Scheme of Examination of
M.Sc. Mathematics,

Semester- IV

(w.e.f. Session 2018-19)

Course Code	Title of the Course	Theory Marks	Internal Marks	Practical Marks	Credit (L:T:P)
	Hard Core				
MM-4H1	Functional Analysis-II	80	20	--	5:1:0
MM-4H2	Classical Mechanics	80	20	--	5:1:0
MM-4H3	Advanced Complex Analysis	80	20	--	5:1:0
MM-4H4	Matlab	--	20	80	0:0:4
	Soft Core				
	Group C (Any One)				
MM-4SC1	Discrete Mathematics	80	20	--	5:1:0
MM-4SC2	Boundary Value Problems	80	20	--	5:1:0
MM-4SC3	Dynamical Systems	80	20	--	5:1:0
MM-4SC4	Algebraic Number Theory	80	20	--	5:1:0
MM-4SC5	Mechanics of Solids	80	20	--	5:1:0
	Group D (Any One)				
MM-4SD1	Operation Research	80	20	----	5:1:0
MM-4SD2	Viscous Fluid Dynamics	80	20	--	5:1:0
MM-4SD3	Mathematical Aspects of Seismology	80	20	--	5:1:0
MM-4SD4	Fuzzy Sets & Applications-II	80	20	--	5:1:0
MM-4SD5	Non Commutative Rings	80	20	----	5:1:0
	Total Credits	:	**34**		

Note 1 : The Criteria for awarding internal assessment of 20 marks shall be as under:

A) Class test : 10 marks.

B) Assignment & Presentation : 5 marks

C) Attendance : 5 marks

Less than 65% : *0 marks*

Upto 70% : *2 marks*

Upto 75% : *3 marks*

Upto 80% : *4 marks*

Above 80% : *5 marks*

Note 2 : The syllabus of each course will be divided into **four** Sections of **two** questions each. The question paper of each course will consist of **five** Sections. Each of the sections I to IV will

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contain two questions and the students shall be asked to attempt **one** question from each. Section - V shall be compulsory and contain **eight** short answer type questions without any internal choice covering the entire syllabus.

Note 3 : Elective courses can be offered subject to availability of requisite resources/ faculty.

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SEMESTER – IV

MM-4SD1 **Operation Research**

Time : 3 hours **Credits : 5:1:0**
Max. Marks : 80

Note : The questions paper will consist of **five** Sections. Each of the first four units will contain two questions from Section **I, II, III, IV** respectively and the students shall be asked to attempt one question from each Section. Section five will contain **eight to ten** short answer type questions without any internal choice covering the entire syllabus and shall be compulsory.

Section -I

Operations Research : Origin, definition, methodology and scope, Linear Programming: Formulation and solution of linear programming problems by graphical and simplex methods, Big – M and two phase methods, Degeneracy, Duality in linear programming.

Section -II

Transportation Problems: Basic feasible solutions, optimum solution by stepping stone and modified distribution methods, unbalanced and degenerate problems. Transhipment problem. Assignment problems: Solution by Hungarian method, unbalanced problem case of maximization, travelling salesman and crew assignment problems.

Section -III

Queuing models: Basic components of a queuing system, General birth-death equations steady-state solution of Markovin queuing models with single and multiple servers (M/M/I, M/M/C, M/M/I/k, M/MC/k) Inventory control models: Economics order quantity (EOQ) model with uniform demand and with different rates of demands in different cycles, EOQ when shortages are allowed, EOQ with uniform replenishment, Inventory control with price breaks.

Section -IV

Game Theory : Two person zero sum game, Game with saddle points, the rule of dominance; Algebraic, graphical and linear programming methods for solving mixed strategy games. Sequencing problems: Processing of n jobs through 2 machines, n jobs through 3 machines, 2 jobs through m machines, n jobs through m machines.

Books recommended :

1. Taha, H.A., Operation Research-An introduction, Printice Hall of India.
2. Gupta, P.K. and Hira, D.S., Operations Research, S. Chand & Co.
3. Sharma, J.K., Mathematical Model in Operation Research, Tata McGraw Hill
4. Sharma, J.K., Mathematical Model in Operation Research, Tata McGraw Hill.

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Sunil 03/03/2021