

## Nonlinear Functional Analysis – A First Course

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*Nonlinear Functional Analysis  
A First Course*  
S Kesavan

2004, Hindustan Book Agency  
<http://www.hindbook.com>

This book is an important introductory book for Indian students and researchers, and even for international workers who need to use topological and variational methods for partial differential equations arising from various applications.

The basic differential calculus is developed well in the first chapter. Important basic theorems like implicit function theorem and Sard's theorem are also covered here. The examples, counter examples and exercises help the reader to assimilate the new concepts well.

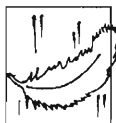
The finite dimensional Brower's degree is introduced in the second chapter while the infinite dimensional Leray-Schauder degree

for compact perturbations of identity in the third chapter. The highlights are the fixed point theorems of Schauder and Schaeffer with interesting applications to differential equations to conclude existence of a solution.

In the last 2 chapters, basics of bifurcation theory and critical point theory are developed. Basic bifurcation theorem is proved via Morse lemma. Krasnoselski's theorem and Rabinowitz global bifurcation theorem are proved using degree theory. The last chapter is devoted to the search of critical points for the functionals. These critical points are the solutions of the differential equations in variational form associated with the functional. The deformation lemma and then the mountain pass theorem are covered with full details. Interesting examples from differential equations are included as application of this theorem.

The topics covered are very useful for those using differential equations. The treatment is clear and coherent. Thus the book is a valuable addition to any library or to any individual collection.

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There are in fact two things, science and opinion;  
the former begets knowledge, the latter ignorance.

*Hippocrates*  
(460 BC – 377 BC)