

| | | |
|-------------------------|--|-------------------|
| I – M.Sc (Maths) | MATHEMATICAL PROGRAMMING For the students admitted from the year 2014 | EPMT705T |
| SEMESTER – I | | HRS/WK – 6 |
| ELECTIVE – I | | CREDIT – 4 |

OBJECTIVES

This course introduces advanced topics in Linear and non-linear Programming.

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Identify the significance to use ILP.

CO2: Know the different between LPP and DPP approaches.

CO3: Able to use some of the NLP technique.

CO4: Learn to solve general LPP in an essential computation procedure.

CO5: Solving LPP using revised simplex method

| SEMESTER: I | COURSE CODE: EPMT705T | | | | | COURSE TITLE: MATHEMATICAL PROGRAMMING | | | | | | | | | | HOURS 6 | CREDITS 4 |
|--------------------|---------------------------|-------------|-------------|-------------|-------------|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------|-----------------------|--------------|
| COURSE OUTCOMES | PROGRAMME OUTCOMES(PO) | | | | | PROGRAMME SPECIFIC OUTCOMES(PSO) | | | | | | | | | | MEAN SCORE OF CO'S | |
| | P O 1 | P O 2 | P O 3 | P O 4 | P O 5 | P S O 1 | P S O 2 | P S O 3 | P S O 4 | P S O 5 | P S O 6 | P S O 7 | P S O 8 | P S O 9 | PSO 10 | | |
| CO1 | 4 | 5 | 3 | 4 | 4 | 5 | 5 | 4 | 4 | 4 | 4 | 3 | 4 | 5 | 4 | 4.1 | |
| CO2 | 4 | 5 | 3 | 4 | 3 | 4 | 4 | 3 | 5 | 4 | 3 | 4 | 5 | 3 | 5 | 3.9 | |
| CO3 | 4 | 4 | 3 | 3 | 3 | 3 | 5 | 3 | 4 | 5 | 3 | 3 | 4 | 4 | 4 | 3.7 | |
| CO4 | 4 | 5 | 3 | 4 | 3 | 5 | 4 | 3 | 4 | 4 | 3 | 3 | 5 | 3 | 4 | 3.8 | |
| CO5 | 4 | 4 | 3 | 4 | 3 | 3 | 5 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 5 | 4.0 | |
| Mean Overall Score | | | | | | | | | | | | | | | 3.9 | | |

Result: The Score of this Course is 3.9 (High)

| | | | | | |
|-------------|--------------|----------------|----------------|----------------|----------------|
| Association | 1%-20% | 21%-40% | 41%-60% | 61%-80% | 81%-100% |
| Scale | 1 | 2 | 3 | 4 | 5 |
| Interval | 0<=rating<=1 | 1.1<=rating<=2 | 2.1<=rating<=3 | 3.1<=rating<=4 | 4.1<=rating<=5 |
| Rating | Very Poor | Poor | Moderate | High | Very High |

This Course is having **HIGH** association with Programme Outcomes and Programme Specific Outcomes.

UNIT-I: INTEGER LINEAR PROGRAMMING:

Types of Integer Linear Programming Problems - Concept of Cutting Plane -Gomory's AN Integer Cutting Plane Method - Gomory's mixed Integer Cutting Plane method - Branch and Bound Method. - Zero-One Integer Programming.

UNIT-II: CLASSICAL OPTIMIZATION METHODS:

Dynamic Programming: Characteristics of Dynamic Programming Problem -Developing Optimal Decision Policy - Dynamic Programming Under Certainty - DP approach to solve LPP.

UNIT-III: NON-LINEAR PROGRAMMING METHODS:

Examples of NLPP - General NLPP -Graphical solution - Quadratic Programming - Wolfe's modified Simplex Methods - Beale's Method.

UNIT-IV : THEORY OF SIMPLEX METHOD

Canonical and Standard form of LP - Slack and Surplus Variables -Reduction of any Feasible solution to a Basic Feasible solution - Alternative Optimal solution - Unbounded solution - Optimality conditions - Some complications and their resolutions - Degeneracy and its resolution.

UNIT-V: REVISED SIMPLEX METHOD

Standard forms for Revised simplex Method - Computational procedure for Standard form I - comparison of simplex method and Revised simplex Method.

TEXT BOOK:

1. J.K.Sharma, Operations Research , Macmillan [India] New Delhi 2001

Unit 1 – Chapte 7 - Sec:7.1 to 7.7

Unit 2 – Chapter 22- Sec: 22.1 to 22.5

Unit 3 - chapter 24 Sec: 24.1 to 24.4

Unit 4- chapter 25 Sec: 25.1 to 25.8

Unit 5 – chapter 26 Sec: 26.1 to 26.4

REFERENCE BOOKS:

- 1.Hamdy A. Taha, Operations Research, [seventh edition] Prentice - Hall of India Private Limited, New Delhi, 1997.
2. F.S. Hillier &J.Lieberman Introduction to Operation Research [7th Edition] Tata- McGraw Hill company, New Delhi, 2001.
3. Beightler. C, D.Phillips, B. Wilde foundations of Optimization [2nd Edition] Prentice Hall Pvt Ltd., New York, 1979
4. S.S. Rao - Optimization Theory and Applications, Wiley Eastern Ltd. New Delhi. 1990

| | | |
|-------------------------|---|-------------------|
| I – M.Sc (Maths) | OPERATIONS RESEARCH For the students admitted from the year 2014 | EPMT810T |
| SEMESTER – II | | HRS/WK – 6 |
| ELECTIVE-II | | CREDIT –4 |

OBJECTIVES:

The course aims to introduce PERT, CPM, deterministic and probabilistic inventory systems, queues, replacement, maintenance problems and simulation problems.

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Acquires the knowledge of PERT – CPM calculation

CO2: develops the skill of analyzing the stock managements

CO3: exposed to identify and solve different queuing models

CO4: to optimize the outcome in production using Replacement models

CO5: gets knowledge on stocks, demand and supply for smooth business progress.

| SEMESTER II | COURSE CODE: EPMT810T | COURSE TITLE : OPERATIONS RESEARCH | | | | | | | | | | | | | | HOURS 6 | CREDITS 4 |
|--------------------|--------------------------|---------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------------|--------------|
| COURSE OUTCOMES | PROGRAMME OUTCOMES (PO) | PROGRAMME SPECIFIC OUTCOMES(PSO) | | | | | | | | | | | | | | MEAN SCORE OF CO'S | |
| | P O 1 | P O 2 | P O 3 | P O 4 | P O 5 | P O 1 | P O 2 | P O 3 | P O 4 | P O 5 | P O 6 | P O 7 | P O 8 | P O 9 | P O 10 | | |
| CO1 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 3.9 | |
| CO2 | 3 | 4 | 4 | 4 | 3 | 3 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 3.6 | |
| CO3 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 3.8 | |
| CO4 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 3.7 | |
| CO5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 3.9 | |
| Mean Overall Score | | | | | | | | | | | | | | | 3.8 | | |

Result: The Score of this Course is 3.8 (High)

| | | | | | |
|-------------|--------------|----------------|----------------|----------------|----------------|
| Association | 1%-20% | 21%-40% | 41%-60% | 61%-80% | 81%-100% |
| Scale | 1 | 2 | 3 | 4 | 5 |
| Interval | 0<=rating<=1 | 1.1<=rating<=2 | 2.1<=rating<=3 | 3.1<=rating<=4 | 4.1<=rating<=5 |
| Rating | Very Poor | Poor | Moderate | High | Very High |

This Course is having **HIGH** association with Programme Outcomes and Programme Specific Outcomes.

UNIT-I: PROJECT MANAGEMENT: PERT AND CPM

Basic Difference between PERT and CPM – Steps in PERT/CPM Techniques- PERT/CPM Network Components and Precedence Relationships – Critical Path Analysis – Probability in PERT Analysis – Project time-cost Trade Off – Updating the Project – Resource Allocation.

UNIT - II: DETERMINISTIC INVENTORY CONTROL MODELS

Meaning of inventory Control – Functional Classification – Advantage of Carrying Inventory – Features of Inventory System – Inventory Model building – Deterministic Inventory Model with no Shortage – Deterministic Inventory with Shortages.

UNIT-III: QUEUES THEORY

Essential Features of Queueing System – Operating Characteristic of Queueing System – Probabilistic Distribution in Queueing Systems – Classification of Queueing Models – Solution of Queueing Models – Probability Distribution of Arrivals and Departures

UNIT-IV: REPLACEMENT AND MAINTANANCE MODELS

Failure Mechanism of Items – Replacement of Items Deteriorates with Time – Replacement of Items that fail completely – other Replacement Problems.

UNIT- V: SIMULATION

Introduction – Steps of Simulation Process – Advantages and Disadvantages of Simulation – Monte Carlo Simulation – Random Number Generation – Simulation Inventory Problems – Queueing Problems – PERT Problems.

TEXT BOOK:

1. JK. Sharma, Operations Research, MacMillan India, New Delhi, 2001.

Unit 1- Chapter 13 : Sec. 13.1 to 13.9

Unit 2 - Chapter 14: Sec. 14.1 to 14.8

Unit 3 -.Chapter 16: Sec. 16.1 to 16.7

Unit 4 - Chapter 17: Sec. 17.1 to 17.5

Unit 5 - Chapter 19: 19.1to 19.11, 19.13

REFERENCE BOOKS

1. Kanti Swarup, P.K. Gupta, Man Mohan - *Operations Research*, Sultan Chand & Sons, New Delhi.
2. F.S. Hillier and J.Lieberman - *Introduction to Operations Research* [8th Edition], Tata McGraw Hill Publishing Company, New Delhi,2006.
3. Beightler.C, D.Phillips, B. Wilde, *Foundations of Optimization* [2nd Edition] Prentice Hall Pvt Ltd., New York, 1979.