Second Semester

Compulsory Papers

Paper I : Fields and Modules
Paper II : Topology-II
Paper III : Partial Differential Equations
Paper IV : Differentiable Manifolds
Paper V : Fluid Dynamics

Optional Papers:

Any one of the following papers will have to be opted. Those who have offered Paper VI (a) in First Semester will offer Paper VI (a) in second semester, and similarly for other optional papers.

Paper VI (a) : Spherical Astronomy-II
Paper VI (b) : Operations Research-II
Paper VI (c) : Fuzzy Logic
Paper VI (d) : Numerical Methods
(i) Theory : 30 marks
(ii) Practical : 20 marks (2 hours duration)
Paper VI (e) : History of Mathematics-II
Paper VI (f) : Dynamics of Real Gases-II

Viva –Voce and Project Work: 50 marks

There will be a Viva-Voce and Project Work based on all the 12 papers of M.A./M.Sc. Previous (Mathematics). Under the project, the candidate will present a dissertation in his/her own handwriting. The dissertation will consist of one theorem/article with proof or one problem with solution, relevant definitions with examples and/or counter-examples, wherever necessary, from each paper of Mathematics studied in First and Second semesters. The dissertation will of 20 marks and the viva-voce will be of 30 marks. For viva-voce examination and evaluation of project work there will be a board of examiners consisting of a coordinator, an external examiner and an internal examiner. The dissertation will be forwarded by the Head of Department at the university center and by the Principal of the college at the college center.
M.A./ M. Sc. Second Semester
Mathematics
Paper I
Fields and Modules

(5 questions)


(3 questions)

Books recommended:
Separation axioms – $T_0$, $T_1$, $T_2$, regular, $T_3$, normal and $T_4$ spaces, their comparison and examples, hereditary and topological invariant characters. Urysohn’s lemma and Tietze extension theorem.


(2.5 questions)

Inadequacy of sequential convergence. Directed sets, nets and subnets and their examples Convergence of a net, characterisation of open sets, closed sets, closure, cluster point and limit point of a set in terms of net convergence. Hausdorffness and continuity of a function in terms of nets.


Net based on filter and filter based on net.

(3 questions)

Quotient topology, quotient space, quotient map, quotient space $\mathbb{X}/\mathbb{R}$,

Finite product space, projection mapping.

Tychonoff product topology in terms of standard subbase and its characterizations in terms of projection maps, continuous functions, Product of $T_0,T_1,T_2$, spaces. Connectedness and compactness, first and second countability for product spaces.

(2.5 questions)

Books recommended:
Paper III
Partial Differential Equations


Books recommended:
1. A.R. Forsyth: A Treatise on Differential Equations

M.A./M.Sc. Second Semester
Mathematics
Paper – IV
Differential Geometry of Manifolds


Books recommended:
2. N.J. Hicks: Notes on Differential Geometry.
Paper – V
Fluid Dynamics


Book recommended:
1. F. Chorlton: Text Book of Fluid Dynamics, C.B.S. Publishers, Delhi, 1985

M.A./ M. Sc. Second Semester
Mathematics
Paper – VI (a)
Spherical Astronomy-II

Planetary phenomena, geocentric motion of a planet, elongation, stationary points, phases, brightness of the planet. (2 questions)

Lunar and solar eclipses, Earth’s shadow at moon’s distance, ecliptic limits, greatest and least number of eclipses in a year. (3 questions)

Determination of longitude and latitude, sextant, dip of the horizon, Mercator’s projection, great circle on Mercator’s chart, position circle. (1.5 questions)

Proper motions and its effect in right ascension and declination, position angle, change in position angle due to star’s motion and due to the motion of the pole, the motion of the sun, parallactic motion in right ascension and declination. Binaries. (1.5 questions)

Books recommended:

M.A./ M. Sc. Second Semester
Mathematics

(2 questions)


(3 questions)


(2 questions)


(1 question)

Books recommended:


M.A./M.Sc. Second Semester

Mathematics

(2 questions)


(2 questions)

An Introduction to Fuzzy Control: Fuzzy controllers. Fuzzy rule base. Fuzzy inference engine. Fuzzification and the various de-fuzzification methods (the center of area, the center of maxima, and the mean of maxima methods).

(2 questions)


(2 questions)

Books recommended:
Numerical Methods (with Programming in C)

**Theory:**

Max Marks: 30

**Numerical Solution of Systems of Linear Equations:**

(4 questions)

**Numerical Solution of Partial Differential Equations:**

(4 questions)

**Books Recommended:**

(1) E. Balagurusamy: Programming in ANSI C, TMH, New Delhi.
(3) S.S. Sastry : Introductory Methods of Numerical Analysis, PHI, New Delhi.

**Practical:**

Max. Marks: 20

**Numerical Methods (with Programming in C )**

1. To implement Newton-Raphson method.
2. To implement Newton’s forward/backward interpolation formula.
3. To implement Lagrange’s interpolation formula.
4. To implement Trapezoidal rule.
5. To implement Simpson’s one third rule.
6. To implement Gauss- elimination method
7. To implement Gauss- Jordan method.
8. To implement Crout’s method
9. To implement Jacobi’s method
10. To implement Gauss-Seidel method
11. To implement SOR method

M.A./M.Sc. Second Semester

Mathematics
Paper VI(e)

History of Mathematics-II


(8 questions)

Book Recommended:
(1) F. Cajon: A History of Mathematics

M.A./ M. Sc. Second Semester

Mathematics

Paper – VI (f)

Dynamics of Real Gases-II

Linearized flow behind a normal shock wave. Quasi-one-dimensional flow. Dispersed shock wave, Nozzle flow.

(2 questions)


(6 questions)

Book recommended: