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SYLLABUS [M. PHIL] 12

Master of Philosophy in Mathematics

Course offered in affiliated Colleges

The Master of Philosophy Course in Mathematics to be offered in affiliated Colleges shall have uniform syllabus and uniform question paper pattern. The syllabus and the question paper pattern shall be effective from this academic year itself.

In the I Semester there shall be 3 papers:

- 1) Research Methodology;
- 2) Advanced topic in the concerned subject
- 3) Optional to be chosen from FOUR.

In the II Semester there shall be only dissertation work.

Outline of the Syllabus

Paper I: Research Methodology.

1. Research Methodology (3 Units), 2. Mathematical component (2 units-one Pure Mathematics and one Applied Mathematics)

Paper II : Advanced Mathematics.

1. Fuzzy theory (2 Units), 2. Markov Process (2 units) and 3. Algorithms and complexity (1 unit)

Paper III : Optional (one to be chosen from the following four).

1. Graph Theory
2. Commutative algebra and generalized inverses of matrices
3. Distribution Theory
4. Random Process

Each paper shall carry 100 marks (60 marks for external and 40 marks for internal). For the internal, 40 marks is split into 25 marks for test and 15 for seminar. There shall be no assignment. Dissertation carries 200 marks (150 for the evaluation of the Dissertation and 50 for the viva-voce examination).

The syllabus for each paper is divided into 5 units.

Question Paper Pattern: Question paper shall be of 3 hours duration and carries 60 marks. There shall be two parts, Part-A and Part-B. For Part-A there shall be 5 questions with internal choice ($5 \times 6 = 30$ marks) and for Part-B there shall be 5 questions and 3 to be answered ($3 \times 10 = 30$ marks). All questions shall be from the 5 units spelt clearly for the syllabus.

Teaching:

30 hours per week shall be the teaching schedule for the said course. For the I Semester 30 hours can be split as follows : $3 \times 5 = 15$ hours

teaching the core content of the 3 papers, $2 \times 3 = 6$ hours of Seminar work, $1 \times 3 = 3$ hours for tutorial and $2 \times 3 = 6$ hours of Library work.

For the II Semester the 30 hours can be split as follows: 20 hours for collection of reference materials from various sources relevant for the dissertation, preparation of the rough draft of the dissertation and 10 hours for discussion with the guide on the concerned topic.

Detailed Syllabus:

Paper 1. Research Methodology

Unit 1 – What is research in Mathematics? Fixing an area for research, Proof Techniques, Pure and Applied Mathematics research, Articles (Popular, Technical, Review, Survey), Magazines, Journals, Mathematical and Statistical Software's (free and commercial), Mathematical, Statistical Societies (National and International), Prizes and Medals in Mathematics

Unit 2 – Dissertation, Thesis, Expository, Research Paper, Abstract, Review, Referee, Components of Dissertation and Thesis, Difference between

Dissertation and Thesis, The Internet, web sites related to mathematical articles and softwares

Unit 3 – Document preparation, Power point presentation, Poster presentation, using the special software like MS- Word, Scientific Word, Latex, AMS(American Mathematical Society) subject classification (main), Impact Factor, Citation Index, Search engines and how to search using Google main and Google Scholar. The following sites are important: citeseer.ist.psu.edu ; arXiv.org ; math.haifa.ac.il ; archives.math.utk.edu ; www.mathforum.org/library ; www.emis.de/ELibM.html; www.ams.org

Unit 4 – Commutative Algebra (Noetherian Rings, Chains etc.), The five theorems (Hahn-Banach, Uniform Boundedness, Open mapping, Closed Graph, Krein-Milman) in the context of Topological Vector spaces.

Unit 5 – Numerical Techniques for solving PDEs, Generating functions and Transform Techniques.

Note: The main results in units 4 and 5 should be taught in the context of proof techniques mentioned in Unit 1

Text-Books:

1. Thesis and Assignment writing by J.Anderson et al., Wiley Eastern 1977.
2. Commutative Algebra (the relevant sections) from either Commutative Algebra by N.S. Gopalakrishnan or Commutative Algebra by Atiyah and McDonald, Addison-Wesley Publication
3. Functional Analysis by W.Rudin (the relevant sections)
4. Numerical Mathematics by Jain, Iyengar and Jain, New Age India International.
5. Transform Techniques

Paper 2 – Advanced Mathematics

Fuzzy Theory: (2 units)

1. Fuzzy Algebra, Vol.1, Rajesh Kumar, University of Delhi Publications, Chapter 2(sections 2.1,2.2,2.3), Chapter 3.
2. Fuzzy sets and Fuzzy logic, Klir and Yuan, Prentice Hall of India, Chapter 1 (1.3,1.4) Chapter 2 (2.1,2.2)

Markov Process: (2 units)

1. Stochastic Processes, Second Edition, J.Medhi, New Age

International Publishers, Chapter 3 (Sections 3.1-3.6), Chapter 4 (Sections 4.1-4.5)

Algorithms and Complexity: (1 unit)

1. Analysis of Algorithms, Jeffrey J. McConnell, Narosa, Chapter 1 and Chapter 2. (Programming exercises to be omitted)

Paper 3 – Optional

1. Graph Theory: (Domination Theory)

1. Fundamentals of Dominations in Graphs, Hedetniemi et al., Marcel Dekker Inc., Chapters 1 to 4 (omit section 2.6 and all Theorems, lemmas, propositions that are stated without proofs)

2. Generalized inverses of Matrices

1. Generalized Inverses: Theory and Applications, Adi Ben-Israel, Thomas N.E. Greville, Chapter 1, Chapter 2 and Chapter 3 (omit sections 3.3 and 3.4)

3. Distribution Theory

1. Functional Analysis, W. Rudin, Part 2- Chapter 6 and Chapter 7.
2. Distribution Theory, Technical Report 2, DSA, School of Mathematics, Madurai Kamraj University.

4. Stochastic Process

1. Stochastic Processes, Second Edn., J. Medhi, New Age International Publishers, Chapters 6, 7, 8, 9.