Irrigation And Water Power Engineering By Arora

Irrigation And Water Power Engineering By Arora irrigation and water power engineering by arora is a comprehensive field that combines the principles of water management, hydraulic engineering, and sustainable development to optimize water resources for agriculture, energy generation, and environmental conservation. This discipline plays a crucial role in addressing global challenges such as water scarcity, food security, and renewable energy production. The works of experts like Arora have significantly contributed to advancing knowledge, technology, and practices in this vital sector. Overview of Irrigation and Water Power Engineering Irrigation and water power engineering focus on the design, development, and management of systems that utilize water resources efficiently. These systems include various types of irrigation methods, hydroelectric power plants, dams, and water distribution networks. The goal is to ensure the reliable supply of water for agricultural productivity, household use, and energy generation while minimizing environmental impacts. Fundamental Concepts in Irrigation and Water Power Engineering Water Resources Management Effective management of water resources involves the planning, development, and control of water supplies to meet present and future demands. It encompasses hydrological studies, rainfall analysis, runoff estimation, and storage management. Hydraulic Engineering Principles Hydraulic engineering is at the core of water power engineering. It involves understanding fluid mechanics, designing hydraulic structures like dams, weirs, canals, and pipelines to control and utilize water effectively. Irrigation Techniques Various methods are employed based on local topography, climate, and economic factors: Surface Irrigation (e.g., basin, border, furrow) Drip Irrigation Sprinkler Irrigation Subsurface Irrigation 2 Types of Water Power Systems Hydroelectric Power Plants Hydropower harnesses the energy of flowing or falling water to generate electricity. Major components include turbines, generators, reservoirs, and spillways. Dams and Reservoirs Dams store water to create reservoirs, regulate flow, and provide water for

irrigation, hydroelectric power, and flood control. Water Conveyance Systems These involve canals, pipelines, and tunnels designed to transport water from sources to end-users efficiently. Design and Construction of Hydraulic Structures Dam Design Designing a dam requires understanding soil mechanics, structural stability, spillway capacity, and environmental impact. Different types include gravity dams, arch dams, and embankment dams. Canal and Waterway Layout Ensuring proper alignment, slope, and cross-section for efficient water flow and minimal losses. Hydropower Plant Components Key components include: Intake Structures Penstocks Turbines (Pelton, Francis, Kaplan) Generators Outflow Tunnels Environmental and Sustainability Considerations Irrigation and water power projects must balance development with environmental preservation: 3 Maintaining aquatic ecosystems Preventing soil erosion and siltation Ensuring water quality Adopting ecofriendly technologies Recent Advances and Innovations by Arora Arora's contributions have significantly advanced the field through innovative research and application. Some notable areas include: Smart Irrigation Systems Integration of sensors, automation, and data analytics to optimize water use, reduce wastage, and increase crop yields. Renewable Energy Integration Combining hydropower with solar and wind energy solutions to create hybrid systems for reliable power supply. Environmental Impact Assessments Developing methodologies to evaluate and mitigate environmental impacts of large-scale water projects. Water Conservation Technologies Designing efficient irrigation methods, rainwater harvesting systems, and water recycling techniques. Challenges in Irrigation and Water Power Engineering Despite technological advances, several challenges persist: Water Scarcity and Droughts1. Climate Change Impact2. Sedimentation and Siltation in Reservoirs3. High Capital Costs4. Environmental and Social Concerns5. Future Directions and Sustainable Practices The future of irrigation and water power engineering lies in sustainable development practices: 4 Adopting integrated water resources management (IWRM) Implementing adaptive designs to cope with climate variability Promoting community participation and awareness Utilizing advanced materials and automation Enhancing transboundary water cooperation Educational and Professional Opportunities Students and professionals interested in this field can pursue degrees in civil, hydraulic, or environmental engineering. Career options include: Design

Engineer Hydrologist Project Manager Research Scientist Environmental Consultant Conclusion Irrigation and water power engineering by Arora exemplifies the integration of scientific principles, innovative technologies, and sustainable practices to harness water resources efficiently. As the world faces increasing water-related challenges, the role of skilled engineers and researchers in this field becomes even more critical. Continued advancements in automation, environmental management, and renewable energy integration promise a sustainable and resilient future for water resource development globally. References and Further Reading - Arora, K. R. (Year). Water Resources Engineering. [Publisher] - International Commission on Irrigation and Drainage (ICID) -World Bank Water Resources Reports - Journal of Hydraulic Engineering Keywords: irrigation engineering, water power, hydroelectricity, dams, water management, sustainable water use, Arora, hydraulic structures, renewable energy, water conservation QuestionAnswer What are the fundamental principles of irrigation engineering covered in Arora's book? Arora's 'Irrigation and Water Power Engineering' covers principles such as water sources, flow measurement, canal design, types of irrigation systems, and soil-water relationships, providing a comprehensive understanding of efficient water distribution. How does Arora address modern water conservation techniques in irrigation engineering? The book discusses modern techniques like drip irrigation, sprinkler systems, and watershed management, emphasizing sustainable water use and efficiency improvements in irrigation practices. 5 What are the key topics related to hydroelectric power discussed in Arora's text? Arora covers hydroelectric power generation, dam design, turbines, penstocks, and the environmental considerations of water power projects to give a thorough overview of water power engineering. Does Arora's book include recent advancements in water power engineering? While primarily a foundational text, the latest editions incorporate recent advancements such as micro- hydropower, environmental impacts, and innovations in turbine technology, making it relevant for current engineering practices. What design methodologies for irrigation canals are explained in Arora's book? The book explains various design methodologies, including hydraulic calculations, cross-section selection, hydraulic gradient, and lining materials to ensure efficient and sustainable canal construction. How does Arora address the environmental

impacts of irrigation and water power projects? The book discusses environmental considerations such as ecological impacts, sedimentation, water quality, and measures to mitigate adverse effects, promoting environmentally responsible engineering solutions. Is the book suitable for students preparing for competitive exams in water engineering? Yes, Arora's 'Irrigation and Water Power Engineering' is widely regarded as a comprehensive resource for students preparing for competitive exams, offering detailed concepts, practice questions, and updated information relevant to water engineering. Irrigation and Water Power Engineering by Arora: A Comprehensive Guide to Modern Water Resource Management Irrigation and Water Power Engineering by Arora stands as a cornerstone in the field of water resources, offering in-depth insights into the principles, design, and application of irrigation systems and water power structures. Authored by renowned engineer and scholar B.C. Arora, this seminal work continues to serve as an essential reference for students, researchers, and professionals dedicated to optimizing water use for agriculture, industry, and energy generation. This article provides a detailed exploration of the core concepts presented in Arora's work, highlighting its significance in contemporary water resource engineering. ---Introduction to Irrigation and Water Power Engineering Water is the most vital resource for sustaining life and supporting economic development. Efficient management of water resources involves both the equitable distribution of water through irrigation systems and the harnessing of water power for energy production. Irrigation and Water Power Engineering by Arora encapsulates the scientific principles, engineering techniques, and practical considerations necessary for designing effective water infrastructure. The book emphasizes an integrated approach, combining hydrological studies, hydraulic design, and environmental considerations, to develop sustainable water systems. As global water demand increases amidst climate change and population growth, understanding the fundamentals outlined in Arora's work becomes more critical than ever. ---Fundamental Concepts in Irrigation Engineering Hydrological Principles and Water Resources Irrigation engineering begins with a thorough Irrigation And Water Power Engineering By Arora 6 understanding of hydrology—the science of water movement on and beneath the Earth's surface. Key concepts include: - Watershed and Drainage Basin: The area contributing runoff to a particular

water body. - Runoff and Infiltration: The processes determining how much rainwater reaches the ground and how much infiltrates the soil. – Design Rainfall: The statistical estimation of rainfall intensity for designing irrigation and drainage facilities. - Yield of Water Sources: Calculating the sustainable supply from rivers, reservoirs, and groundwater sources. Arora underscores the importance of accurate hydrological data collection and analysis for designing reliable irrigation systems that can withstand variability in rainfall and runoff. Types of Irrigation Systems The book classifies irrigation methods based on application techniques, water source, and distribution methods: - Surface Irrigation: Water flows over the soil surface by gravity (e.g., border, basin, furrow, and flood irrigation). - Sprinkler Irrigation: Water is sprayed over crops similar to natural rainfall, suitable for uneven terrains. - Drip (Trickle) Irrigation: Delivers water directly to the roots through emitters, minimizing wastage. - Subsurface Irrigation: Water is applied below the ground surface, reducing evaporation. Each system has specific design considerations, efficiencies, costs, and suitability depending on crop type, soil properties, and climatic conditions. --- Design Principles of Irrigation Systems Hydraulic Design and Layout A critical aspect of irrigation engineering is ensuring water reaches crops efficiently. Key factors include: - Flow Rate and Head Losses: Calculating the required flow velocity and minimizing energy losses. - Canal and Pipe Design: Determining cross-sectional dimensions for channels and pipelines based on flow conditions. -Distribution Uniformity: Ensuring even water application across fields to prevent over or underirrigation. Arora emphasizes the use of empirical formulas, hydraulic models, and computational tools to optimize system design. Soil and Water Management Proper irrigation design also involves soil characterization—permeability, texture, and water retention capacity—and water scheduling based on crop needs and soil moisture levels. Efficient water management reduces wastage and enhances crop yields. - -- Water Power Engineering: Harnessing Hydropower Principles of Hydropower Generation Water power engineering focuses on converting the potential and kinetic energy of water into electrical energy. Main components include: - Dams and Reservoirs: Store water and regulate flow. - Penstocks: Conduits channeling water to turbines. - Turbines: Devices that convert water energy into mechanical energy. - Generators: Convert mechanical energy into

electricity. Arora details the types of turbines—Pelton, Francis, Kaplan—and their suitability based on head height and flow rate. Hydraulic Structures and Their Design Designing hydraulic structures such as spillways, sluice gates, and energy dissipators is crucial for safe operation and efficiency. The book discusses: - Spillway Design: To safely pass floodwaters without damaging the dam. -Outlet Works: For controlled water release. - Fish Ladders and Environmental Considerations: To preserve aquatic ecosystems. Site Selection and Feasibility Choosing an appropriate site involves assessing: - Water Irrigation And Water Power Engineering By Arora 7 availability and flow characteristics. - Geological stability and foundation conditions. - Environmental impact and social considerations. - Economic viability and cost-benefit analysis. --- Environmental and Social Aspects Modern water resource engineering must balance developmental goals with environmental sustainability. Arora emphasizes: - Ecological Impacts: Effects on aquatic habitats, sediment transport, and downstream ecosystems. - Water Quality: Prevention of pollution and salinity issues. - Social Impact: Displacement, livelihoods, and community participation. Designing eco-friendly and socially acceptable projects is integral to sustainable water management. --- Recent Advances and Future Trends Irrigation and Water Power Engineering by Arora also explores emerging technologies, including: - Automation and SCADA Systems: For real- time monitoring and control. -Remote Sensing and GIS: For watershed management and resource assessment. - Renewable Energy Integration: Combining hydropower with other renewable sources. - Climate Resilient Designs: Adapting to changing rainfall patterns and extreme weather events. The integration of these innovations promises to enhance efficiency, resilience, and sustainability in water resource projects. --- Conclusion Irrigation and Water Power Engineering by Arora remains a comprehensive and authoritative resource that bridges theoretical principles with practical applications. Its detailed treatment of hydrological studies, hydraulic design, structural engineering, and environmental considerations makes it indispensable for advancing sustainable water management practices. As water scarcity and energy demands continue to grow globally, the insights provided by Arora's work will undoubtedly inform future innovations and policies in water resource engineering. By combining scientific rigor with a focus on real- world challenges, the book

helps engineers, planners, and policymakers develop resilient and efficient systems that support both human needs and ecological health. In essence, Arora's contribution continues to shape the landscape of modern water resource engineering, ensuring water remains a sustainable resource for generations to come. irrigation engineering, water resources engineering, hydraulic engineering, water management, irrigation systems, water power engineering, flood control, hydraulic structures, water conservation, sustainable water practices

Water PowerElectricity and Water Power and Their Inter-relationsElectricity and water power and their relations ... Energy and Water Development Appropriations for 2013 Electricity and Water Power and Their Inter-RelationsMineral and Water Resources of IdahoUtility CorporationsGeological Survey CircularWater-Power, an Outline of the Development and Application of the Energy of Flowing WaterWater-powerElectricityWater Power and Electric Power for Industrial EnterprisesWater Power EngineeringCatalogue of the Public Documents of the ... Congress and of All Departments of the Government of the United States for the Period from ... to ... Electric Transmission of Energy and Its Transformation, Subdivision, and DistributionWater PowerCensus Reports Tenth Census. June 1, 1880: Power and machinery employed in manufacturesCassier's MagazineWater Power EngineeringCases Argued and Determined in the Supreme Judicial Court of Maine Ian Graham Mark A. Replogle Mark A. Replogle United States. Congress. House. Committee on Appropriations. Subcommittee on Energy and Water Development Mark A. Replogle Geological Survey (U.S.) United States. Federal Trade Commission Frizell Joseph Palmer Joseph Palmer Frizell Roanoke Navigation and Water Power Company Daniel Webster Mead Gisbert Kapp Tea Benduhn United States. Census Office. 10th Census, 1880 Daniel W. Mead Maine. Supreme Judicial Court Water Power Electricity and Water Power and Their Inter-relations Electricity and water power and their relations ... Energy and Water Development Appropriations for 2013 Electricity and Water Power and Their Inter-Relations Mineral and Water Resources of Idaho Utility Corporations Geological Survey Circular Water-Power, an Outline of the Development and Application of the Energy of Flowing Water Water-power Electricity Water Power and Electric Power for Industrial Enterprises Water Power Engineering Catalogue of the Public Documents of the ... Congress and of All

Departments of the Government of the United States for the Period from ... to ... Electric Transmission of Energy and Its Transformation, Subdivision, and Distribution Water Power Census Reports Tenth Census. June 1, 1880: Power and machinery employed in manufactures Cassier's Magazine Water Power Engineering Cases Argued and Determined in the Supreme Judicial Court of Maine Ian Graham Mark A. Replogle Mark A. Replogle United States. Congress. House. Committee on Appropriations.

Subcommittee on Energy and Water Development Mark A. Replogle Geological Survey (U.S.) United States. Federal Trade Commission Frizell Joseph Palmer Joseph Palmer Frizell Roanoke Navigation and Water Power Company Daniel Webster Mead Gisbert Kapp Tea Benduhn United States. Census Office. 10th Census, 1880 Daniel W. Mead Maine. Supreme Judicial Court

examines the historical uses of water as a source of energy the advantages and disadvantages and new advances in harnessing water power

unlike some other reproductions of classic texts 1 we have not used our optical character recognition as this leads to bad quality books with introduced typos 2 in books where there are images such as portraits maps sketches etc we have endeavoured to keep the quality of these images so they represent accurately the original artefact although occasionally there may be certain imperfections with these old texts we feel they deserve to be made available for future generations to enjoy

introduces methods of obtaining power from water places water power in context with other power resources explains how it works and considers the advantages and disadvantages of its possible future use

excerpt from water power engineering the theory investigation and development of water powers air and water both physical agents most essential to life have all ways been the most obvious sources of potential energy and have each been utilized for power purposes since the earliest times be side the nile the euphrates and the yellow rivers thousands of years ago the primitive hydraulic engineer planned and constructed his simple forms of current wheels and utilized the

energy of the river current to raise its waters and irrigate the otherwise arid wastes into fertility such primitive wheels were also utilized for the grinding of corn and other simple power purposes from these simple forms and primitive applications have gradually been de veioped the modern water power installations of to day about the publisher forgotten books publishes hundreds of thousands of rare and classic books find more at forgottenbooks com this book is a reproduction of an important historical work forgotten books uses state of the art technology to digitally reconstruct the work preserving the original format whilst repairing imperfections present in the aged copy in rare cases an imperfection in the original such as a blemish or missing page may be replicated in our edition we do however repair the vast majority of imperfections successfully any imperfections that remain are intentionally left to preserve the state of such historical works

Getting the books Irrigation And Water Power **Engineering By Arora** now is not type of challenging means. You could not deserted going later than books amassing or library or borrowing from your associates to open them. This is an unquestionably easy means to specifically get lead by on-line. This online publication Irrigation And Water Power Engineering By Arora can be one of the options to accompany you when having extra time. It will not waste your time. understand me, the ebook will totally proclaim you extra business to read. Just invest tiny period to retrieve this online revelation Irrigation And Water Power **Engineering By Arora** as well as review them wherever you are now.

- Where can I buy Irrigation And Water Power
 Engineering By Arora books? Bookstores: Physical
 bookstores like Barnes & Noble, Waterstones, and
 independent local stores. Online Retailers: Amazon,
 Book Depository, and various online bookstores
 offer a wide range of books in physical and digital
 formats
- 2. What are the different book formats available? Hardcover: Sturdy and durable, usually more expensive. Paperback: Cheaper, lighter, and more portable than hardcovers. E-books: Digital books available for e-readers like Kindle or software like Apple Books, Kindle, and Google Play Books.
- How do I choose a Irrigation And Water Power
 Engineering By Arora book to read? Genres:
 Consider the genre you enjoy (fiction, non-fiction,
 mystery, sci-fi, etc.). Recommendations: Ask
 friends, join book clubs, or explore online reviews

- and recommendations. Author: If you like a particular author, you might enjoy more of their work.
- 4. How do I take care of Irrigation And Water Power Engineering By Arora books? Storage: Keep them away from direct sunlight and in a dry environment. Handling: Avoid folding pages, use bookmarks, and handle them with clean hands. Cleaning: Gently dust the covers and pages occasionally.
- 5. Can I borrow books without buying them? Public Libraries: Local libraries offer a wide range of books for borrowing. Book Swaps: Community book exchanges or online platforms where people exchange books.
- 6. How can I track my reading progress or manage my book collection? Book Tracking Apps: Goodreads, LibraryThing, and Book Catalogue are popular apps for tracking your reading progress and managing book collections. Spreadsheets: You can create your own spreadsheet to track books read, ratings, and other details.
- 7. What are Irrigation And Water Power Engineering By Arora audiobooks, and where can I find them? Audiobooks: Audio recordings of books, perfect for listening while commuting or multitasking. Platforms: Audible, LibriVox, and Google Play Books offer a wide selection of audiobooks.
- How do I support authors or the book industry? Buy
 Books: Purchase books from authors or
 independent bookstores. Reviews: Leave reviews

- on platforms like Goodreads or Amazon. Promotion:

 Share your favorite books on social media or
 recommend them to friends.
- 9. Are there book clubs or reading communities I can join? Local Clubs: Check for local book clubs in libraries or community centers. Online Communities: Platforms like Goodreads have virtual book clubs and discussion groups.
- 10. Can I read Irrigation And Water Power Engineering By Arora books for free? Public Domain Books: Many classic books are available for free as theyre in the public domain. Free E-books: Some websites offer free e-books legally, like Project Gutenberg or Open Library.

Greetings to puskesmas.cakkeawo.desa.id, your stop for a wide collection of Irrigation And Water Power Engineering By Arora PDF eBooks. We are devoted about making the world of literature reachable to every individual, and our platform is designed to provide you with a effortless and pleasant for title eBook getting experience.

At puskesmas.cakkeawo.desa.id, our goal is simple: to democratize knowledge and promote a love for reading Irrigation And Water Power Engineering By Arora. We are convinced that everyone should have admittance to Systems Study And Design Elias M Awad eBooks,

encompassing diverse genres, topics, and interests. By supplying Irrigation And Water

Power Engineering By Arora and a wide-ranging collection of PDF eBooks, we aim to strengthen readers to explore, learn, and immerse themselves in the world of books.

In the wide realm of digital literature, uncovering Systems Analysis And Design Elias M Awad sanctuary that delivers on both content and user experience is similar to stumbling upon a hidden treasure. Step into puskesmas.cakkeawo.desa.id, Irrigation And Water Power Engineering By Arora PDF eBook download haven that invites readers into a realm of literary marvels. In this Irrigation And Water Power Engineering By Arora assessment, we will explore the intricacies of the platform, examining its features, content variety, user interface, and the overall reading experience it pledges.

At the core of puskesmas.cakkeawo.desa.id lies a wide-ranging collection that spans genres, serving the voracious appetite of every reader. From classic novels that have endured the test of time to contemporary page-turners, the library throbs with vitality. The Systems

Analysis And Design Elias M Awad of content is apparent, presenting a dynamic array of PDF eBooks that oscillate between profound narratives and quick literary getaways.

One of the distinctive features of Systems

Analysis And Design Elias M Awad is the organization of genres, creating a symphony of reading choices. As you explore through the Systems Analysis And Design Elias M Awad, you will come across the intricacy of options — from the structured complexity of science fiction to the rhythmic simplicity of romance. This assortment ensures that every reader, irrespective of their literary taste, finds Irrigation And Water Power Engineering By Arora within the digital shelves.

In the domain of digital literature, burstiness is not just about assortment but also the joy of discovery. Irrigation And Water Power Engineering By Arora excels in this interplay of discoveries. Regular updates ensure that the content landscape is ever–changing, presenting readers to new authors, genres, and perspectives. The unexpected flow of literary treasures mirrors the burstiness that defines human expression.

An aesthetically attractive and user–friendly interface serves as the canvas upon which Irrigation And Water Power Engineering By Arora illustrates its literary masterpiece. The website's design is a showcase of the thoughtful curation of content, presenting an experience that is both visually engaging and functionally intuitive. The bursts of color and images harmonize with the intricacy of literary choices, forming a seamless journey for every visitor.

The download process on Irrigation And Water
Power Engineering By Arora is a concert of
efficiency. The user is acknowledged with a
straightforward pathway to their chosen eBook.
The burstiness in the download speed
guarantees that the literary delight is almost
instantaneous. This effortless process
corresponds with the human desire for quick
and uncomplicated access to the treasures held
within the digital library.

A crucial aspect that distinguishes

puskesmas.cakkeawo.desa.id is its dedication to
responsible eBook distribution. The platform
rigorously adheres to copyright laws, assuring
that every download Systems Analysis And
Design Elias M Awad is a legal and ethical effort.

This commitment adds a layer of ethical complexity, resonating with the conscientious reader who values the integrity of literary creation.

puskesmas.cakkeawo.desa.id doesn't just offer Systems Analysis And Design Elias M Awad; it cultivates a community of readers. The platform supplies space for users to connect, share their literary ventures, and recommend hidden gems. This interactivity injects a burst of social connection to the reading experience, raising it beyond a solitary pursuit.

In the grand tapestry of digital literature, puskesmas.cakkeawo.desa.id stands as a dynamic thread that integrates complexity and burstiness into the reading journey. From the subtle dance of genres to the swift strokes of the download process, every aspect reflects with the dynamic nature of human expression. It's not just a Systems Analysis And Design Elias M Awad eBook download website; it's a digital oasis where literature thrives, and readers start on a journey filled with pleasant surprises.

We take pride in curating an extensive library of Systems Analysis And Design Elias M Awad PDF eBooks, meticulously chosen to satisfy to a broad audience. Whether you're a fan of classic literature, contemporary fiction, or specialized non-fiction, you'll find something that engages your imagination.

Navigating our website is a piece of cake. We've crafted the user interface with you in mind, ensuring that you can easily discover Systems Analysis And Design Elias M Awad and get Systems Analysis And Design Elias M Awad eBooks. Our search and categorization features are easy to use, making it straightforward for you to discover Systems Analysis And Design Elias M Awad.

puskesmas.cakkeawo.desa.id is dedicated to upholding legal and ethical standards in the world of digital literature. We prioritize the distribution of Irrigation And Water Power Engineering By Arora that are either in the public domain, licensed for free distribution, or provided by authors and publishers with the right to share their work. We actively oppose the distribution of copyrighted material without proper authorization.

Quality: Each eBook in our selection is meticulously vetted to ensure a high standard of quality. We aim for your reading experience to

be pleasant and free of formatting issues.

Variety: We consistently update our library to bring you the newest releases, timeless classics, and hidden gems across fields. There's always a little something new to discover.

Community Engagement: We value our community of readers. Connect with us on social media, discuss your favorite reads, and join in a growing community passionate about literature.

Whether you're a passionate reader, a learner in search of study materials, or an individual venturing into the realm of eBooks for the first time, puskesmas.cakkeawo.desa.id is here to provide to Systems Analysis And Design Elias M Awad. Join us on this literary adventure, and let the pages of our eBooks to transport you to new realms, concepts, and experiences.

We grasp the excitement of uncovering something new. That's why we frequently update our library, ensuring you have access to Systems Analysis And Design Elias M Awad, celebrated authors, and hidden literary treasures. With each visit, anticipate new opportunities for your perusing Irrigation And

Water Power Engineering By Arora.

Gratitude for selecting puskesmas.cakkeawo.desa.id as your reliable

destination for PDF eBook downloads. Delighted reading of Systems Analysis And Design Elias M Awad