Semester Courses of M.A/M.Sc. (Mathematics)

The course of M.A/M.Sc. (Mathematics) will be spread in two years – 1st year being called “Previous” & other “Final”. There will be two semester examinations and a viva-voce & project work examination every year.

M.A./ M.Sc. Previous (Mathematics)

(Effective from session 2011-2012)

The M.A./ M.Sc. “Previous” (Mathematics) examination will consist of two semesters, called first and second semesters. Their examinations will be held in the months of December and April respectively. In each of these semester examinations there will be five compulsory papers and one optional paper. Each paper will be of three hours’ duration and of 50 maximum marks, except where stated otherwise. Besides there will be a viva-voce & project work examination of 50 marks in the second semester.

Format of the Question Paper.

There will be one compulsory question consisting of 5 parts of short answer type question based on the whole course, with all being mandatory to be answered. Besides, there will be 8 more questions, ordinarily consisting of two parts (a) and (b), 4 questions per part, out of which exactly 4 questions (two from each part) will have to be answered. Thus in all 5 questions will have to be attempted and 9 questions will have to be set. All questions will carry equal marks, except where stated otherwise.

First Semester

Compulsory Papers

<table>
<thead>
<tr>
<th>Paper I</th>
<th>Groups and Canonical Forms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper II</td>
<td>Topology-I</td>
</tr>
<tr>
<td>Paper III</td>
<td>Differential and Integral Equations</td>
</tr>
<tr>
<td>Paper IV</td>
<td>Riemannian Geometry</td>
</tr>
<tr>
<td>Paper V</td>
<td>Hydrodynamics</td>
</tr>
</tbody>
</table>

Optional Papers

Any one of the following papers will have to be opted.

| Paper VI (a) | Spherical Astronomy-I   |
| Paper VI (b) | Operations Research-I    |
| Paper VI (c) | Fuzzy Sets               |
| Paper VI (d) | Programming in C (with ANSI features) |
|              | (i) Theory : 30 marks   |
|              | (ii) Practical : 20 marks (2 hours’ duration) |
| Paper VI (e) | History of Mathematics-I |
| Paper VI (f) | Dynamics of Real Gases-I |
M.A./M.Sc. First Semester
Mathematics
Paper I
Groups and Canonical forms


(5 questions)


(3 questions)

**Books Recommended**: 
M.A./ M. Sc. First Semester
Mathematics
Paper –II
Topology –I

Topological space - Definition through open set axioms. Examples including usual topology, ray, lower limit and upper limit topologies on R, topology of metric spaces, cofinite and cocountable topologies, weak and strong topologies.

Closed sets, interior of a set, closure of a set. Characterization of topologies in terms of closed sets, interior operators, closure axioms.

Neighbourhoods, neighbourhood system and neighbourhood base. Topology through neighbourhood axioms.

(2 questions)

Adherent points, limit points and derived set, dense set.
Base and subbase for a topology and characterization of topology in terms of base and subbase axioms. Topology generated by a family of subsets.


(3 questions)

Continuous functions and their properties. Continuity in terms of open sets, closed sets, neighbourhoods, closures. Convergence of a sequence, sequential continuity, homeomorphisms. Topological invariant properties.

Compact sets and their properties. Finite intersection property, Bolzano Weierstrass property. Continuous functions and compactness, Sequential compactness, countable compactness and their comparison. One point compactification.

(3 questions)

Books recommended:
M.A./ M. Sc. First Semester  
Mathematics  
Paper III  
Differential and Integral Equations  

**Series Solution of Differential Equations:** Solution in power series by Frobenius method. Legendre, Bessel and hypergeometric equations. A set of 24 particular solutions of hypergeometric differential equation. Legendre, Bessel and hypergeometric functions and their properties.  

(4 questions)  


(4 questions)  

**Books recommended:**  
3. F.G. Tricomi : Integral Equations.
M.A./ M. Sc. First Semester  
Mathematics  
Paper – IV  
Riemannian Geometry


(1.5 questions)


(1.5 questions)


(2 questions)

Riemannian curvature tensor. Its contraction. Covariant curvature tensor. Bianchi’s identity. Riemannian curvature of a \(V_n\). Theorem of Schur. Mean curvature of a space for a given direction.

(1 question)

Projective and conformal transformations. Weyl’s projective and conformal curvature tensors and their properties.

(2 questions)

**Books recommended**:  

(4 questions)


(4 questions)

Books recommended:
M.A./ M. Sc. First Semester
Mathematics
Paper – VI (a)
Spherical Astronomy-I

Refraction, parallel plate formula, homogeneous shell, concentric layers of varying density, differential equation for refraction, refraction in right ascension and declination, effect of refraction on sun-rise and disc of the sun.

(1.5 question )

Precession and nutation, physical cause of precession and nutation. Precession and nutation in right declension and declination, independent day numbers.

(1.5 question )

Aberration in longitude and latitude; right ascension and declination, aberrational ellipse, diurnal aberration and its effect in hour angle and declination, planetary aberration.

(3 questions )

Geocentric and heliocentric parallax, geocentric parallax in zenith distance, distance of the moon, lunar parallax in right ascension and declination, stellar parallax in longitude and latitude; right ascension and declination. parallactic ellipse.

(3 questions )

Books recommended :
Origin and development of OR. Objective, nature, definition and scope of OR.

Phases of OR Methods.


**Sequencing Problems:** Assumptions for sequencing problem. Processing n jobs on two machines, n jobs on three machines, 2 jobs on m machines. (1 question)

**Non-Linear Programming:** Introduction and definitions. Formulation of non-Linear programming problems, General non-linear programming problems. Constrained optimization with equality constraints. Constrained optimization with inequality constraints. Saddle point problems Saddle points and NLPP. (1.5 questions)

**Goal Programming:** Introduction and definition. Concept of goal programming. Difference between linear programming approach and goal programming approach. Goal programming model formulation. Methods of solution of goal programming problem. Graphical method and Simplex method. (1.5 questions)

**Books recommended:**


(2 questions)


(2 questions)


(2 questions)


(2 questions)

Books recommended:
Overview of C : History and importance of C. Sample Programs. Programming Style. Executing a ‘C’ Program. Constants, Variables and Data Type.

Operators : Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise, Special.

Expressions : Arithmetic expressions, evaluation of expressions. Input and output operators. (3 questions)


Book recommended:
1. E. Balagurusamy: Programming in ANSI C, TMH, New Delhi

Practical : Max. Marks : 20

Programming in C (with ANSI features )
1. To print the prime numbers between 1 and 100.
2. To print the odd prime numbers between 1 and 100.
3. To find the sum of first 10 natural numbers.
4. To find the average of n numbers.
5. To find the area of a triangle when coordinates of its vertices are given.
6. To find the area of a triangle when lengths of its sides are given.
7. To find the roots of a quadratic equation.
8. To add any two 3x3 matrices.
9. To multiply any two 3x3 matrices.
10. To sort all the elements of a 4x4 matrix.
11. To find the value of the determinant of a 5x5 matrix.
12. To implement bisection method.
13. To implement false-position method.

M.A./M. Sc. First Semester
Mathematics
Paper – VI (e)
History of Mathematics-I


(8 questions)

Book recommended:

M.A./M. Sc. First Semester
Mathematics
Paper – VI (f)
Dynamics of Real Gases-I


(4 questions)


(4 questions)
Book recommended: