

REAL TIME IMAGING

Static Scanning

Real-time Imaging

DISPLAY MODES

A-Mode 'Amplitude Mode'

- 1. Amplitude of reflected waves
- 2. Amplitude of transmitted waves

TRANSFORMERS

Prerequisites

- 1. Knowledge of basic electrical engineering
- 2. Knowledge of basic physics
- 3. Knowledge of basic mathematics

Prerequisites materials

- 1. Knowledge of basic electrical engineering
- 2. Knowledge of basic physics

SOUND & MEDIA

3 processes that contribute to Attenuation

- 1. Reflection
- 2. Absorption
- 3. Scattering

PULSED WAVES

3 parameters that describe Pulsed Sound

- 1. Pulse duration
- 2. Pulse repetition period
- 3. Pulse repetition frequency

SOUND

3 Acoustic Variables

- 1. Pressure
- 2. Density
- 3. Particle displacement

3 parameters that describe sound

- 1. Amplitude
- 2. Frequency
- 3. Wavelength

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2D IMAGING

SOUND BEAMS

3 types of Sound Beam

Focal Zone

Beam Width

Beam Depth

RANGE EQUATION

Time of Flight or the Return Time

Time of Flight or the Return Time



ULTRASOUND PHYSICS NOTES



SOUND WAVES

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

Period & Frequency

BASICS

The Matrix System

The Matrix System

The Matrix System

The Matrix System

The Matrix System

The Matrix System

The Matrix System

The Matrix System

The Matrix System

The Matrix System

The Matrix System

The Matrix System

The Matrix System

Directly Related (Proportional)

Directly Related (Proportional)

Directly Related (Proportional)

Directly Related (Proportional)

Directly Related (Proportional)

Reciprocal

Reciprocal

Reciprocal

Reciprocal

Reciprocal

ETHICS

Consent

- 1. Patient must be informed of the risks and benefits of the procedure
- 2. Patient must be informed of the risks and benefits of the procedure

MOORE EFFECTS

Resonance

- 1. Resonance occurs when the frequency of the sound wave is equal to the natural frequency of the tissue
- 2. Resonance occurs when the frequency of the sound wave is equal to the natural frequency of the tissue

Moore

- 1. Moore's law states that the number of transistors on a microchip doubles every two years, though the rate of increase is slowing down
- 2. Moore's law states that the number of transistors on a microchip doubles every two years, though the rate of increase is slowing down

QUALITY ASSURANCE

3. Tissue Equivalent Phantom

- 1. Tissue Equivalent Phantom is used to test the accuracy of ultrasound measurements
- 2. Tissue Equivalent Phantom is used to test the accuracy of ultrasound measurements

ARTIFACTS

1. Reverberation

- 1. Reverberation occurs when the sound wave reflects off a strong reflector and returns to the transducer
- 2. Reverberation occurs when the sound wave reflects off a strong reflector and returns to the transducer

2. Shadowing

- 1. Shadowing occurs when the sound wave is blocked by a strong reflector
- 2. Shadowing occurs when the sound wave is blocked by a strong reflector

HEMODYNAMICS

Hemodynamics

- 1. Hemodynamics is the study of the flow of blood through the vessels
- 2. Hemodynamics is the study of the flow of blood through the vessels

Flow 'Volumetric Flow rate'

- 1. Volumetric Flow rate is the volume of fluid that flows through a cross-section of a vessel per unit time
- 2. Volumetric Flow rate is the volume of fluid that flows through a cross-section of a vessel per unit time

Velocity

- 1. Velocity is the speed at which the fluid flows through a cross-section of a vessel
- 2. Velocity is the speed at which the fluid flows through a cross-section of a vessel

Energy Gradient

- 1. Energy Gradient is the difference in energy between two points in a fluid
- 2. Energy Gradient is the difference in energy between two points in a fluid

Turbulent Flow

- 1. Turbulent flow is the flow of fluid in which the particles move in a disorganized manner
- 2. Turbulent flow is the flow of fluid in which the particles move in a disorganized manner

Continuous Wave Transducer

- 1. Continuous Wave Transducer is used to measure the flow of blood through a vessel
- 2. Continuous Wave Transducer is used to measure the flow of blood through a vessel

3. Tissue Equivalent Phantom

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HARMONICS & CONTRAST

Hydrostatic Pressure

- 1. Hydrostatic Pressure is the pressure exerted by a fluid at equilibrium
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DISPLAYS & IMAGE STORAGE

Monitors vs Gray Scale Displays

- 1. Monitors are used to display the ultrasound image
- 2. Monitors are used to display the ultrasound image

Digital Scan Conversion

- 1. Digital Scan Conversion is the process of converting an analog signal into a digital signal
- 2. Digital Scan Conversion is the process of converting an analog signal into a digital signal

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Physics Study Guide For Ultrasound

Thomas Griffiths



Physics Study Guide For Ultrasound:

Pass Ultrasound Physics Exam Study Guide Review Volume I PDF Edition Mansoor Khan MBBS, RDMS, RDCS, 2014-11-21 This Pass Ultrasound Physics Exam Study Guide Review Volume I is in easy to understand question and answer format with over 400 questions This study guide review is designed to help students and sonographers practice and prepare for the questions which appear on the ARDMS Sonography Principles and Instrumentation exam It is divided into two Volume I and Volume II The Volume I contains questions and answers from chapters such as Pulse Echo Instrumentation Ultrasound Transducers Sound Beam Bioeffects Intensity and Resolution The material is based on the ARDMS exam outline It explains the concepts in very simple and easy to understand way You can increase your chances to pass Ultrasound Physics and Instrumentation SPI exam by memorizing these questions and answers After studying this study guide review you will feel confident and will be able to answer most of the questions easily which appear on the ARDMS Sonographic Principles and Instrumentation Exam The Pass Ultrasound Physics Exam Study Guide Notes Volume I will be a great compliment to this study guide review and I highly recommend it if you are preparing to sit for ARDMS Sonographic Principles and Instrumentation exam

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Physics and Technology of Diagnostic Ultrasound Robert/Wyatt Gill,2016-09-19 This Study Guide is a companion to the popular ultrasound physics textbook The Physics and Technology of Diagnostic Ultrasound A Practitioner s Guide It contains over 120 short questions and provides model answers for each It has been designed for both students and teachers Students will find it valuable as a learning aid and as a resource to test their knowledge and understanding Teachers supervisors and tutors will find it a useful teaching asset and an excellent starting point for writing quiz and exam questions Pass

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Review: Physics, Abdomen, Obstetrics and Gynecology Susanna Ovel,2013-11-07 Be confident that you can answer any and all questions on your registry exams correctly when you prepare with this complete review Mosby's Comprehensive Review for General Sonography Examinations provides study resources for all three main exams required for general ultrasound practice physics abdomen and ob gyn Each chapter is arranged in table and outline format with 50 review questions at the end of the chapter and a mock exam at the end of each section Access additional mock exams for each subject area on the companion CD or Evolve site These exams give you experience with timed test taking in an electronic environment that simulates the actual registry exam experience With this realistic preview of the exam environment and solid review of the material you will be prepared to ace the exams no doubt that this is a worthwhile text which could provide a useful revision platform for sonography students in the UK Reviewed by Sue Halson Brown on behalf of RAD Magazine February 2015 Complete preparation for the three general ARDMS exams physics abdomen and ob gyn Content review in outline and tabular format provides a quick review of all the material you need to learn including key terms anatomy functions scanning techniques lab values and pathology More than 2 500 questions in Registry format cover everything you will be tested on in the Registry exams Rationales for answers to mock questions help you understand why an answer is correct or incorrect and increase your comprehension More than 350 ultrasound scans included in the abdominal and ob gyn sections prepare you for exam questions that ask you to identify pathology on scans Color insert with Doppler images of the liver biliary and umbilical cord helps you be ready to answer questions related to Doppler imaging Companion CD provides extra timed graded mock exams and two entertaining interactive games Sonography Millionaire and Tournament of Sonography **Sonography Exam Review: Physics, Abdomen, Obstetrics and Gynecology E-Book** Susanna Ovel,2019-05-22 Ensure you can correctly answer any and all questions on their registry exams Sonography Exam Review

Physics Abdomen Obstetrics and Gynecology 3rd Edition provides the exact review materials you need to pass the three main sonography exams physics abdomen and OB GYN Each chapter is arranged in table and outline format with 50 review questions at the end of the chapter and a mock exam at the end of each section New and revised chapters in this 3rd edition include additional information on salivary glands musculoskeletal and male pelvis sonography Updated information on patient care imaging techniques and protocols is also included and much more Complete preparation for the three main ARDMS exams physics abdomen and ob gyn covers the three subject areas required for general ultrasound practice More than 1 900 questions in registry format 1 910 in the text and 700 online allow you to thoroughly prepare for the registry exams using multiple methods of learning Content review in outline and tabular format offers a quick concise review of key terms anatomy functions scanning technique lab values and pathology for each registry subject Rationales for answers to mock exam questions are provided to help you understand why an answer is correct and incorrect More than 350 ultrasound scans are included in the abdominal and ob gyn sections Color insert of Doppler images of anatomy and pathology prepares you to answer questions related to Doppler imaging NEW Updated coverage of the neck to include salivary glands NEW Revised section on the male pelvis to include penile sonography NEW Additional coverage on imaging techniques and protocols

Study Guide and Laboratory Exercises for Technology for Diagnostic Sonography - E-Book Wayne R. Hedrick, Paul R. Wagner, 2016-06-24 Gain a firm foundation for sonography practice Corresponding to the chapters in Hedrick's Technology for Diagnostic Sonography this study guide focuses on basic concepts to help you master sonography physics and instrumentation It includes laboratory exercises designed to teach you how to operate a scanner and comprehensive review questions allow you to assess your knowledge Not only will you learn the theoretical knowledge that is the basis for ultrasound scanning but also the practical skills necessary for clinical practice Laboratory exercises teach you the function of operator controls and how to optimize image quality and practice ALARA and include step by step instructions for scanner operation for hands on application and practice 250 review questions help you assess your understanding of sonography physics and instrumentation and identify areas of knowledge that may need further study Key Points at the beginning of each chapter emphasize the most important sonography principles that you need to understand and apply

Secrets of the Ardms Ultrasound Physics and Instrumentation Exam: Study Guide Mometrix Media, 2011-12-01

Review of Radiologic Physics Walter Huda, Richard M. Slone, 2003-01-01 The purple book that helps residents and techs to prepare for the radiologic physics portion of board and registry exams is now in its Second Edition Chapters outline key information and test the reader's understanding with board type review questions along with answers and rationale provided Includes 500 multiple choice questions Topics covered include MRI CT US mammography radiography fluoroscopy nuclear medicine and more New features include an 18% larger text more test questions at the end of each chapter new and revised illustrations and an expanded glossary New chapters include those on image quality and dose digital imaging and

PACS computers and mathematics and a separate chapter on CT **Echocardiography Review Guide E-Book** Catherine M. Otto, Rebecca Gibbons Schwaegler, Rosario V. Freeman, 2011-03-01 Echocardiography Review Manual fully prepares you for success on the echocardiography boards the PTEeXAM or the diagnostic cardiac sonographer's exam Drs Catherine M Otto and Rosario Freeman along with cardiac sonographer Rebecca G Schwaegler clearly demonstrate how to record echos avoid pitfalls perform calculations and understand the fundamentals of echocardiography for all types of cardiac disease Consult this title on your favorite e reader with intuitive search tools and adjustable font sizes Elsevier eBooks provide instant portable access to your entire library no matter what device you're using or where you're located Enhance your calculation skills for all aspects of echocardiography Challenge yourself with multiple choice questions in every chapter thoroughly updated in this edition covering all of the latest information tested on exams Review essential basic principles with The Echo Manual a consolidated portable reference from the Textbook of Clinical Echocardiography Benefit from expert advice and easy to follow procedures on using and interpreting echo including pitfalls in recording in every chapter Prepare for the PTEeXAM with a brand new chapter on TEE Assess your mastery of today's clinical echocardiography with all new questions and answers and new illustrations in every chapter Access the complete contents online at www.expertconsult.com

Technology for Diagnostic Sonography Wayne R. Hedrick, 2012-02-16 Gain a complete understanding of sonography physics and instrumentation related to clinical practice *Technology for Diagnostic Sonography* provides clear in depth coverage of physics principles ultrasound transducers pulse echo instrumentation Doppler instrumentation clinical safety and quality control It includes the latest information on real time imaging techniques plus a comprehensive discussion of image artifacts With wide ranging online review questions it also offers ample opportunities to assess your learning progress Written by sonography and testing expert Wayne Hedrick *Technology for Diagnostic Sonography* simplifies this difficult topic and allows you to demonstrate your knowledge of physics and instrumentation on exams with the ultimate goal of preparing you for success in clinical practice A focus on essential physics and instrumentation provides the exact technical content you need to prepare for clinical sonography practice Accessible conversational writing style with real world analogies explains physics concepts and makes this difficult topic less intimidating Examples and sample problems help you make the connection between theory and practical applications The latest information on equipment and scanning methods ensures an understanding of how to competently and safely use ultrasound instrumentation Comprehensive discussion of image artifacts with illustrative examples helps you recognize and eliminate artifacts Detailed description of performance testing with tissue mimicking phantoms allows assessment of the proper operation of B mode scanners Practical guidance on the clinical use of mechanical index and thermal index enables practice of the ALARA principle when scanning patients Full color format shows scans as they appear in the clinical setting Key terms and other learner friendly features focus your study on important information Summaries of essential principles and equations reinforce the most important concepts Extensive review

questions on a companion Evolve website allow realistic assessment of your knowledge *Mosby's Radiation Therapy Study Guide and Exam Review* Leia Levy, 2025-08-21 Reinforce your understanding of radiation therapy and prepare for the Registry exam Mosby's Radiation Therapy Study Guide and Exam Review Second Edition is both a study companion for Washington and Leaver's Principles and Practice of Radiation Therapy and a superior review for the ARRT Radiation Therapy Certification Exam This completely updated edition reflects the latest exam specifications and features an easy to read format that presents information in concise bullets and tables More than 2 000 total multiple choice questions in Registry format provide a realistic testing experience to prepare you for the real exam NEW Quality control procedures and guidelines for linear accelerators NEW Fractionation and protraction considerations UPDATED Content reflects the latest ARRT Radiation Therapy Certification Exam Specifications UPDATED Radiation Protection and Safety and Overview of Cancer Imaging and Management Modalities chapters offer the most current information in these key areas EXPANDED Charge capture and record keeping content enhances the Oncology Patient Care chapter EXPANDED Additional cross sectional images provide anatomy review and reinforce treatment planning concepts More than 2 000 multiple choice questions in Registry format in the text and on the companion Evolve website provide a realistic exam experience Complete coverage helps you prepare for the ARRT Radiation Therapy Certification Exam Content review in outline and tabular format provides a concise recap of the material you need to know to succeed on the exam Exercises at the end of each section offer engaging active review opportunities *ARDMS Ultrasound Physics & Instrumentation Exam Secrets Study Guide: Unofficial ARDMS Test Review for the American Registry for Diagnostic Medical Sonography*, 2018-04-12 Secrets of the ARDMS Ultrasound Physics A comprehensive General Strategy review including Make Predictions Answer the Question Benchmark Valid Information Avoid Fact Traps Milk the Question The Trap of Familiarity Eliminate Answers Tough Questions Brainstorm Read Carefully Face Value Prefixes Hedge Phrases Switchback Words New Information Time Management Contextual Clues Don't Panic Pace Yourself Answer Selection Check Your Work Beware of Directly Quoted Answers Slang Extreme Statements Answer Choice Families A comprehensive Ultrasound Physics and Instrumentation Exam including Sound Mechanisms of Sound Generation Sound Propagation Single Line Reconstruction Sound Detection Image Formation Applications and Techniques Hardware Controls Image Features Resolution Beamforming The Scattering and Reflection of Sound Key Points Ultrasound Physics or Abdomen Ultrasound Four types of Doppler Ultrasound and much more Disclaimer The American Registry for Diagnostic Medical Sonography Inc ARDMS does not endorse this product nor is the ARDMS affiliated in any way with the owner or any content related to this website

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Physics Study Guide For Ultrasound Introduction

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