



Parvatibai Chowgule College of Arts and Science
Autonomous

Accredited by NAAC with Grade 'A' (CGPA Score 3.41 on a 4 Point Scale)
Best affiliated College-Goa University Silver Jubilee Year Award

**Minutes of the meeting of Board of Studies in Mathematics held on 7th May 2022 via
Google Meet**

PART B: Important Points/ recommendations of BoS that require consideration / approval of Academic Council:

1. Course restructure was approved.
2. The syllabus of Operations Research I and II were approved.
3. A course on Data Science was suggested by the BOS members.

**PARVATIBAI CHOWGULE COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS)
DEPARTMENT OF MATHEMATICS
COURSE STRUCTURE
THREE YEARS B.A./B.Sc. DEGREE COURSE IN MATHEMATICS**

SEM EST ER	CORE COMPULSORY		CORE ELECTIVE					SKILL ENHANCEM ENT COURSES
I	Basic Algebra	Basic Real Analysis						
II	Coordina te Geometr y	Mathema tical Analysis I						
III	Mathema tical Analysis II		Abstract Algebra I	Number Theory I	Combinat orics	Numerica l Methods		Differential Equations I
IV	Linear Algebra		Advanced Analysis	Number Theory II	Operation s Research I	Probabilit y Theory		Differential Equations II
V	Function s of Several Variables		Metric Spaces	Graph Theory	Cryptogra phy	Logic and Boolean Algebra	Operation s Research II	
VI	Vector Analysis		Complex Analysis	Abstract Algebra II	Computat ional Linear Algebra	Computer s for Mathemat ics	Pedagogy of Mathemat ics	

PARVATIBAI CHOWGULE COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS),
MARGAO - GOA
SYLLABUS FOR PROGRAMME BACHELOR OF ARTS/SCIENCE IN MATHEMATICS
S.Y.B.Sc. (SEMESTER-IV)

1. Course Title : Operations Research I
2. Course Code :MAT-IV. E -7
3. Marks : 100
4. Credits :4
5. Duration : 60 hours
6. Prerequisite Courses : None
7. Course Objectives : This course aims to teach linear programming
8. Course Outcomes :Students will be able to solve linear programming problems

Syllabus :

- Unit 1. Linear Programming Problem (5 Hours)
Definition of standard form, formulation of LPP, convex set and their properties, extreme points. Graphical solution of LPP (Only two variables).
- Unit 2. Simplex Method: (20 Hours)
Theorems related to simplex method .and problems. Cases pertaining to existence of multiple solutions, unbounded and no feasible solution. Big M method and two phase Simplex method
- Unit 3. Duality in LPP: (10 Hours)
General Primal-Dual Pair, Formulating Dual problem, Primal-dual pair in matrix Form, Duality theorems, Duality and simplex Method.
- Unit 4. Post Optimal analysis: (10 Hours)
Change in Objective function/ constraint/activity coefficients, Structural changes.
- Unit 5. Transportation Problems: (8 Hours)
Mathematical formulation, condition for existence of feasible solution, rank of transportation matrix, Initial basic feasible solution by (i) NWC method (ii) Matrix-minima and (iii) VAM, Modi's method to find an optimal solution, balanced and unbalanced transportation problems.
- Unit 6. Assignment Problems: (7 Hours)
Mathematical formulation, Hungarian methods to solve assignment problems, balanced & unbalanced assignments problems

References :

1. Kanti Swarup, Gupta P.K, Man Mohan, Operations research, S Chand

2. Loomba, Linear Programming
3. Taha H, Operation Research, Pearson
4. Vajda, Game Theory

PARVATIBAI CHOWGULE COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS),
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SYLLABUS FOR PROGRAMME BACHELOR OF ARTS/SCIENCE IN MATHEMATICS
T.Y.B.Sc. (SEMESTER-V)

1. Course Title : Operations Research II
2. Course Code :MAT-V. E -13
3. Marks : 100
4. Credits : 4
5. Duration : 60 hours
6. Prerequisite Courses : Operations Research I
7. Course Objectives :This course aims to teach more methods of OR.
8. Course Outcomes :Students will be able to use more methods to solve OR problems.

Syllabus :

- Unit 1. Game Theory: (15 Hours)
Optimal Solution of Two-Person Zero-Sum Games, Solution of Mixed Strategy Games, Graphical solution of $2 \times n$ and $2 \times m$ Games, arithmetic method for $n \times n$ games, general solution of $m \times n$ games, Converting Game theory into LPP.
- Unit 2. Inventory Control: (15 Hours)
Types, Reasons, Objective and the Factors affecting inventory control, Concept of EOQ, deterministic Inventory problem with/without shortage, Price Breaks, Multi-item deterministic problem. Uncertain demands, one period problem with / without set-up cost.
- Unit 3. Queueing Theory: (15 Hours)
Elements of Queueing system, Probability Distribution in queueing system, Classification of queueing system, queueing models, Transient and Steady states, Poisson/ non-Poisson queueing systems, Cost model in queueing.
- Unit 4. Simulation: (15 Hours)

Need of simulation, processes of simulation, simulation models, Event type of simulation, generation of random numbers, Monte-Carlo simulation, Simulation of – Inventory/ Queuing/ Maintenance problems. Simulation in investments, budgeting and job sequencing.

References :

1. Kanti Swarup, Gupta P.K, Man Mohan, Operations research, S Chand
2. Lomba, Linear Programming
3. Taha H, Operation Research, Pearson
4. Vajda, Game Theory

ANNEXURE A

(Summary of changes incorporated in the syllabus)

Semester	Course Title	Existing (Indicate only the unit where the change is proposed)	Changes Proposed	Specify the reason for the change