas/dynamicslectureslides.html>

Pedagogy

Chalk and Talk, Seminar, Group Discussion, Numerical Exercises, Quiz and Case Study.

Course Designers:

1. Dr. K.Sumathi, Associate Professor, Department of Mathematics
2. Dr. G. Arthi, Assistant Professor, Department of Mathematics

COURSE NUMBER TH19A13	COURSE NAME ALLIED MATHEMATICS FOR PHYSICS II	Category	L	T	P	Credit
		Theory	101	4	–	5

Preamble

- To develop general skills in differentiation, integration and algebraic manipulation
- To introduce variety of differential equations and their solutions with emphasis on applied problems in Engineering and Physics
- To describe basic ideas of Fourier series

Prerequisite

Knowledge of Differential Calculus, Integral Calculus and Vector Calculus.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Use multiple integration to find areas and volumes of simple geometrical objects	K1
CO2.	Develop the ability to apply differential equations to significant applied or theoretical problems.	K1
CO3.	Solve problems in ordinary differential equations, dynamical systems	K2
CO4.	Demonstrate their understanding of how physical phenomena are modeled by differential equations and dynamical systems	K2
CO5.	Compute the Fourier series representation of a periodic function, in both exponential and sine-cosine forms	K3

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5
CO1.	S	S	S	S	S
CO2.	S	S	S	S	S
CO3.	S	S	S	S	S
CO4.	S	S	S	S	S
CO5.	S	S	S	S	S

S – Strong; M – Medium; L – Low

Syllabus

**SEMESTER IV – ALLIED
MATHEMATICS FOR PHYSICS - II**

Credits: 5

Hours: 101

UNIT I

20 Hrs

Integration – Multiple integrals – Evaluation of double integrals – Changing the order of integration – Double integrals in polar Coordinates – Cylindrical co-ordinates (problems related cylindrical coordinates) - Application of double integrals in evaluating area between curves.

UNIT II

20 Hrs

Integration: Evaluation of triple integrals – Jacobian of two and three variables- Beta and Gamma functions – Relation-Evaluation of double and triple integrals using Beta and Gamma Functions – Bessel’s function (Simple problems)

UNIT III

20 Hrs

Differential equation of the form $(aD^2 + bD + C)y = e^{ax}\phi(x)$ where a,b,c are constants, $\phi(x) = \sin mx$ or $\cos mx$ or x^m - Solution of homogeneous linear differential equations of the form $(ax^2D^2 + bxD + c)y = X$ where X is a function of x – Equation reducible to homogeneous equation.

UNIT IV

20 Hrs

Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions – Solutions of standard types of first order equations. $f(p,q) = 0$, $f(x,p,q)=0$, $f(y,p,q)=0$, $f(z,p,q)=0$, $f_1(x,p) = f_2(y,q)$, $z = px+qy+f(p,q)$ – Equations reducible to the standard forms - Lagrange method of solving linear partial differential equation $Pp+Qq = R$ – Charpit’s method (simple problems only).

UNIT V

21 Hrs

Fourier series:Definition – Finding Fourier Coefficients for a given periodic function with period 2π - Odd and Even functions –Half range series – Change of Intervals – Applications.

Text Book

1	S. Narayanan and T.K.M Pillay	Calculus Volume II &III	S. Viswanathan (Printers and Publishers) Pvt. Ltd. – Reprint Volume III (2014), Volume II (2015)
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Reference Books

1	Dr. M.D. Raisinghania	Ordinary and Partial differential Equations	S Chand and Company Ltd., Revised Edition (2013)
2	Richard C. Diprima William E.Boyce	Elementary Differential equations and Boundary value problems	Wiley India private Ltd., 9 th Edition (2013)
3	A.K.Sharma	Multiple Integrals	Discovery Publishing House, First Edition (2005)

UNIT I &II : Chapter 5 Sections –2.1 to 4.0, 5.1to 5.4& 6.0 to 6.3
 Chapter 6 Sections-1.1 to 2.4
 Chapter 7 Sections-2.1 to 2.3,3,4,5,6

UNIT III : Chapter 2 Sections – 1.0 to 4, 8.0 to8.3

UNIT IV : Chapter 4 Sections 1.0 to 7.0

UNIT V : Chapter 6 Sections 1.0 to 6.0

Pedagogy

Chalk and Talk, Seminar, Group Discussion, Numerical Exercises and Demonstration.

Course Designers:

1. Dr.K.Sumathi, Associate Professor, Department of Mathematics
2. Dr.D.Sasikala, Assistant Professor, Department of Mathematics

TH19A14	ALLIED - MATHEMATICS FOR SCIENCES II	Category	L	T	P	Credit
		Theory	101	4	-	5

Preamble

- To acquaint the students with the tools in Mathematics to problem solving in as many areas as possible.
- To acquire both a conceptual and operational understanding of differential and integral calculus in one and several variables

Prerequisite

- Knowledge in Differential and Integral Equations

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Know basic concepts relating integration, differentiation and Fourier series	K1
CO2.	Understand several techniques of differentiation and integration of real valued functions	K2
CO3.	Learn methods of formation and solving differential equations of dimensions one and higher	K2
CO4.	Impart the application of periodic functions through Fourier series	K3
CO5.	Develop skills in problem solving, modelling, approximation and mathematical exploration	K3

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	S	S	S	S
CO2	S	S	S	S	S	S
CO3	S	S	S	S	S	S
CO4	S	S	S	S	S	S
CO5	S	S	S	S	S	S

S – Strong; M – Medium; L – Low

Syllabus

SEMESTER IV – ALLIED MATHEMATICS FOR SCIENCES II

Credits: 5

Hours: 101

UNIT I

20 Hrs

Integration – Integration by parts – Multiple integrals – Evaluation of the double integral – Changing the order of integration – Double integral in polar co-ordinates.

UNIT II

20 Hrs

Integration: Application of double integrals in evaluating area between curves – Evaluation of triple integrals – Jacobian of two and three variables – Beta and Gamma functions – Relation – Evaluation of double and triple integrals using Beta and Gamma Functions.

UNIT III**20 Hrs**

Differential equation of the form $(aD^2 + bD + C)y = e^{ax}\phi(x)$, where a,b,c are constants, $\phi(x) = \sin mx$ or $\cos mx$ or x^m –Solution of homogeneous linear differential equations of the form $(ax^2D^2 + bxD + c) y = X$, where X is a function of x–Equations reducible to the linear homogenous equation.

UNIT IV**20 Hrs**

Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions – Solutions of standard types of first order equations: $f(p,q) = 0$, $f(x,p,q)=0$, $f(y,p,q)=0$, $f(z,p,q)=0$, $f_1(x,p) = f_2(y,q)$, $z = px+qy+f(p,q)$ – Lagrange method of solving linear partial differential equation $P_p+Q_q = R$ – Charpit’s Method – Simple problems.

UNIT V**21 Hrs**

Fourier series: Definition – Finding Fourier coefficients for a given periodic function with period 2π . Odd and Even functions – Half range series – Change of intervals.

Text Book

1.	S. Narayanan and T.K.ManicavachagomPillay	Calculus Vol II & III	S.Viswanathan (Printers and Publishers) Pvt.Ltd.Reprint (2000).
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Reference Books

1	Dr. M. D. Raisinghanian	Ordinary and Partial differential Equations	S Chand and Company Ltd., Revised Edition (2013)
2	Richard C. Diprima William E.Boyce	Elementary Differential equations and Boundary value problems	Wiley India private Ltd., 9 th Edition (2013)
3	A. K. Sharma	Multiple Integrals	Discovery Publishing House, First Edition (2005)

UNIT I & II : Vol II

Chapter 1– Section – 12.0.

Chapter 5 –Sections – 2.1 to 4.0, 5.1 to 5.4 & 6.1 to 6.3.

Chapter 6 –Sections – 1.1 to 2.4.

Chapter 7 –Sections – 2.1 to 2.3,3,4,5,6.

UNIT III : Vol III

Chapter 2 –Sections – 1.0 to 4, 8.0 to 8.3, 9.0.

UNIT IV :

Chapter 4 –Sections – 1.0 to 7.0.

UNIT V :

Chapter 6 –Sections – 1.0 to 6.0.

NOTE:

Question paper setters to confine to the above text books only.

Pedagogy

Chalk and Talk, Seminar, Group Discussion, Numerical Exercises, Quiz and Case Study

Course Designers:

1.Dr.B.TamilSelvi, Associate Professor and Head, Department of Mathematics

2.Dr.D.Sasikala, Assistant Professor, Department of Mathematics

TH20A08	ALLIED STATISTICS FOR COMMERCE	CATEGORY	L	T	P	CREDIT
		ALLIED	86	4	-	5

Preamble

- To present students the Basic concepts of statistics.
- To enable the students to find the practical applications to the real world problems.

Course Outcomes

Upon the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Indicate the strength and direction of a <i>linear</i> relationship between two variables, <i>regression and time series</i> .	K1
CO2.	Construct simple price, quantity, and value indexes.	K2
CO3.	Understand the concepts of a random variable and a probability distribution.	K2
CO4.	Hypothesize various advanced statistical techniques for exploring practical situations.	K4
CO5.	To measure progress toward quality improvement and public health <i>goals</i> .	K3

Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	M	S	M	S	M
CO3	S	M	S	M	S
CO4	M	S	M	S	S
CO5	S	S	S	M	S

S- Strong; M-Medium; L-Low

Syllabus

SEMESTER II/IV

Allied - Statistics for Commerce

COMMON TO B.COM(Aided & SF) - SEMESTER IV AND B.COM (CA, E-COM, FS, A&F) - SEMESTER II

Credits 5

Hours 86

Subject Code : TH20A08

UNIT I

16Hrs

Correlation analysis: Introduction - Significance of the study of correlation - correlation and causation - Types of correlation - Methods of studying correlation - Graphic method - Karl Pearson's coefficient of correlation - Coefficient of correlation and probable error -Regression analysis. Analysis of time Series: Introduction - Utility of time series - Components of time series - Preliminary adjustments before analysing time series - Measurement of trend - Free hand graphic method - Method of semi averages - Moving average method - Measurement of seasonal variations - Method of simple averages - ratio to moving average – link relative method.

UNIT II

19 Hrs

Index Numbers: Introduction - Uses of index numbers - Classification of index numbers - problems in construction of index numbers - Methods of constructing index

numbers - Quantity or volume index numbers - Value index numbers - Tests of adequacy of index number formulae- Consumer price index numbers-meaning and need-method of constructing the index- Index number of industrial production.

UNIT III

17 Hrs

Concepts of probability- Addition theorem-Multiplicative theorem – Conditional probability-Bayes theorem-Mathematical Expectation-Theoretical distributions-Binomial Distribution -Poisson distribution- Normal distribution.

UNIT IV

17 Hrs

Statistical Inference-Tests of hypothesis-Introduction—Procedure-Types of errors-Two-tailed and one-tailed tests of hypothesis-standard error and sampling distribution-Tests of significance for large samples-Difference between small and large samples- Two tailed test and standard error of the difference between small and large samples-chi-square test and goodness of fit.

UNIT V

17 Hrs

Vital Statistics-Definition-Utility of vital statistics-Measures of population and Vital statistics-Introduction-Measures of population - Measures of vital statistics - Mortality Rates –Fertility Rates.

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	S P Gupta	Statistical Methods	Sultan Chand & Sons publishers	2004
Unit I :Volume I: Chapter: 10,11,14. Unit II: Volume I: Chapter: 13 Unit III: Volume II: Chapter: 1&2 Unit IV: Volume II: Chapter:3&4.				
2.	Veer Bala Rastogi	Biostatistics Third Revised Edition	MEDTECH	2015
Unit V: Chapter20; Sections:20.2, 20.2.1.,20.2.2. Chapter21:21.1, 21.2, 21.2.1, 21.3,21.4,21.5				

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	P.A. Navnitham	Business Mathematics and Statistics	Jai Publishers, Trichy.	2003
2.	V.K.Kapoor	Fundamentals of Applied Statistics	Sultan Chand & Sons	2007
3.	P.N.ARORA SUMEET ARORA , S.ARORA	Comprehensive Statistical Methods	Sultan Chand & Sons	2008

MOOC learning

<https://www.youtube.com/watch?v=zlZaOnBbpUg>

(1 lesson by Prof. Arunkanda, Department of Mechanical Engineering, IIT ,Delhi)

Lecture 35 - Analysis of Time Series

<https://www.youtube.com/watch?v=JT9o8b43Gk0>

Index numbers

<https://nptel.ac.in/courses/102106051/>

26 Lessons by Prof. Mukesh Doble , IIT Madras

Lecture 1 – Introduction

Lecture 2 – Binomial Distribution

Lecture 3 – Poisson Distribution

Lecture 4 – Normal Distribution

Lecture 5-10 – T- test

Lecture 22-24 – Chi-Square test

Note

Question paper setters to confine to the above text books only

Pedagogy

2. Chalk and talk, PPT, Group discussion, Seminar, Quiz, Assignment

Course Designers

1.Ms.M.Deepa, Assistant Professor, Department of Mathematics

2. Ms.S.Narmadha, Assistant Professor, Department of Mathematics

TH19SB01	Fundamentals of Data Science & R Programming Semester III & IV	CATEGOR	L	T	P	CREDIT
		Y				
		Theory	43	2	-	4

Preamble

- To extract valuable information for use in strategic decision making

Course Outcomes

Upon the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Identify the characteristics of datasets and compare the trivial data and big data for various applications	K2
CO2	Integrate machine learning libraries and mathematical and statistical tools with modern technologies like R.	K3
CO3	Understand the basics in R Programming in terms of constructs, control statements, string functions	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3
CO1	S	S	S
CO2	S	S	S
CO3	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

Semester III & IV

Fundamentals of Data Science & R Programming

Credits: 4

Hours: 43

Subject code: TH19SB01

OBJECTIVE

To enhance career opportunities for the students and to provide an overview of Data Science and “R” programming to carry out big data analytics

UNIT I

9 Hrs

Introduction to data science - Data Evolution: Data Development Time Line – ICT Advancements- Data Growth- IT Components-Business Process-Landscape- Data to Data Science- Data Classification – Data analytics- Relation –Data Science, analytics and Big data Analytics

UNIT II

9 Hrs

Data Science Components-Data Engineering- Data Analytics – methods and Algorithms- Data Visualization- Big data Technology- Data science user- roles and skills-Big data road map- Digital data- an imprint- evolution of Dig data, What is Big data?, sources of Big data- Characteristics of Big data- Data discovery – traditional Approach.

UNIT III

9 Hrs

Exploring R Basics- Introduction- Getting started-Rstudio-R basic data types-R operators- R objects-Vectors-list, arrays-Matrix- factors-Data frame- Data Visualization in R- Exploratory data Analytics- Lattice package- Data sets- different types of diagrams in Statistics.

UNIT IV

8 Hrs

Statistical Measures – Introduction – Understanding data distribution – Use cases- Central Tendency Measure- Measures of Variability- Standard deviation- Probability distributions.

UNIT V

8 Hrs

Regression Analysis – Data types of regression – Linear regression- Inferential Analysis- Residuals and coefficients- plot Diagnostics- Multi linear regression using ANOVA.

Text Book

S.No	Author	Title of the book	Publishers
1.	V. Bhuvanewari, T. Devi	Big Data Analytics: A Practitioner's Approach (Unit I : Page No. 1 – 13) Unit II : Page No. 14-25	Published by Department of Computer Applications, Bharathiar University, 2016
2.	V. Bhuvanewari	Data Analytics with R Step by Step Unit III: Chapter 3, 4 Pg no. 21 - 65 Unit IV: Chapter 5 Pg no. 83 to 130 Unit V: Chapter 6 Page No. 107 to 115	Lean Publishers, 2016

Reference Books

Book Name	Author	Publisher	Year & Edition
The Art of R Programming	Norman Matloff	No Starch Press	2011
The R Book	Michael J. Crawle	Wiley	2008
Statistical Analysis with R.	M. John	Tata McGraw Hill Publishing Co. Ltd	October 2010
Learning R	Richard Cotton	O'Reilly Media	September 2013

Course Designers:

1. Dr. K.Sumathi, Associate Professor, Department of Mathematics.
2. Dr. R.Lakshmi, Assistant Professor, Department of Mathematics

TH19SBP1	RProgramming Practical Semester III & IV	CATEGORY	L	T	P	CREDIT
		Practical	-	-	43	2

Preamble

- To Appreciate and apply R programming from a statistical perspective
- Learn to apply hypotheses and data into actionable predictions

Course Outcomes

Upon the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Summarize the fundamental knowledge on basics of data science and R programming	K2
CO2	Develop programs in R language for understanding and visualization of data using statistical functions and plots.	K3
CO3	Create and edit visualizations with R	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3
CO1	S	S	M
CO2	M	S	S
CO3	M	S	S

S- Strong; M-Medium; L-Low

Syllabus

SEMESTER III & IV R PROGRAMMING PRACTICAL

Credits: 2

Hours: 43

Subject code: TH19SBP1

1. Creating Vectors, Matrices, Factors and plotting graphs
2. Import Data, copy data from Excel to R
3. Working with variables and Data in R
4. Logic statements
5. Bar charts and pie charts in R
6. Histograms in R
7. Summary statistics in R: Mean, Standard Deviation, Frequencies, t-Test
8. ANOVA
9. Chi-Square
10. Correlation
11. Regression

SEMESTER III /IV VALUE EDUCATION AND HUMAN RIGHTS

Credits : 2

Hours : 26

Subject Code :NM14VHR

UNIT: I

(4 hours)

Education systems in India-Introduction, ancient systems of education- colonial system of education- value erosion-personal level, family level, societal level, national level, global level. Personal values and family values- Introduction- types and importance of personal values- Family values: definition- types of family- types of family values. Universal values: Meaning - nature of values- need for value education to the students – Dharma, truth, non violence, love and peace.

UNIT: II

(4 hours)

Human excellence: Meaning- importance- factors inducing human excellence- Social values and responsibilities towards society-Meaning, types of social values-community values-responsibilities towards society/community- care for the troubled and alleviation of poverty- impact of globalisation on values-negative and positive impact.

UNIT: III

(6 hours)

Human Rights: Meaning, Definition, characteristics-evolution-Nature and Scope-Theories of Human Rights: Natural Rights- Legal rights and Historical theory of rights-UNO and Human Rights-UNO and international Human Rights, enforcement of human rights up to world war II, Universal

Declaration of Human Rights ,importance of UDHR, International covenants on Civil and Political rights.

UNIT: IV

(6 hours)

Women's Rights: Rights of women and children-world scenario- Indian context- role of government and non government organizations in solving women's problem. Children's Rights: Introduction- issues related to child rights- constitutional provisions-instruments on the rights of children. Contemporary issues in human rights: female infanticide- child labour- steps towards elimination of child labour- human rights of older persons- transgender and human rights.

UNIT: V

(6 hours)

Indian Constitution and Human Rights-Right to Education- Protection of Human Rights: Amnesty International- Public Interest litigation (PIL) -Right to Information Act (RTI)- Case studies.

Text book :

Value Education and Human Rights published by PSGR Krishnammal College for Women (2015)

REFERENCES

- K. Mohanasundaram : Human Rights: Theories and Practice
(New Delhi: Concept Publishers, 2013)
- P.C.Sinha : India's Human Rights Regime – Part I,
(New Delhi: Kanishka Publishers, 2003).
- RachanaKaushal : Women and Human Rights in India,
Kaveri book, 2000 (New Delhi: Kaveri Book).
- Dr. (Mrs) SivagamiParamasivam : Human Rights – A study, 1998 (Salem: Thai
Pathippagam).
- BiswarwarjanMohanti : Dynamics of Political Theory (New
Delhi: Atlantic Publishers, 2010).
- AbdurRahmanAsshaha : Islamic Concepts of Human Rights
(Delhi: Sipra Publications, 2004).

Suggested Readings:

1. Shankar Sharan.2007, Changing Values in Education.
2. Swami Chidbhavanandha. 1999, The Indian National Education, Sri Ramakrishna Tapovanam, Tirupparaithurai.
3. Swami Paramarthananda.2000, Human Excellence, Ramakrishna Mutt, Hyderabad.
4. Peush Nag, "Human Rights: Meaning and History", in Human Rights and Reforming the Law, ed.B.Goswami (Jaipur: Raj Publishing House, 2008)
5. A.C.Kapoor, Principles of Political Science(New Delhi: S.Chand&Co.Ltd., 1995)
6. L.N.Basu, Human Rights in a Global Perspective (Jaipur: Aavishkar Publishers, 2003).
7. R.C.Rampal, Perspectives in Human Rights (New Delhi: Rajat Publications, 2001)
8. S.Subramaniam, Human Rights: International Challenges Vol 2 (New Delhi: Manas Publications, 2004)
9. Amnesty International, Universal Jurisdiction: The Challenges for Police and prosecuting authorities, AI Index: IOR 53/007/2007 June 2007, 1 July, 2008 and Amnesty International, Universal Jurisdiction: Improving the effectiveness of State cooperation, AI Index: IOR 53/006/2007 June 2007, 1 July,2008.

10. B.Gopala Krishnan, Rights of Children (Jaipur: Aavishkar Publishers, 2004).
11. K.Mohanasundram, "Human rights and the Child Labour", Third concept, March 2000
12. LinaGonsalves, Women and Human rights (New Delhi:A.P.H. Publishing Corporation, 2001)

CORE MODULE SYLLABUS FOR ENVIRONMENTAL STUDIES FOR UNDER GRADUATE COURSES OF ALL BRANCHES OF HIGHER EDUCATION

Credit: 2

26 hrs&4hrs Tutorial

Subject Code : NM10EVS

ESE: 75 Marks

CA: 25 marks

Unit I

3hrs

The multidisciplinary nature of environmental studies – Definition, scope and importance. Need for public awareness.

Unit II

3hrs

Renewable and non-renewable resources : Natural resources and associated problems.

- a) Forest resources : use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams – benefits and problems.
- c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- d) Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer – pesticide problem, water logging, salinity, case studies.
- e) Energy resources : Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
- f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
 - Role of an individual in conservation of natural resources
 - Equitable use of resources for sustainable lifestyles.

Unit III

3hrs

Ecosystems – Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem : (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans. estuaries)

Unit IV

3hrs

Biodiversity and its conservation – Introduction – definition : genetic, species and ecosystem diversity – Biogeographical classification of India – Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, National

and local levels – India as a mega – diversity nation – Hot-spots of biodiversity – Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Unit V

4hrs

Environmental Pollution – Definition – Causes, effects and control measures of : (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution. (e) Noise pollution (f) Thermal and electromagnetic pollution (g) Nuclear hazards

Solid waste management: Causes, effects and control measures of urban and industrial wastes - Role of an individual in prevention of pollution - Pollution case studies - Disaster management: floods, earthquake, cyclone and landslides

Unit VI

3hrs

Social issues and the environment –

From unsustainable to sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, watershed management - Resettlement and rehabilitation of people ; its problems and concerns, case studies. - Environmental ethics : Issues and possible solutions - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies - Wasteland reclamation - Consumerism and waste products - Environment protection act - Air (prevention and control of pollution act) - Water (Prevention and control of pollution) act - Wildlife protection act - Forest conservation act - Issues involved in enforcement of environment legislation - Public awareness.

Unit VII

3hrs

Human population and the environment -Population growth, variation among nation - Population explosion – Family Welfare programme - Environment and human health - Human Rights - Value Education - HIV/AIDS - Women and child welfare - Role of information technology in Environment – Remote sensing application , Global Positioning Systems (GPS) - Case studies .

Unit VIII

4hrs

Field work – Visit to a local area to document environmental grassland / hill / mountain.

Visit to a local polluted site – Urban / Rural / Industrial / agricultural - Study of common plants, insects, birds- Study of simple ecosystems-pond, river, hill slopes, etc. (Field work equal to 5 lecture hours)

Contact Hours: 26hrs

Tutorial Hour: 4hrs

References

1. Agarwal.K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India, Email: mapping@icenet.net(R)
3. Brunner.R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc.480p
4. Clark.R.S, Marine Pollution, Clanderson Press Oxford (TB)
5. Cunningham.V.P, Cooper, T.II.Gorhani.E&Hepworth.M.T, 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai 1196p

6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment (R)
8. Gleick.H.P, 1993, Water in crisis, Pacific Institute for Studies in Dev. Environment & Security, Stockholm Env. Institute Oxford Univ. Pres 173 p
9. Hawkins.R.E, Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay ®
10. Heywood.V.II& Watson.R.T.1995, Global Biodiversity Assessment. Cambridge Univ.Press 11.10p
11. Jadhav.II& Bhosale.V.M.1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
12. Mekinney.M.I&Schoeh.R.M 1996, Environmental Science systems & Solutions, Web enhanced edition 639p.
13. Mhaskar.A.K, Matter Hazardous, Techno-Science Publications (TB)
14. Miller.T.G. Jr., Environmental Science, Wadsworth Publishing Co,(TB)
15. Odum.E.P 1971, Fundamentals of Ecology, W.B.Saunders Co. USA. 574p
16. Rao.M.N&Datta.A.K. 1987, Waste Water treatment, Oxford & IBM Publ. Co. Pvt. Ltd. 345 p.
17. Sharma.B.K. 2001, Environmental Chemistry, Goel Publ. House, Meerut
18. Survey of the Environment, The Hindu (M)
19. Townsend.C, Harper.J and Michael Begon, Essentials of Ecology, Blackwell Science (TB)
20. Trivedi.R.K, Handbook of Environmental Laws, Rules, Guidelines, compliances and Standards, Vol I and II Enviro Media (R).
21. Trivedi.R.K and P.K.Goel, Introduction to air pollution, Techno-Sciences Publications (TB)
22. Wagner.K.D., 1998, Environmental Management. W.B.Saunders Co., Philadelphia, USA 499p

(M) Magazine
 (R) Reference
 (TB) Textbook

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