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A TEXTBOOK OF **BUSINESS COMMUNICATION**



Mr. Jeetendra Barulkar



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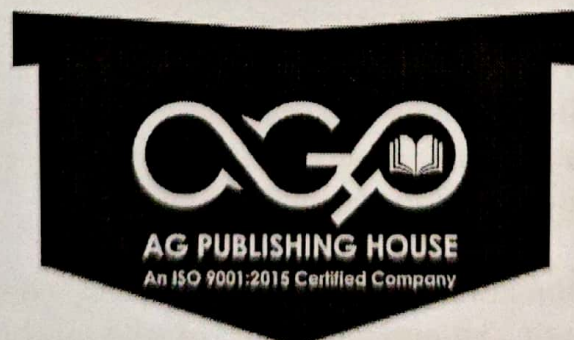


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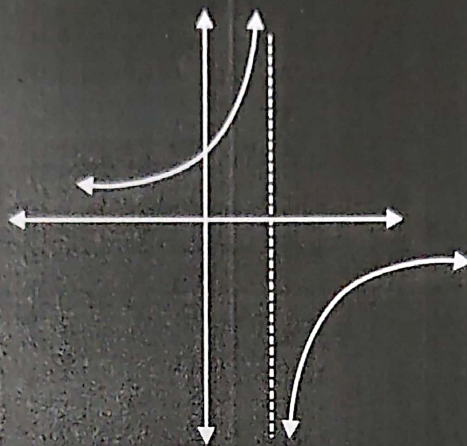
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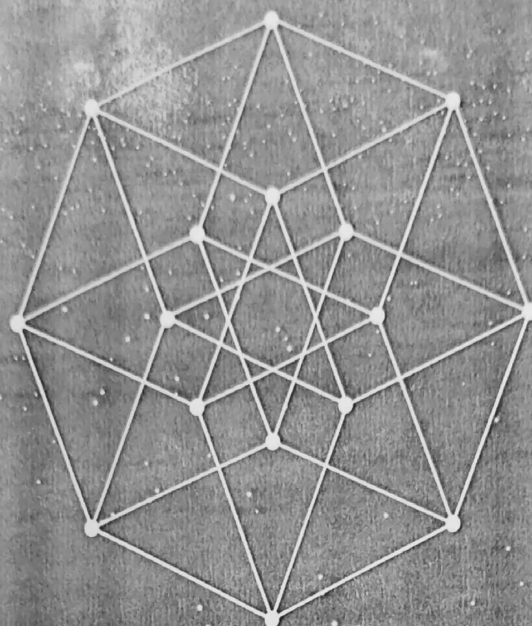
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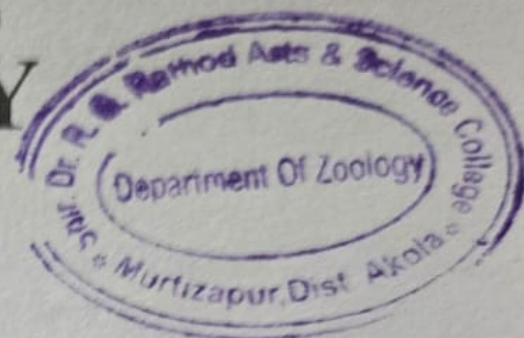
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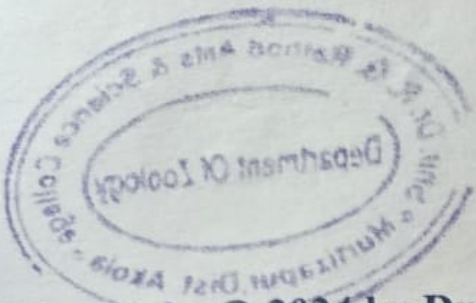
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Semester - IV

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ABSTRACT

Pollution by toxic and harmful chemicals, particularly, dyes and pigments has been a serious global issue and expected to be worsening in coming years. The effluents from textile, paper, printing, electro-plating, pulp, cosmetics, pharmaceuticals and food industries are the major source of water pollution and jeopardizing the natural resources. Discharging of organic dyes in the water bodies has made significant hazardous impact on the aquatic life by blocking the penetration of sunlight. Therefore, the removal of dyes from the industrial effluents, before their discharged into the aquatic bodies and surrounding environment, is gaining large attention. The futuristic challenges are focusing on the science of interface between the pollutants in the water and the materials to be used for their efficient removal in sustainable and affordable manners. Over the past two decades, several approaches have been developed for removal of dyes; among them, adsorption has been recognized as one of the fast, inexpensive and effective method. A number of adsorbent materials such as clays, zeolites, wool fibres, bio-mass, synthetic and bio-polymers, activated carbon etc. have been used for water purification. Carbon-based nanomaterials are gaining immense interest as adsorbents owing to their high adsorption capacity. Herein, high surface area containing carbon-based material were addressed as a novel material for adsorption of malachite green (MG), safranin (SF), phenol red (PR), and bromophenol blue (BB) dyes. The adsorption of dyes in the simulated waste water was monitored using a UV-visible spectrophotometer and visual observations. Further, the dyes adsorption capacities of used materials were compared with previously reported materials.

Holographic Dark Energy Cosmological Model in $f(R)$ Theory of Gravitation

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Abstract

In this investigation, we examine the Bianchi Type III Universe within the context of the $f(R)$ theory of gravity. To derive meaningful insights, the Field Equations are resolved by using power law relationship between F and ' a ' and by establishing the relationship between the metric potential B^n and C . Furthermore, we advance our understanding by developing important cosmological parameters such as the deceleration parameter and the Dark energy density parameter, total energy density parameter. Through this analysis, we study the physical characteristics and behaviour of this model.

Keywords: - Holographic Dark Energy (HDE), $f(R)$ Gravity, Bianchi Type III, Cosmological Parameter.

1. Introduction

Einstein's general theory of relativity has provided a complex explanation for the phenomenon of gravitation, proving to be highly effective in its description. Additionally, it has served as the basis for various models of the universe. However, Einstein himself acknowledged that the general relativity falls short in adequately accounting for the fundamental properties of matter. As a result, there have been intriguing efforts in recent years to expand upon the general theory of relativity by incorporating specific desired characteristics that were absent in the original theory. Notably, recent observations in cosmology [1] have played a crucial role in enhancing our comprehension of the late-time cosmic acceleration. This accelerated expansion of the universe strongly indicates the existence of a negative pressure originating from an exotic form of dark energy. The origin of dark energy holds significant importance in modern cosmology, and several proposed solutions aim to unravel this perplexing puzzle. One such solution is the holographic dark energy (HDE) model [2-3], which suggests that the dark energy density can be represented by the equation, $\rho_{DE} = 3d^2 M_P^2 L^{-2}$ where d is a numerical factor approximately equal to unity, M_P represents the reduced Planck mass $M_P^2 = 1/8\pi G$, and L denotes the event horizon of the universe.

Recent advancements in science, particularly in the fields of astronomy, astrophysics, cosmology, data science, and space science, have significantly contributed to our understanding of the universe. Observations have provided strong evidence that our universe is expanding at an accelerated rate [4-11]. This phenomenon is believed to be influenced by 'Dark Matter' (DM) and 'Dark Energy' (DE), which are yet to be fully understood. The exploration of alternative gravitational theories beyond Einstein's General Relativity (GR) has become crucial in addressing fundamental challenges related to quantum gravity, dark energy, and dark matter. Although GR has been successful in many aspects, it still faces unresolved issues such as singularities and the nature of DE and DM. These challenges have prompted researchers to seek modifications or extensions of GR that can address its limitations across both ultraviolet (UV) and infrared (IR) scales [12]. One such approach is the $f(R)$ gravity theory, which offers an intriguing generalization of the Einstein-Hilbert action by replacing the Ricci scalar, R , with an analytic differentiable function. This extension is motivated by the need to formulate quantum field theories on curved spacetime [13]. The $f(R)$ gravity theory has



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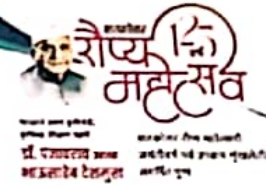
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Complex analysis of essential Soil mensuration properties as soil data sets and its relationship identification for designing prediction system using PCA

Dr.Maya V.Mawale

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Dr.Deepak Mohekar

Senior Technical Officer, ICAR-NBSS&LUP, Nagpur

Dr.N.G.Patil

Director of ICAR-NBSS&LUP, Nagpur

Abstract

This study was carried out to predict meaningful information from large set of soil micronutrient and macro nutrient values as parameters and represented in graphical manner for clear understanding. This complex analysis helps in determining role of dependent variable and independent variable and their relationships, their dependability for designing any prediction system.

Analysis process is carried out to collect information for assessing soil parameter. Soil parameters analysis is done on 108 soil samples collected from ICAR-NBSS & LUP, Nagpur. The values of EC, CaCo₃, CEC, N, P, K, Cu, Fe, Mg, Zn, Mn, Bulk Density and pH of soil sample collected for the year 2022-2023 and Principle Component Analysis (PCA) is done to predict these soil parameters as a dependent and independent parameter that have direct/indirect effects on Nutrient Holding Capacity(NHC).

Keywords

complex analysis, soil parameter, Principle Component Analysis, Cu_copper, Fe_iron; ; K_potassium; Mn_manganese; OC_organic content: P_phosphorus; Zn_zinc.



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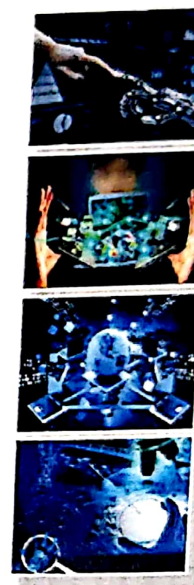
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