ABSTRACTS

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Organoids as models for tissue engineering and biomedical applications

(pages 113-119)

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Keywords: organoids, drug delivery, biomedical engineering.
Abstract: Collagen, the primary structural protein in the extracellular matrix, has gained significant attention as a surface modification agent for biomaterials due to its exceptional biocompatibility, bioactivity, and ability to promote cellular adhesion and proliferation. Collagen coatings enhance the integration of synthetic and natural biomaterials with biological tissues, making them highly relevant in biomedical engineering, regenerative medicine, and implantable medical devices. This review explores the mechanisms by which collagen coatings improve biomaterial properties, including their role in modulating surface chemistry, hydrophilicity, and cellular interactions. Furthermore, we discuss various coating techniques, such as adsorption, covalent binding, and electrospinning, and their implications for optimizing material performance in biomedical applications. The advantages of collagen coatings in orthopedic, dental, and cardiovascular implants, as well as wound healing and drug delivery systems, are also examined. By highlighting the potential of collagen-functionalized surfaces, this article provides insight into the future directions of biomaterial innovation aimed at improving patient outcomes and medical device efficacy.

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Analytical solution for optimizing pollution load capacity in river segments

(pages 121-126)

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Keywords: pollution load, loading capacity, decay coefficient, dispersion, analytical solution.
Abstract: The problem of determining the pollution load capacity for a river section has an important meaning in protecting the water environment for the purpose of sustainable development. This is a complex optimization problem that only has an analytic solution in simple cases. This paper presents a method for obtaining an analytical solution for a river section in the case of dispersed waste sources distributed along the river, taking into account the influence of decay and dispersion processes. The results show a quantitative relationship between the decay coefficient, the dispersion coefficient and the load capacity of the river. The obtained results can be applied to more complex real-world problems.

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Impact of weather conditions on forecasting the number of road accidents in Poland

(pages 127-136)

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Keywords: traffic accident, pandemic, weather conditions, forecasting, exponential smoothing.
Abstract: The incidence of road traffic accidents in Poland remains significantly high. When compared to the average levels recorded across European Union (EU) member states, Poland's rate is approximately 1.3 times greater. The COVID-19 pandemic contributed to a temporary reduction in road accidents. The primary objective of this study is to forecast the number of road accidents in Poland under varying weather conditions. The analysis is based on monthly accident data for the years 2007-2021, obtained from national police records. Using this historical data, projections for the years 2022-2024 were developed. The findings suggest that, despite minor downward trends, the level of road traffic incidents is likely to remain comparable to pre-pandemic patterns. It is important to note, however, that the pandemic has introduced distortions that may affect the accuracy of the forecast. The predictive analysis was conducted in Statistica using selected time series models. Forecasts for 2022-2024 reveal that the majority of accidents are expected to occur under favorable weather conditions, with an average of 24,342 incidents. This is likely associated with increased traffic volume during such conditions. Nevertheless, extreme weather events pose heightened risks: heavy rainfall can lead to as many as 4,347 accidents, while strong winds may contribute to up to 12,880 incidents. Additionally, intense sunlight—through reduced visibility—accounts for an average of 4,150 accidents annually. Although fog and snowfall are less frequent (averaging 109 and 352 incidents respectively), they represent particularly hazardous conditions due to compromised road traction.

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Logistical aspects of mining rescue in Slovakia – status, challenges and perspectives

(pages 137-140)

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Keywords: mining rescue, logistics, occupational safety, emergency service, Slovakia.
Abstract: Mining rescue in Slovakia represents a specific component of the rescue system with a long tradition and a significant position in the field of occupational health and safety. Its main task is to resolve underground emergencies, including accidents, collapses, fires or gas leaks, while the activities of mining rescue workers require high professional preparedness and logistical coordination. The article focuses on the analysis of the strengths and weaknesses of the mining rescue system in Slovakia with regard to organizational, technical, logistical and social aspects. The paper presents findings from literature, legislation and practical experience, supplemented by the international context and recommendations for further development.

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Glance on maze wanderer robot

(pages 141-146)

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ABSTRACTS

Keywords: robotic maze wanderer, design, deployment.
Abstract: Intelligent machines that can perform tasks that they have been programmed to perform are called robots. They have demonstrated importance in reducing the amount of human labour, particularly in industries. Robots are the technological advancement that would undoubtedly make life easier and more convenient. The design, programming, and implementation of a maze-wanderer robot that uses obstacle avoidance to determine its motion direction are the main topics of this paper. The robot's intelligence will be provided by a program. Additionally, the paper will be limited to a motorized vehicle that has been endowed with the intelligence to successfully navigate a specific maze.

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Impact of green logistics and its significant importance in SCM operations-overall glance

(pages 147-152)

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Keywords: green logistics, enhancing efficiency, carbon emissions, sustainable logistics.
Abstract: Green logistics is a term that is important in the context of logistics management operations that have an influence on the environment. Green logistics focusses on systematically measuring, analyzing, and reducing the environmental effect of logistics. This covers every action related to the forward and backward flow of information, products, and services from the point of origin to the point of consumption. Green inventory management, green facility placement, the operational effects of environmental restrictions, ethical purchasing, green technology selection, and eco-design principles are all related to it. It seeks to use a balance between environmental and economic efficiency to build a sustainable firm value. For a sustainable global future, green logistics must be implemented. An attempt has been made in this article to survey the significance of green logistics in the current technological landscape. In order to gather data regarding the application of green logistics in organizations, the survey form has been created to include respondents of all ages.