



BILINGUAL
TEXTBOOK

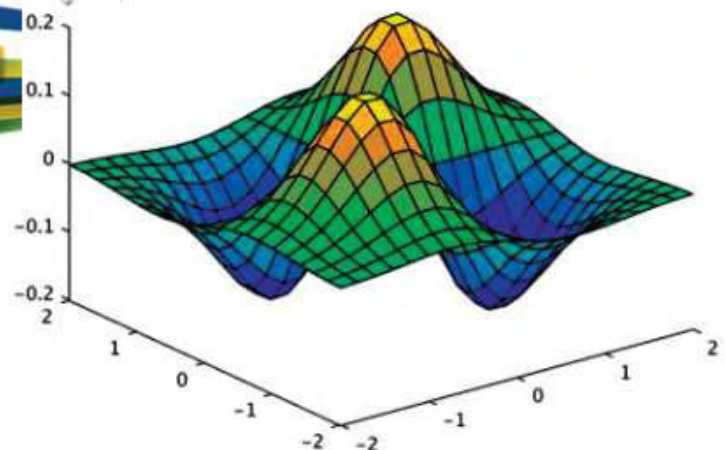
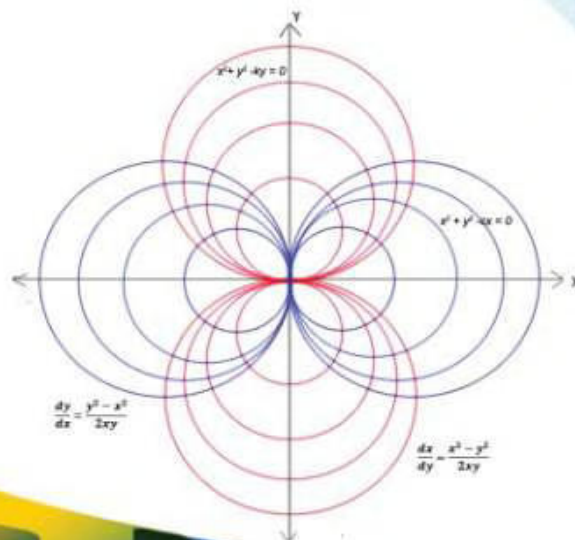


Sem - I

First Year B.Sc.

MATHEMATICS

Differential Equations



ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

(A Statutory Body of the Government of A.P.)



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TEXTBOOK

Sem-I

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MATHEMATICS
Differential Equations

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B.Sc.(First Year – Semester – I) : Mathematics (Differential Equations);

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Foreword



The Andhra Pradesh State Council of Higher Education, in line with the directions of the Hon'ble Chief Minister of Andhra Pradesh, introduced English Medium in all Degree programmes from this academic year 2021-22. As part of empowering the students joining Degree programmes from vernacular medium, the AP State Council of Higher Education is bringing out *podcasts, video casts* and notably the *bilingual text books*. These bilingual books are written in English, with the gist of the content in Telugu to enable the students to comprehend the content in their mother tongue. The bilingual text book is envisioned on the core concept of Outcome Based Education, highlighting the learning outcomes for every chapter. These are better called as bilingual resources rather than textbooks, as the APSCHE has developed a template for the bilingual textbooks designing them with concepts and frameworks going beyond the usual reading material.

Furthering the detailed description of the topics, as per the common syllabus of the Redesigned Curricular Framework for Choice Based Credit System, the bilingual text book contains Glossary, where certain important terms which the student might be unfamiliar with are identified and explained in one or two sentences, which is not a mere dictionary meaning. Links to online videos or audios which will be useful for further reading and understanding of the topics are given under the Interactive links. To foster further reading, information on online resources, articles or another text book pertaining to the content are provided. To make the text book more of a resourceful book, Curricular Activities, wherein suggested activities that could be taken up in realization of the outcomes are provided for the benefit of students. To help the students to assess understanding of the content, Self Assessment instruments are provided. For Advanced Learners, caters to the needs of advanced learners providing them with additional material about the topics. Finally, for every chapter References are provided.

I sincerely appreciate the Authors and the Editors for taking pains in bringing out this bilingual text book in a record time, replete with knowledge which fosters the academic progression of students. I earnestly thank my Academic Officers, Dr. B. S. Selina, Sri. Srirangam Mathew, Dr. P. Anil Kumar for their coordinating activities and Prof. K. Rama Mohana Rao, the Vice-Chairman of APSCHE under whose guidance the publication is brought out.

K. Hemachandra Reddy
Chairman, APSCHE



PREFACE

As a followup to the adoption of common core syllabus under the CBCS for the 3year degree course in the colleges of the state, the Government of Andhra Pradesh has taken up the task of preparing bilingual text books for some subjects to serve the needs of both the English and Telugu medium students of this state. In this context, this book is intended to cover the First year First Semester Mathematics course on Differential Equations.

The subject matter of this course, comprising 5 units of the syllabus is divided into 9 chapters, each chapter spreading over different sections. In each chapter all the concepts and definitions are elucidated with examples and theorems are provided with detailed proofs. At the end of each section, a few problems are worked out, utilizing mostly the concepts and theorems that were dealt with there and some problems were given in the exercise to enable the students to acquire and improve the problem solving skills in working them on their own or by taking the help of a teacher if necessary. At the end of each chapter, some objective type questions are given for self assessment by a student in understanding the contents of that chapter.

A few reference books and some web links/online resources are also provided at the end of the book for the benefit of those who intend to pursue additional inputs beyond the contents of this book.

Emphasis was laid on the fundamentals of the subject that are essential for the students at UG level. It is earnestly hoped that students will be comfortable to read and understand the content by themselves and appreciate it. Notwithstanding the care and effort we have taken in the preparation of the contents of this book, there might be a few typos and slips here and there. We request the readers to bring them (if any) to the notice of the agency concerned to enable them to rectify the same in the next edition. Constructive suggestions towards improving the quality of the contents of this book will be appreciated and are welcome.

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- Chapter 6.2 Differential and polynomial operators: Some properties and results
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- Chapter 7.4 Method of finding particular integral when $f(D)y = xv$, where v is a function of x
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Chapter 9.3 Cauchy - Euler equations

Chapter 9.4 Legendre's linear equations

Chapter 9.5 Miscellaneous differential equations

Reference Books:

1. An Introduction to the theory of Ordinary Differential Equations by E.A. Coddington, published by Prentice Hall of India Pvt. Ltd., New Delhi-110001.
2. Differential Equations with Applications and Historical Notes by George F Simmons, published by Tata-MC Graw-Hill Ltd., New Delhi.
3. Ordinary and Partial Differential Equations by Dr. M.D, Raisinghania, published by S. Chand & Company, New Delhi
4. Differential Equations and Their Applications by Zafar Ahsan, published by Prentice-Hall of India Pvt. Ltd, New Delhi-Second edition.
5. Differential Equations by N.P.Bali, published by Laxmi Publications(P)Ltd., New Delhi.
6. B.A/B.Sc, First Year Mathematics text book , Published by Telugu Akademi, Hyderabad.
7. A text book of Mathematics for B.A/B.Sc, Vol 1, published by S. Chand & Company, New Delhi.
8. B.Sc, Mathematics -I, Differential Equations, published by Spectrum University Press.
9. I B.Sc. A text book of Mathematics SEM 1 & SEM 2, published by Deepti Publications, Tenali-522201 (A.P).

Web Resources:

- 1) <https://ccelms.ap.gov.in/rusa/user/gtitles/40>
- 2) https://en.wikipedia.org/wiki/Ordinary_differential_equation
- 3) <https://www.cuemath.com/calculus/differential-equation/>
- 4) <https://byjus.com/maths/differential-equation/>
- 5) <https://people.bath.ac.uk/mir20/images/odenotes.pdf>
- 6) <https://www.khanacademy.org/math/ap-calculus-ab/ab-differential-equations-new/ab-1/v/differential-equation-introduction>

APS CHE

- A** Accessible and affordable Higher Education ensuring Accountability
- P** Perspective plan for effective governance in Higher Education
- S** Strengthening institutional networking and global linkages
- C** Curricular restructuring and Technology Enabled Learning
- H** Human Resource potential enrichment
- E** Enhancing quality and accelerating research

• Significance of the Emblem •



The Emblem Symbolizes Three Components:



DISSOLVING
IGNORANCE



GERMINATION
OF IDEAS



KNOWLEDGE

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