1. Record Nr. UNINA9910795835103321 Autore Ospina Juan Titolo Closed-Form Solutions for Drug Transport Through Controlled-Release Devices in Two and Three Dimensions Pubbl/distr/stampa Somerset: .: John Wiley & Sons, Incorporated, . 2015 ©2015 **ISBN** 9781119055945 9781118947258 Edizione [1st ed.] Descrizione fisica 1 online resource (301 pages) Altri autori (Persone) SimonLaurent Disciplina 615.1/9 Soggetti Drug delivery systems Pharmaceutical technology Electronic books. Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia Cover -- Title Page -- Copyright -- Contents -- Preface --Nota di contenuto Acknowledgements -- Chapter 1 Steady-State Analysis of a Two-Dimensional Model for Percutaneous Drug Transport -- 1.1 Separation of Variables in 2-D Cartesian Coordinates -- 1.2 Model for Drug Transport across the Skin -- 1.3 Analytical Solution of the Diffusion Model in 2-D Cartesian Systems -- 1.4 Summary -- 1.5 Appendix: Maple, Mathematica, and Maxima Code Listings -- Problems --References -- Chapter 2 Constant Drug Release from a Hollow Cylinder of Finite Length in Two Dimensions -- 2.1 Separation of Variables in 2-D Cylindrical Coordinates -- 2.2 Model for Drug Release from a Hollow Cylinder -- 2.3 Analytical Solution of the Transport Model in 2-D Cylindrical Coordinates -- 2.4 Summary -- 2.5 Appendix: Maple Code Listings -- Problems -- References -- Chapter 3 Analysis of Steady-State Growth Factor Transport Through Double-Layered Scaffolds --3.1 Governing Steady-State Transport Equations -- 3.2 Solution Procedure for Transport Through a Two-Layered Scaffold -- 3.3 Concentration Profile of Vascular Endothelial Growth Factor in Two

Layers -- 3.4 Summary -- 3.5 Appendix: Maple Code Listings -- Problems -- References -- Chapter 4 Steady-State Two-Dimensional

Diffusion in a Hollow Sphere -- 4.1 Separation of Variables and Legendre Polynomials in 2-D Spherical Coordinates -- 4.2 Model For 2-D Diffusion in a Sphere -- 4.3 Analytical Solution of 2-D Diffusion in Spherical Coordinates -- 4.4 Summary -- 4.5 Appendix: Maple, Mathematica, and Maxima Code Listings -- Problems -- References -- Chapter 5 Steady-State Three-Dimensional Drug Diffusion through Membranes from Distributed Sources -- 5.1 Separation of Variables in 3-D Cartesian Coordinates -- 5.2 Transport across the Membrane -- 5.3 Analytical Solution of the Diffusion Model in 3-D Cartesian Systems -- 5.4 Summary.

5.5 Appendix: Maple Code Listings -- Problems -- References --Chapter 6 Constant Drug Release from a Hollow Cylinder of Finite Length in Three Dimensions -- 6.1 Separation of Variables in 3-D Cylindrical Coordinates -- 6.2 Model For 3-D Drug Release from a Hollow Cylinder -- 6.3 Analytical Solution of the Transport Model in 3-D Cylindrical Coordinates -- 6.4 Summary -- 6.5 Appendix: Maple Code Listings -- Problems -- References -- Chapter 7 Sustained Drug Release from a Hollow Sphere in Three Dimensions -- 7.1 Method of Green's Function in 3-D Spherical Coordinates -- 7.2 Model for Molecular Transport across the Wall of a Hollow Sphere -- 7.3 Analytical Solution of the Transport Model in 3-D Spherical Coordinates -- 7.4 Summary -- 7.5 Appendix: Maple, Mathematica and Maxima Code Listings -- Problems -- References -- Chapter 8 Analysis of Transient Growth Factor Transport Through Double-Lavered Scaffolds -- 8.1 Laplace and Fourier-Bessel-based Methods in 2-D Cylindrical Coordinates -- 8.2 Governing Equations for Transport through Double-Layered Scaffolds -- 8.3 Concentration Profile of Vascular Endothelial Growth Factor in Two Layers -- 8.4 Summary -- 8.5 Appendix: Maple Code Listings -- Problems -- References -- Chapter 9 Molecular Diffusion through the Stomach Lining and into the Bloodstream -- 9.1 Laplace Transforms, Legendre Functions and Spherical Harmonics --9.2 Spherical Diffusion in Three Dimensions -- 9.3 Analytical Solution of the Transient Transport Model in 3-D Spherical Coordinates -- 9.4 Summary -- 9.5 Appendix: Maple Code Listings -- Problems --References -- Chapter 10 Diffusion-Controlled Ligand Binding to Receptors on Cell Surfaces -- 10.1 Weber's Integral -- 10.2 Steady-State Diffusion-Limited Ligand Binding -- 10.3 Transient Diffusion-Controlled Ligand Binding in 2-D Cylindrical Coordinates -- 10.4 Summarv.

10.5 Appendix: Maple, Mathematica and Maxima Code Listings --Problems -- References -- Chapter 11 Two-Dimensional Analysis of a Cylindrical Matrix Device with a Small Hole For Drug Release -- 11.1 Mathematical Modeling of Drug Transport through the Device -- 11.2 Drug Concentration Profile inside the Matrix -- 11.3 Normalized Cumulative Percentage of Drug Released -- 11.4 Summary -- 11.5 Appendix: Maple Code Listings -- Problems -- References -- Chapter 12 Three-Dimensional Drug Diffusion through Membranes from Distributed Sources -- 12.1 Governing Equations of the Transport Model -- 12.2 Analytical Solution of the Diffusion Model in 3-D Cartesian Systems -- 12.3 Average Dimensionless Concentration and Flux -- 12.4 Summary -- 12.5 Appendix: Maple and Mathematica Code Listings -- Problems -- References -- Chapter 13 Effective Time Constant for Two- and Three-Dimensional Controlled-Released Drug-Delivery Models -- 13.1 Effective Time Constant in Controlled-Release Drug-Delivery Systems -- 13.2 Intravitreal Drug Delivery using a 2-D Cylindrical Model -- 13.3 Analysis of a Rectangular Parallelepiped-Shaped Matrix with a Release Area -- 13.4 Summary -- 13.5 Appendix: Maple and Mathematica Code Listings -- Problems -- References --

Chapter 14 Data Fitting For Two- and Three-Dimensional Controlled-Release Drug-Delivery Models -- 14.1 Data Fitting in Controlled-Release Drug-Delivery Systems -- 14.2 Estimation of Diffusion Coefficient in a Solid Cylinder of Finite Length -- 14.3 Estimation of Diffusion Coefficient in a Rectangular Parallelepiped-Shaped Matrix -- 14.4 Summary -- 14.5 Appendix: Maple and Mathematica Code Listings -- Problems -- References -- Chapter 15 Optimization of Two- and Three-Dimensional Controlled-Released Drug-Delivery Models -- 15.1 Optimum Design of Controlled-Released Drug-Delivery Systems.

15.2 Design of a 2-D Cylindrical Dosage Form with a Finite Mass Transfer Coefficient -- 15.3 Design of a Rectangular Parallelepiped-Shaped Matrix with a Finite Mass Transfer Coefficient -- 15.4 Summary -- 15.5 Appendix: Maple and Mathematica Code Listings -- Problems -- References -- Index -- EULA.

Sommario/riassunto

Provides solutions for two- and three-dimensional linear models of controlled-release systems Real-world applications are taken from used to help illustrate the methods in Cartesian, cylindrical and spherical coordinate systems Covers the modeling of drug-delivery systems and provides mathematical tools to evaluate and build controlled-release devices Includes classical and analytical techniques to solve boundary-value problems involving two- and three-dimensional partial differential equations Provides detailed examples, case studies and step-by-step analytical solutions to relevant problems using popular computational software.