Devi Ahilya University, Indore
Syllabus for Ph.D. Course Work in Applied Mathematics
(Under Faculty of Engineering)

Paper –IV: **1AMR04: Advance Course in Applied Mathematics** **3 Credits**

1. **Correlation and Regression Analysis:** Linear correlation and regression, Multiple correlation and regression and Partial correlation and regression.
   Mathematical Modelling: Concept of Models, Classification of models, Meaning and formulation of Mathematical models, Mathematical modelling through Differential Equations and Difference Equations.

2. **Operations Research:** Introduction to LPP and its subclass, Integer LPP, Sensitivity Analysis. Inventory problems and their Analytical structure. Classification of Queues, Queuing models and its Applications. Introduction to Non – Linear Programming, Dynamic Programming and Geometric Programming.

3. **Fixed Point Theory:** Fixed Point, Banach Contraction Principle and its Applications, Brouwer's Fixed point theorem and its Application, Schauder's fixed point theorem and related results.

4. **Graph Theory:** Introduction, Connectedness, Euler and Hamilton graphs, Matching, Covering and Coloring of graphs, shortest path problem, Minimum Spanning tree algorithms and their applications, Ford-Fulkerson algorithm, Max. flow Min. Cut method, Graph Labeling.

5. **Fuzzy Optimization:** Classical (Crisp) Sets, Fuzzy Sets: Basic Concepts and Properties, Fuzzy Arithmetic, Fuzzy Relations, Fuzzy Functions, Fuzzy Graph, Fuzzification and Defuzzification, Possibility theory, Approximate Reasoning, Fuzzy Logic, Fuzzy Inference, Fuzzy Controllers and their applications.

RECOMMENDED BOOKS:

1. S.C.Gupta, Fundamentals of Statistics, Himalaya Publishing House, Mumbai, 6th Ed., 2009.
2. Freund John E, Mathematical Statistics, PHI, N.D., 7th Ed., 2010.
3. A. P. Baisnab and M. Jas, Elements of Probability and Statistics, Tata McGraw-Hills Publishing Company Ltd. New Delhi.
4. J.N. Kapur, Mathematical Modelling, Wiley Eastern Limited, New Delhi, 1988.
5. Zafar Ahsan, Differential Equations and their Application, Prentice-Hall of India Pvt.Ltd., New Delhi, 2004.
6. Introduction to Mathematical Modelling, Edward A. Bender, Dover Publications Inc., New York, USA.
7. Hillier, F. S., Lieberman, G. J. – Introduction to Operation Research, 8th Ed., New York, McGraw- Hill, 2005.

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8. Taha, H. A. – Operations Research: An Introduction, 7th ed., Macmillan Publication Co., 2003.
9. P. K. Gupta and D. S. Hira, Operations Research, S. Chand., 2008.
10. H.K. Pathak and Pradeep K Joshi, Operations Research, Shiksha Sahitya Prakashan, 2nd Edition, 2015.
11. George F. Simmons, Introduction to Topology and Modern Analysis, McGraw Hill Book Company Inc., 1963.
12. Walter Rudin, Functional Analysis, McGraw-Hill Publishing Co., 1973.
13. H.K. Pathak, Functional Analysis with applications, Shiksha Sahitya Prakashan, 3rd Ed., 2013.
14. Kenneth H. Rosen, Discrete Mathematics and its Applications, 7th ed., Tata McGraw-Hill Ed. 2007.
15. C.L.Liu, Introduction to Discrete Mathematics, McGraw Hill, 1986.
16. Graph Theory With Applications to Engineering and Computer Science, Narsingh Deo, Phi Learning,
17. Graph Theory, F. Harary, Narosa Publishing House, 5th Ed., 2001.
18. G. J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, PHI, New Delhi, 2005.
19. H.J. Zimmermann, Fuzzy Set Theory and its Applications, Allied Publishers, New Delhi, 1991.
20. Kwang Hyung Lee, First Course on Fuzzy Theory and Applications, Springer, 2005.
21. Timothy J. Ross, Fuzzy Logic with Engineering Applications, Wiley Publication, 2010.

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