Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2021-22
Course Handout Part-II

Date: 20/08/2021

In addition to Part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course Number	**:**	**BITS F218**
Course Title	**:**	**General Mathematics III**
Instructor-In charge	**:**	Jhuma Sen Gupta

Scope and Objective of the Course: The course is designed for Pharmacy students keeping in mind the importance of Linear Algebra and Linear programming problems and their possible applications in various fields of science and engineering. Linear algebra begins with vectors and matrices – two of the most important practical concepts in mathematics. Linear Algebra is broadly concerned with solving systems of linear equations which in turn depends on working with vectors and matrices. Whereas Linear programming is a method to achieve the best outcome in a mathematical model whose requirements are represented by linear relationships. Linear programming can be applied to various fields of study. It is used in business and economics, but can also be utilized for some engineering problems. Industries that use linear programming models include transportation, energy, telecommunications, and manufacturing.

1. **Text Books:**
   T1: E. Kreyszig, Advanced Engineering Mathematics, 8th Edition, Wiley, 2010
   T2: HA Taha, Operation Research: An Introduction, Pearson Education, 9th Edition, 2011.

2. **Reference Books:**
   R1: S. Andrilli and D.Hecker, Elementary Linear Algebra by, 4th edition, 2012, Elsevier.
   R2: SS Rao, Engineering Optimization: Theory and Practice, New Ge International (P) Limited, 3rd Edition, 1996.
   R3: BS**,** Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publication, 2009.

3. **Course Plan for General Mathematics III:**

Lect. No.	Learning objectives	Topics to be covered	Chapter in the Text Book
	Part I: LINEAR ALGEBRA		
Self Study	To learn the rule of addition, multiplication of two matrices and transpose of a matrix.	Matrix addition, multiplication and transpose	**T1** (6.1-6.2)

1-2	Study linear system of equations, coefficient and augmented matrix, to understand how to apply elementary row operation to reduce a matrix into Echelon and RREF form.	Solving systems and Row equivalent forms – Matrices, Augmented matrices, Row reduced equivalent forms	**T1** (6.3)
3-5	Interpret linear systems as matrix equation. To solve the system of homogeneous and inhomogeneous equations. To understand the meaning of consistent and inconsistent systems, concept of unique solution, infinite solution and no solutions.	Solving Homogenous systems and non-homogenous systems	**R1**(2.1 – 2.3)
6-7	To find determinant of a matrix, inverse of a matrix (if it exits) using row transformation, and Adjoint of a matrix and to understand Cramer's rule.	Inverse matrix, Determinant, Adjoint matrix, Cramer's rule	**T1** (6.6 – 6.7)
8-11	To understand the meaning of vector space, linear independence/dependence and span, Basis and dimensions.	Linear dependence, Basis and Dimensions	**R1** (4.1-4.5)
12-13	Identify the linear transformation, Determine the standard matrix of a linear transformation.	Linear transformation	**R1** (5.1-5.2)
	Part II: LINEAR PROGRAMMING		
14-16	To understand the meaning of Linear programming, its importance and applications, concept to formulate a linear programming problem, solving LPP involving two decision variables using graphical methods.	Introduction to LP – Formulation to LPP, Graphical solutions	**T2** (2.1, 2.2, 2.4)
17-23	To introduce and explain the computational procedure of the simplex method, artificial starting solution (M method and two phase method), Introduce various special cases.	Algebraic solutions - Simplex method, Artificial variable method, Special cases	**T2** (3.2 - 3.5)
24-26	The concept of Duality, computational techniques for Dual simplex method and interpretation.	Duality and Dual Simplex Method	**T2** (4.1, 4.2, 4.4)
27-29	To analyze the post optimal results subject to the change of objective function coefficient, constraints, addition and subtraction of variable etc.	Introduction to post optimal analysis	**T2** (4.5)
30-34	To deal various Transportation and Assignment problems using various computational methods.	Transportation and Assignment problem, Finding BFS, Using North-West Corner Rule, LCM & VAM, Modi's method , Hungarian Method for solving assignment problem	**T2** (5.1, 5.3, 5.4)

	Part II: NONLINEAR PROGRAMMING		
35-40	To understand the techniques to solve non-linear programming problems where the objective function is non-linear.	Single variable, Unconditional optimization, Fibonacci search method, Golden Section Search Method, Gradient based method	**R2** (5.7) **T2** (21.1)

4. **Evaluation Scheme:**

Sl. No.	Evaluation Component	Duration	Weightage (%)	Date and Time	Nature of Component
1	Mid Semester Test	90 mins	30	19/10/2021 9.00 - 10.30AM	Open
2	Quizzes		10 + 10 + 10	There will be **three** quizzes conducted at tutorial/lecture hours. One will be before mid-sem and one after mid-sem and the one will be of surprise nature	Open
3	Comprehensive Exam	120 mins	40	14/12 FN	Open

5. **Announcements:** All the announcements in relation to the above course will be put up on CMS.
6. **Total Marks: 100**
7. **Make up policy:** Make up for the mid-semester/comprehensive examination will be given to genuine cases.
8. **Chamber consultation hours:** To be announced in the class.
9. **Academic Honesty and Integrity Policy**: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor In-Charge
BITS F218