

# MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR

## M. A. / M. Sc. MATHEMATICS (FINAL)

2016-17

### Non-Collegiate

**Note-** There will be five papers in all. Paper-I: Topology and Functional Analysis and Paper-II: Discrete Mathematics will be compulsory. Each paper will be assigned six hours per week.

Paper I	Topology and Functional Analysis	100	3 Hrs.	6
Paper II	Discrete Mathematics	100	3 Hrs.	6

### Optional Papers

Any three of the following paper with the permission of the Head of the Department of Mathematics & Statistics.

Paper III	Relativity and Cosmology	100	3 Hrs.	6
Paper IV	Viscous Fluid Dynamics	100	3 Hrs.	6
Paper V	Number theory	100	3 Hrs.	6
Paper VI	Numerical Analysis	100	3 Hrs.	6
Paper VII	Integral Equations and Internal Transforms	100	3 Hrs.	6
Paper VIII	Optimization Techniques	100	3 Hrs.	6
Paper IX	Advanced Topology	100	3 Hrs.	6
Paper X	Computer Programming	Th. 75 Per. 25	3 Hrs. 2 Hrs.	Th. 04 Pre. 02
Paper XI	Mathematical Theory of Statistics	100	3 Hrs.	6
Paper XII	Space Dynamics	100	3 Hrs.	6
Paper XIII	Astronomy	100	3 Hrs.	6
Paper XIV	Compressible Fluids and Magneto hydro Dynamics	100	3 Hrs.	6

### Note:

\* **Scheme of Examination:**

### Question Paper Pattern for Examination: 100 marks

Section A: Total 10 Question will be set from five units i.e. two question from each unit. These questions require very short answer. Each question will be of one (1) mark (Total 10 marks). All the questions in section A are compulsory.

Section B: Total 10 questions will be set from five units i.e. two question from each unit. Students are required to attempt at least one question from each unit. Each question carries 10 marks (Total 50 marks). The answer of each question should be given approximately in 250 words.

Section C: Total 4 descriptive question will be set from five units of the paper, not more than one question from each unit. Each question may also have two sub-division. Students are required to answer two questions in about 500 words. Each question carries 20 marks (Total 40 marks).

\*\* The right to information act, 2005 is applicable.

## **PAPER-VIII OPTIMIZATION TECHNIQUES**

**TIME: 3 hours**

**Max. Marks: 100**

### **UNIT-I**

Dual simplex algorithm, Bounded value algorithm, Parametric linear Programming, sensitivity analysis, changes in the coefficients of the objective function, changes in the components of vector  $b$ , variation in the components (aid) of the matrix  $A$ . Addition of the new variable, deletion of a variable, Addition of a new constraint. Deletion of constraint.

### **UNIT-II**

Integer programming problem. All integer and mixed integer programming problems, Gamory's cutting plane methods(Fractional cut and  $\lambda$ -cut),Branch and bound method; Traveling salesman problem.

### **UNIT-III**

Project scheduling through PERT and CPM, cost time, trade off, Resource leveling.

### **UNIT-IV**

Quadratic forms, convex functions, Global and relative optimum of a function  $f(x)$ , unconstrained extreme of differentiable functions, method of Lagrange multipliers for constrained extreme with equality constraints, convex programming problem. Lagrangian function and saddle point, Kuhn-Tucker theorem, Kuhn-Tucker conditions, Quadratic programming problem Wolfe's algorithms, and Beale's algorithm.

### **UNIT-V**

Dynamic Programming: Bellman's principle of optimality, multiple stage decision problems, characteristics of DPP. Solution of finite number of stages problems by Dynamic programming. Network flow problems. Maximal flow, minimal cut theorems, shortest route problem.

### **Books Recommended:**

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| 1. Operation Research  | : Kanti swaroop, Mak-Mohan, P.K.Gupta. |
| 2. Operation Research  | : Hamdy A Taha                         |
| 3. Operation Research  | : S.D.Sharrna                          |
| 4. Linear-Programming  | : S.I.Gass                             |
| 5. Optimization Methods in Operations<br>Research and systems analysis | : K.V.Mittal                           |