2ND INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT IN CIVIL ENGINEERING

December 5th- 7th, 2019

ICSDC 2019

CONFERENCE ABSTRACT BOOK

Organized by

Department of Civil Engineering &
Institute of Environmental Engineering & Management
Mehran University of Engineering and Technology,
Jamshoro, Sindh-Pakistan

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PREFACE

Mehran University of Engineering and Technology (MUET) is an ISO-9001 certified institute that has been active in 20 domains of engineering constituting 31 departments, institutes, directorates offering courses in undergraduate and postgraduate studies since 1963. It is emerging as one of the leading universities of the country ranked by Higher Education Commission and Pakistan Engineering Council. The university has academic alliance with leading universities around the globe, and industrial collaboration with various establishments across the country.

In order to provide a platform to all the collaborators coming from academic organizations, policy makers, public and private institutes to discuss their technical and general issues, Mehran UET organizes conferences, workshops and seminars regularly. In this framework, Department of Civil Engineering and Institute of Environmental Engineering & Management are hosting "2nd International Conference on Sustainable Development in Civil Engineering" (ICSDC-2019), which will be held in Mehran UET, Jamshoro, Pakistan during December 05-07, 2019.

The Department of Civil Engineering is one of the oldest and largest department of the University, which has produced tens of thousands of engineers working diligently in various academia and industrial sectors. It aims to produce top-level engineers who maintain the integrity and glory of their profession.

The aim of ICSDC-2019 is to provide sustainable platform to present and discuss all the latest research and scientific results on various disciplines of Civil and Environmental Engineering, i.e. Structural Engineering, Geotechnical Engineering, Water and wastewater Treatment Technologies, Construction Management, Solid Waste Management, Green Energy Technology etc. This conference provides opportunities for the delegates to exchange new ideas and experiences to establish research and business relations and to find global partners for future collaboration.

ICSDC-2019 has been triumphant in attracting participants from public and private universities, organizations and industries of Pakistan as well as national and international keynote speakers from around the globe.

ACKNOWLEDGEMENT

The organizing comminutes of the "2nd International Conference on Sustainable Development in Civil Engineering 2019 acknowledges the collaboration and support of the Higher Education Commission (HEC), Pakistan Engineering Council (PEC), Pakistan Science Foundation (PSF), Bahria Town, Karachi, Omni Power (Pvt.) Ltd., M/S Palm, Builders and Developers, and other sponsors.

The active participation of the National and International keynote speakers, authors and participants is highly appreciable who made the event eminent.

Also acknowledge the efforts of following individuals which were involved in composing, editing and printing of abstract book.

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High gratitude for rigorous efforts of conference organizing committees.

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KEYNOTE SPEAKERS


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Prof. Sherif Mohamed

Prof. Sherif Mohamed is an educator and experienced researcher with a strong blend of technical and management skills and formal qualifications gained through an international background in industry, government and university environments. At the industry level, he is a chartered professional civil engineer with over 25 years sound experience in construction and project management. He has gained international experience through application of these skills in the Middle East, United Kingdom, South-East Asia and Australia. He holds a Master as well as Doctorate degrees from the University of Southampton, the U.K. Prof. Mohamed is the Founding Director of the Research Center for Infrastructure Engineering and Management at Griffith University, Australia. He is currently serving as Head of School in School of Engineering and Built Environment at Griffith University, Australia.

BUILDING FLEXIBILITY IN PROCEDURES OF CONSTRUCTION SITE: BUDGING FROM DEFENSIVE SAFETY TO PRODUCTIVE SAFETY

Abstract: This demonstration exhibits a strong argument for moving past compliance and simultaneously it challenges the customary way of thinking about Safety of Construction. Globally, construction institutes adopt a system of safety management that is grounded on 4E's (Environment: *hazard identification*, Engineering: *risk reduction*, Education: *awareness*; and Enforcement: *regulations and policies*. Without much contest, this well-tested system has endured for many years. Nevertheless, recent works on organizational sense-making, complexity theory and adaptive systems have delivered a fresh theoretical lens through which, we can inspect construction safety. Systematizing the ways of doing things to avoid failure, Safety Management Systems focus on guarding people from failure. This presentation identifies that circumstances on site vary each time, so the attention should be on how people regulate their performance under different state of affairs to make sure they do the right thing. In other words, directing to build flexibility in site operations of construction in order to react to the frequently changing conditions would eventually lead to effective safety outcomes. People would need to be authorized to actively observe and select indications in a changing situation and narrate them to a wider frame of reference (and not a standard procedure) to create a practical and harmless environment for everyone, to enable building flexibility. The presentation highlights on how an alliance of sense-making and adaptive systems had the capability to mitigate unnoticeable risks on construction sites

Dr. Norwati Bt Jamaluddin

Dr. Norwati Jamaluddin is an Associate Professor in department of Structural and Material Engineering, Faculty of Civil & Environmental Engineering, Universiti Tun Hussein Onn Malaysia (UTHM), Malaysia. She has completed Masters of Structural Engineering from Universiti Teknologi Malaysia (UTM), Malaysia (2003) and PhD from University of Leeds, United Kingdom (2011). She has also served as a Structural Engineer (as part of Industrial Attachment) in HLA group of Companies. Her research interests include Steel Structural, Composite Steel-Concrete Structural, and Finite Element Modeling. Moreover, she has been part of following professional societies: CSM, IAPS, MSSA, BEM, & MPA. She also has vast experience in the field of Management while serving in Fakulti Kejuruteraan Awam dan Alam Sekitar.

SUSTAINABLE DEVELOPMENT IN STRUCTURAL ENGINEERING BY ADOPTING SELF-COMPACTING CONCRETE (SCC) ALONG WITH CONCRETE FILLED TUBE (CFT)

Abstract: The concept of Sustainable Development is decades old, yet again its implementation has been in vain. As per recent research and surveys, structural engineering has the finest scope to utilize numerous materials which can result in saving of raw materials. Self-compacting concrete has resulted self-consolidation and helps in filling up the voids. This has been a new research in the field of Structural Engineering and is directly upholding the principles of Sustainable Development. There are multiple opportunities to develop SCC by utilizing recycled waste material or other additives in concrete. However, different parameters of environment must be considered while making this possible, like hazardous waste often make their way into the mixture which makes it unsustainable for use. Concrete filled tube, on the other hand, is the phenomenon to be used to determine axial compressive behavior, length of column, and strength. It involves the usage of different Code of Practice to make it in line with the standards. In order to avoid the release of Acoustic Emission, which is the release of high frequency stress wave generated after release of high energy, no change must occur during crack initiation and growth. High sensitivity to crack growth, the ability to locate the source, its passive nature and the possibility to perform real-time monitoring are some of the attractive features of the AE technique. In spite of these advantages, challenges still exist in using the AE technique for monitoring applications, especially in the analysis of recorded AE data as large volume of data are usually generated during the monitoring process.

Keywords: Self-Compacting; Concrete; SCC; CFT; Concrete-filled; Structural; Engineering; Civil-Engineering.

Dr. Pramod Thakur

Dr. Pramod Thakur is a Registered Professional Engineer of Queensland (RPEQ) and Chartered Professional Engineer (CPEng) with over 15 years of experience in the field of geotechnical engineering, predominantly on civil infrastructure projects. He has been involved in a wide range of multi-disciplinary projects for clients such as Transport and Main Roads (TMR) Queensland, Local Governments (Councils), New Zealand Transport Agency, Wellington Water and GHD internal clients. His primary skills are in geotechnical investigation, design, construction support, project management, and business development. He has specialized expertise in shallow foundation design, deep foundation design (driven and bored piles, sheet pile, micro pile etc.), soil nail and anchor design, slope stability analysis and design (embankments, cuts, natural slopes, slope failures), retaining structures design (RSS wall, gravity retaining wall, piled wall etc.), ground improvement (remove and replace, surcharging, wick drains, soil cement mixing, stone column etc.), liquefaction potential analysis and mitigation measure design, numerical modelling. He is an experienced user of commercial geotechnical software such as: SLOPE/W, PLAXIS, WALLAP, FLAC, CIRCLY, GRLWEAP, PIGLET, LPILE, RocLab, PHASE2, DIPS, SLIDE, gINT etc.

GROUND IMPROVEMENT WORKS FOR ROAD CONSTRUCTION IN QUEENSLAND AUSTRALIA

Abstract: Ground improvement works are an important aspect of a road infrastructure design and construction. If appropriate methodology and technology are not adopted, construction costs and duration can increase significantly. The presentation describes about the methodologies adopted to improve ground conditions for two road construction projects in Queensland, Australia. One project used the Platypus Anchor system to improve factors of safety in global stability of a road embankment while the second used Rapid Impact Compaction to compact landfill material to reduce long-term compressibility. Various challenges experienced during the construction of these projects together with methodology to overcome the issues will be discussed.

Keywords: Ground Improvement, Rapid Impact Compaction, Global Stability, Compressibility

Prof. Dr. Kypros Pilakoutas

Prof. Kypros Pilakoutas is the Professor of Construction Innovation and Director of the Centre for Cement and Concrete at the University of Sheffield. He obtained his degrees at Imperial College, London, and he was awarded the title of Doctor Honoris Causa by the Technical University of Iasi, where he is also a Visiting Professor. He is also a visiting professor at the Cyprus University of Technology and University of Science and Culture, Tehran. His research is in the fields of structural concrete, FRP, FRC, repair, construction innovation and earthquake engineering. He has over 500 papers and reports; mostly in refereed journals and conferences.

He led research contracts in excess of €20M including >20 EU projects. These include major multi-partner projects such as "Eurocrete", "ConFibreCrete", "Encore", "Ecolanes" "Bandit", "Endure and Anagennisi, with more than 40 international partners. He sits or leads many International Committees, edits/reviews papers for top International journals, participates in scientific committees, chairs sessions in the main conferences in his field and is invited to present keynote papers. He advises internationally (+20 countries) on promotions, research exercises, national standards and major grant reviews. He is a Director of two technologies spin-out companies. He has over 30 patents awarded. Three of his patents are commercially exploited worldwide.

TOTAL RECYCLING OF TYRE COMPONENTS IN CONCRETE

All end-of-life tyre constituents (rubber, steel wire and textile reinforcement) are high quality materials and the work presented aimed to recycle and use them as reinforcement in structural concrete applications. Rubber particles were used to substitute mineral aggregates in concrete and develop Rubberised Concrete (RuC), which when confined with Aramid/Carbon FRP (CRuC), it led to compressive strengths of up to 90 MPa and, more significantly, axial deformations of up to 6%. The seismic performance of RC medium/large scale piers improved the energy dissipation up to 50% and increased ductility up to 25% - (compared to unconfined RuC). Recycled Tyre Steel Fibres (RTSF) were found to be able to partially replace manufactured steel fibres and to increase the flexural strength of concrete. The best flexural performance was found from hybrid mixes, indicating that mixes containing both RTSF and manufactured fibres (MSF) can show better flexural performance than MSF-only mixes at the same fibre dosage. Steel Fibre Reinforced Rubberised Concrete (SFRRuC) can offer a concrete pavement system that has similar flexibility to flexible pavements, flexural strength similar to rigid concrete pavements and good durability properties and freeze & amp; thaw resistance. When subjected to elevated temperatures, Recycled Tyre Polymer Fibre (RTPF) reinforced concrete showed remarkable resistance to spalling, confirming the potential of these fibres for fire-induced concrete spalling mitigation.

Prof. Dr. Jahangir Mirza

Prof. Dr. Jahangir Mirza (speaks 6 languages: English, French, German, Hindi, Punjabi and Urdu), has over 35 years of Applied Research and Development (R & D) as well as teaching experience. He has expertise in Advanced Sustainable Construction Materials covering Civil Engineering, Environmental Sciences and Engineering, Chemistry, Earth Sciences, Geology, Architecture departments, etc. His major experience includes: 1985 till present: Senior Scientist**,** Research Institute of Hydro-Québec (IREQ), Montreal, Canada. Sept. 2018 till present: Visiting Research Professor, Environmental Engineering program, School of Engineering, University of Guelph, Ontario, Canada: "Conduct research on reuse of incineration". May 2014 till June 2016: Professor**,** UTM Construction Research Centre, Faculty of Civil Engineering, Universiti Teknologi Malaysia, Johor Bharu, Malaysia. 1992-2000: Adjunct Professor**,** Dept. of Civil Engineering and Applied Mechanics, McGill University, Montreal, Canada. 1981 – 1984: Research Scientist**,** Canada Cement Lafarge Ltd.

ALKALI-ACTIVATED GEOPOLYMER MORTARS CONTAINING HIGH VOLUME CERAMIC TILE WASTE POWDER AND FLY ASH REPLACING GBFS

Abstract: Traditional Portland cement can be effectively substituted by alkali-activated geopolymer binders. Not only can alkali-activated binders save energy and reduce CO2 emission but they can also augment the durability performance of concrete as well as aid in resolving the landfill problems. It is well-known that extensive quantities of calcined clay waste are created every year by the ceramic industry, of which a significant amount is used in landfills. It is thus more appropriate to reuse this waste efficiently. This study investigated the impacts on sustainability of ceramic tile waste powder (CTWP) based alkali-activated mortars (AAMs) incorporating fly ash (FA) as a replacement of ground blast furnace slag (GBFS), which were exposed to various hostile environments. Binders were prepared by maintaining the CTWP content at 50% in all alkali-activated mortars (AAMs) and FA replacing GBFS by 10%, 20%, 30%, and 40%. Durability properties were evaluated which included elevated temperatures, sulphate and acid attack, drying shrinkage, freezing-thawing and wet-dry cycles, as well as water permeability. The findings suggested that freezing-thawing resistance increased and better durability was displayed by increasing the FA content in AAMs. Furthermore, AAMs with high FA content led to enhance the performance in terms of sulphate and acid environments and elevated temperatures. Apart from the increased durability replacing GBFS with FA and containing 50% CTWP, alkali-activated geopolymer also resulted in a decrease in energy consumption and cost as well as CO2 emission.

Dr. Ali Gul Qureshi

Dr. Ali Gul Qureshi is an associate professor in the Department of Urban Management at Kyoto University, Japan. His basic education is in civil engineering with specializations in transportation engineering, logistics and operations research. His research interests are related with exact and heuristics optimization of different variants of vehicle routing and facility location problems, their integration in different frameworks such as multi-agent systems, and their application in evaluation of city logistics measures. His recent research also relates with humanitarian logistics after disasters. Course Taught by Dr. Ali Gul Qureshi is Sustainable Urban Freight Transport.

VEHICLE ROUTING PROBLEM IN CITY LOGISTICS

Abstract: The main aim of urban planning systems is to create a sustainable urban environment. It is usually achieved by dividing the city in various land use areas and by setting certain restrictions on developments types in each of them. For example, residential areas are usually assigned further away from heavy industry zones. The interaction between land use planning and the passenger transportation has received a lot of attention in the research and practice. However, the interaction between land use planning and the design of urban logistics systems has only been restricted to the location of warehouses and distribution centers (*1*, *2*). The size, location and density of such freight facilities along with the land use pattern will affect the freight systems (such as central vs. satellite distribution) and the type of vehicles used for transportation (i.e. large and/or small trucks) (*3*). It has been found that the industrial land use developments often lead to freight shipment traffic increment, impacting the neighboring transportation network (*4*). As the last-mile delivery in the urban logistics system is mostly carried out using trucks and vans, it contributes heavily in the typical traffic-related problems such as congestion, idling and environmental emissions (*5*) as well as increase the probability of freight vehicles-related crashes (*6*). City logistics aims at the mitigation of these ill-effects considering both public and private costs (*7*) with the introduction of various policies and schemes such as cooperative delivery systems (*8, 9*), and road pricing of urban freight (*10*). Route optimization is also one of the city logistics schemes, which can also be used as a tool for evaluating many earlier-mentioned city logistics initiatives.

Since its inception in 1959 (*11*), the Vehicle Routing Problem (VRP) has attracted many researchers and a number of variants have found their way in the literature based on inclusion of different practical constraints. Addition of the time windows constraints leads to the vehicle routing problem with time windows (VRPTW) (*12*). Whether or not a delayed service with penalties is allowed, VRPTW further extends to its soft time windows (*13*, *14*) and hard time windows variants (*15*), respectively. The Vehicle Routing and scheduling Problem with Soft Time Windows (VRPSTW) can be used for optimized and efficient logistics operations (*16*). It consists of finding a set of minimum cost routes (for delivery vehicles) to cover demands (weights to be picked up or delivered) of all customers within their specified time windows [a_i,

b_i]. If a vehicle arrives earlier it has to wait (without associated cost) until the start of time windows (a_i); whereas, the delivery after b_i is only allowed at some penalty cost. Minimization of the operation cost is used as the main objective in the VRPSTW, irrespective of the footprints of resulting vehicle routes in the urban areas. The environmental benefits are mostly obtained as a by-product based on the minimization of the traveled distance. In earlier studies, it has been found that even a simple optimization may result in better overall cost and less environmental impacts as compared to the actual operation of the urban freight vehicles (*17*). The behavior of freight carriers is often modelled by the VRPSTW with the main objective of minimization of total operation cost. On the other hand, better living environment (less traffic, less emissions, better road safety) is the main concern for the other stakeholders of city logistics (such as administrators and residents) (*18*). This paper presents some of the variants of VRPTW researched by the authors in the field of city logistics, which also include a range of rich VRPTWs aimed to reduce environmental footprint of the freight deliveries in residential areas, and improving the safety and environmental concerns around some of the sensitive urban facilities.

Dr. Marla M. Redillas

Dr. Marla M. Redillas is an Associate Professor and Head of the Hydraulics and Water Resources Division, Civil Engineering department De La Salle University, Manila, the Philippines. She has been professional Civil Engineer for more than 12 years. She has done her Masters (2009) and PhD from Kongju National University, Cheonan, South Korea (2012). Moreover, she has conducted research in 13 domestic research projects. Her research interests include water quality; diffuse/non point source pollution characterization and management/control; urban/agricultural storm water runoff treatment using constructed wetland, structural best management practices (BMPs), low-impact development (LID), and green infrastructure (GI) technology. She has also served as Secretary in International Relations Committee, Korean Society of Hazard Mitigation (KOSHAM). She is currently a Board Member of the Diffuse Pollution and Eutrophication Specialists Group of the International Water Association (IWA). She was recently awarded as one of the Outstanding Young Scientist 2019 of the National Academy of Science and Technology (NAST) Philippines.

SUSTAINABLE DEVELOPMENT IN SMART URBAN CITIES

Abstract: Urban areas are faced with multiple problems like high-rise buildings and their pollution, roads, parking lots, vehicular non-point sources, and high loading rates of other pollutants. In this sorry state, sustainable development remains a mere distant dream. As per literature available, roads and paved buildings have high characteristics of stormwater run-offs, peak flow discharges, and high pollutant run-off. Infiltration trenches are also recommended to be used in order to provide first-hand pretreatment facilities. Roof land-use contains less pollutant possession than other similar types. Low-impact development (LID) is another method which could be applied in smart cities. Low-impact development is the leading management practice which regulates and treats stormwater runoff especially in highly impervious urban areas. Non-point pollution can be countered by using constructed wetlands. An infiltration trench equipped with an extensive pretreatment and filter bed consisting of woodchip, sand and gravel was utilized as a low impact development technique to manage stormwater runoff from a highly impervious road with particular emphasis on heavy metal removal. Apart from LID, bioretention is another method to avoid over-accumulation of pollutants within cities. It is composed of engineering plants and soil, wherein several processes occur thereby urban run-off is treated. It also results in nitrogen removal caused by the soil microbial activities, nitrification, de-nitrification and bioremediation.

Keywords: Stormwater; run-off; Smart-city; LID; Bioretention; Sustainable; Development

Dr. Maurizio Guadagini

Dr. Maurizio Guadagnini is a Senior Lecturer in the Department of Civil and Structural Engineering of the University of Sheffield. He has more than 20 years of research experience in the field of experimental mechanics and advanced modelling of concrete elements utilizing both conventional and novel enforcing systems. He is an active member of the International Federation for Structural Concrete (fib), within which he serves as secretary of Task Group 5.1 on FRP Reinforcement for Concrete Structures and contributes to the dissemination activities of Commission 9 of fib. Dr Guadagnini was the chair of COST Action TU1207 (Next Generation Design Guidelines for Composites in Construction), which coordinated the activities of more than 150 participants from 33 countries, and coordinator of the European funded MC ITN Network endure for Durable Reinforcement and Rehabilitation Solutions, which comprised 13 academic partners and 11 industry partners.

SEISMIC STRENGTHENING OF SUBSTANDARD BUILDINGS WITH COMPOSITE MATERIALS

This paper discusses the results from experimental programmes including shaking table tests on full-scale one-bay two-storey RC frames with poor detailing in the beam-column joints. The tests were performed on the AZALEE shake table at the Commissariat à l'Énergie Atomique (CEA) Laboratory in Saclay, France, as part of two EU-funded Projects that aimed to investigate the effectiveness of externally bonded carbon fibre reinforced polymer (CFRP) reinforcement in improving the seismic behaviour of substandard RC buildings. To simulate typical substandard construction, the reinforcement of columns and beam-column joints of the full-scale structures had inadequate detailing. After an initial series of shake table tests were carried out to assess the seismic behaviour of the bare buildings, columns and joints were repaired and subsequently retrofitted using CFRP for the ECOLEADER building, and a retrofitting solution consisting of CFRP and Post-Tensioned Metal Straps for the BANDIT building. The buildings were then subjected to incremental seismic excitations to assess the effectiveness of the retrofitting solutions at improving the global and local building performance. Whilst the original bare buildings were significantly damaged at a peak ground acceleration (PGA) of 0.15-0.20g, the retrofitted buildings resisted severe shake table tests up to PGA=0.50-0.60g without failure. Moreover, the retrofitting intervention enhanced the interstorey drift ratio capacity and has proven to be very effective at addressing the seismic deficiencies of substandard buildings.

Dr. Saim Memon

Dr. Saim Memon, Senior lecturer in Electrical Engineering at London South Bank University, London, UK. He studied BEng (hons) in Electrical Engineering (Mehran UET, Pk), MSc in Mechatronics (Staffordshire University, UK), PhD in Electrical and Electronic Engineering (Loughborough University, UK) and PGCert in Teaching Qualification FE (University of Aberdeen, UK). He is a Chartered Engineer and Fellow of Higher Education Academy having a Qualified Teacher status by General-Teaching-Council-for-Scotland (GTCS). Dr Saim has multi-disciplinary research/academic experiences in Electrical, Electronic, Solar-Thermal-Vacuum-Systems and Renewable-Energy Engineering. His research experiences are on energy-materials for vacuum-insulated-smart-windows, renewable energy technologies, thermoelectric-materials with vacuum-insulation and heat-storage for the improvement of electric-vehicles charging-efficiency. He has over 35 research publications in the form of high-impact-journals, book-chapter, conferences, book-editor, newsletters and vacuum science magazine. He secured funding worth of over £64k as a lead from H2020, Innovate-UK, The IET EEGS, DAIWA-Anglo-Japanese, RAEng participation and Newton-Fund participation grants. He is developing and presented his research findings in collaboration with leading scientists in the UK, Europe, Japan, Kenya, Thailand, Malaysia, Peru, USA, Russia and China.

RETROFITTING THE EXISTING DOMESTIC HOUSING STOCK WITH THE ENERGY-EFFICIENT SMART WINDOW TECHNOLOGIES

Abstract: Carbon footprint and energy efficiency of buildings are deemed to be the global concerns due to links with fuel poverty and climate change. There is also a solemn prospect of balancing the energy supply and energy demand. Smart Vacuum Insulated Glazing (VIG) is a quintessential development in the move to energy-efficient buildings because of the solar thermal energy transmittance through conventional windows (such as double or triple glazed windows) in the hot-arid countries causing an increase to internal cooling energy requirement such as in Pakistan. The reason vacuum glazing is smart is as it maintains the transparency, regardless of tiny pillar dots (0.13 mm high and 0.3 mm wide made of stainless steel allow), and its slim due its narrow vacuum gap (0.13 mm height) when compared to the conventional glazing. A vacuum gap essentially is a space, between two glass sheets, of reduced mass of atmospheric-air, thus air-density defines the level of the vacuum pressure. This provides solar thermal vacuum insulation, because with a lower density of air the mean free path between air molecules can be increased to above 1000 m, ultimately reduces the solar thermal flow between air molecules in a space. The space between two glass sheets is usually evacuated to high-vacuum pressure (0.13 Pa to 1.33·10-4 Pa) in order to reduce conductive and convective thermal transmittance to marginal levels, however the solar energy transmittance through radiation can only be minimized using low-emittance coatings or with electrochromic films. In this keynote talk the results of the experimental and theoretical investigations into the development of smart vacuum glazing along with the scope of semi-transparent PV (Building Integrated PV) with electrochromic thin films will be presented. The experimental and theoretical results of the performance of smart windows and how they would be beneficial in reducing the solar heat gains and reducing the energy requirement will be presented with a further scope of joint research collaboration with Mehran UET and the development of joint-venture in enhancing our international research portfolio will be discussed.

NATIONAL

KEYNOTE SPEAKERS


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Prof. Dr. Ehsanullah Kakar

Prof. Dr. Ehsanullah Kakar is engineering scientist and expert, especially in the field of Structural Engineering. Dr. Ehsanullah currently serving as the Vice Chancellor of Baluchistan University of Engineering and Technology, Khuzdar, Pakistan. Dr. Kakar has also served as Dean, Faculty of Engineering, BUET, Khuzdar. He did Doctor of Philosophy in Structural Engineering from Kharkiv National University of civil engineering and architecture, Ukraine.

ASSESSMENT OF UTILIZING MARBLE STONE DUST AND WOOD SAW DUST AS PARTIAL REPLACEMENT FOR CEMENT AND SAND IN CONCRETE

Abstract: Marble stone dust and wood saw dust have been used in concrete mixes as fractional replacement for fine and coarse aggregates separately in recent years. The increase or decrease in strength is due to the addition in the percentage of marble stone dust and wood saw dust. Studies have been conducted on determining the optimum marble stone dust and wood saw dust percentage to meet the desired strength of concrete in construction. In this study, marble stone dust (MSD) and wood saw dust (WSD) were used as partial replacement for cement and fine aggregate in concrete mix respectively. The test samples were prepared by replacing 0%, 2%, 4%, and 6% of cement and fines by weight of concrete with MSD and WSD. The combined effect of MSD and WSD on the workability, compressive strength and flexural strength of concrete was investigated. It was found that both compressive and flexural strength gradually decrease with increase in the percentage of marble stone dust and wood saw dust.

Keywords: Concrete; Marble Stone Dust; Wood Saw Dust; Compressive Strength; Workability

Prof. Dr. Bashir Alam

Engr. Prof. Dr. Bashir Alam has 27 years of experience in teaching, research and consultancy. He did Doctor of Science in Structural Engineering from George Washington University USA and has more than 60 research publications in national and international journals. He is member Governing Body Civil KP Pakistan Engineering Council and served as Professor, Consultant, Chairman Department of Civil Engineering, Director P&D, member Syndicate, member F&PC, convener/expert PEC Accreditation team and member HEC Expert team.

ROLE OF CIVIL ENGINEERING IN RESHAPING SOCIETIES AND ECONOMIES

Abstract: Civil engineering profession has played vital role in reshaping societies and economies for the better. Civil engineers provide basic infrastructure facilities needed for the society and are concerned with four aspects, Quality, Productivity, Safety and Economy (QPSE). It is becoming more and more challenging to meet the specification requirements for QPSE on this planet having finite natural resources where the human population as well as the rate of resource consumption per person are growing. This cannot continue indefinitely and the engineers of 21st century must focus on sustainable development with the goals to minimize the depletion of natural resources when creating new developments, to create development that can be maintained and sustained without causing further harm to the environment; and to provide methods for retrofitting existing developments to make them into environmentally friendly facilities and projects.

Prof. Dr. M. Ashraf Tanoli

Prof. Dr. M. Ashraf, Professor/HoD Civil Engineering Department, GIK Institute, Topi, KPK, Pakistan. He got education as Ph.D. Civil/Environmental Engineering Tottori University (Japan) (Sept 2017), Master Civil/Environmental Engineering Tottori University (Japan) (Sept 2004), Bachelor Civil Engineering University of Engineering and Technology Peshawar (Pakistan) (July 2001). Experienced in research, academics, organization and project management, Experience in initiation and establishment of new academic programs and departments, Published numerous research papers in various journals of international repute, Earned different national and international awards Certified Professional Engineer by Pakistan Engineering Council Approved HEC supervisor for PhD and graduate studies in Civil Engineering Member core committee of PEC Program evaluators (PEV) for BS Civil Engineering Member of various national and international technical societies Great aptitude of communication with apprehensive knowledge of information technology Dynamic spirit, recognized for his creativity and his initiative.

SUSTAINABLE EVOLUTION OF CONCRETE IN CONSTRUCTION INDUSTRY

Abstract: The concrete construction industry is not sustainable for the variety of reasons. First, it consumes huge quantities of virgin materials. Secondly, the principal binder in concrete is Portland cement, the production of which is major contributor to green-house gas emission that are implicated in global warming and climate change. Many scientists believe that this phenomenon is associated with high emission rates of green-house gases, primarily CO2. The transportation industry and the Portland cement industry happen to be two largest producers of CO2. The later is responsible for approximately 7% of the world's CO2 (Mehta, 1999). In addition, the concrete industry is the largest consumer of virgin materials such as sand gravel, crushed rock and fresh water. It consumes ordinary Portland and modified Portland cements at the annual rate of about 2 billion metric tons. The cement production consumes vast amounts of limestone and clay besides being energy-intensive. Blended Portland cements, containing fly ash (FA) from coal power plants, and ground granulated blast furnace slag (GBFS) from the iron industry provide excellent example of industrial ecology because they offer a holistic solution for reducing the environmental impact of several industries.

Recent innovation in concrete technology has led to the production of emerging alternative binding materials, which possess exceptional mechanical and durability properties. The concrete has always been considered strong in compression and weaker in tension. In addition, it possesses lower strain capacity which makes it a brittle material. To improve such characteristics, fiber reinforced concrete (FRC) was introduced as a practicable solution. With the advancements in fiber reinforced concrete, the concept of steel free construction has gained attention among experts in various parts of the world. Recent progressions in FRC is focusing on the enhancement of post cracking behavior of the materials which is known as engineered cementitious composites (ECC). As the world is now focusing to develop the green construction materials with little or no use of cement, this concept has led to the formation of a new innovative material, which is known as geo-polymer concrete. It is composed of reactive solid components and alkaline activator. The natural alumosilicates materials (metakaolin, bentonite, natural pozzolana) or industrial wastes (FA, GBFS) are used to produce such type of matrix. So far, the geo-polymer matrix have been produced only for demonstration purposes, hence its

commercialization is still at pilot stage. Other applications of geo-polymer binders can be in bridges and structural retrofits.


Prof. Dr. Habib Ur Rehman

Prof. Dr. Habib Ur Rehman, Chairman, Department of Civil Engineering, UET, Lahore Pakistan. He has completed his Ph.D. in Hydrology and Water Resources Engineering, from University of Tokyo, Japan, Having research interest in physically based distributed Hydrological Modelling, Regional scale soil erosion and sediment transport modeling, Hydraulic modeling, Reservoir sedimentation and Distributed Flood inundation modeling. Worked in National and International projects i.e. An assessment of the Socio-Economic Impacts of Floods in Large Coastal Areas, International Project funded by Asian Pacific Network for Climate change (APN), AIT, Bangkok, 2004, Hydrological study of Bunji Reservoir, 2004, Hydrological study for the Kohat Cement Factory site, Sep. 2005 and Hydrological and sedimentation studies for small dam sites in Punjab and NWFP, ADB, TA., 2007.

IMPACT OF CLIMATE CHANGE ON FLOWS OF RAWAL DAM

Abstract: The day by day increase in the concentration of greenhouse gases in atmosphere has resulted in Global warming. Due to industrial revolution, average global temperatures have been rising and precipitations are also changing its pattern. Under these conditions, extreme weather events are now more likely to occur than they were in previous years. Climate change is an important factor for affecting the hydrology and water resources planning. In this study, an effort has been made to investigate the impact of future climate change over the catchment of Rawal dam in terms of change in flows to the dam reservoir.

SRTM 90m DEM was used to generate river network and to delineate the Rawal dam watershed. For the watershed USGS land-use map and ISRIC soil map were employed to extract land-use and soil parameters. Future climatic parameters were forecasted by using Statistical Downscaling Model (SDSM) and based on past data prediction models for temperatures and precipitations. Potential evaporation data was forecasted based on a relationship between temperatures and FAO website potential evaporation data for Islamabad area.

SHETRAN model was used to investigate the impact of future climate change on inflows to Rawal reservoir. The model was calibrated for the year 2010 and validated for the years 1990 and 2000.The results showed good agreement between the simulated and measured hydrographs at the outlet (Rawal Dam) of the basin with coefficient of model efficiency ranging from 73to 85%. The calibrated and validated SHETRAN model was applied for the future climate change scenarios and daily discharges were computed to assess the impacts of climate change for next thirty years from 2016 to 2045 on flows of Rawal Dam.

The statistics of past data with respect to the base period (1986-2015) show that mean annual temperatures for study area are increasing at a rate of 0.0479 °C per year and weighted annual precipitations of Rawal dam catchment area are decreasing at a rate of 1.74 mm per year. The results on the basis of climate change in future years indicated that the future climate change is expected to reduce the mean annual flow at the Rawal dam by 5.12 % (0.015 cumecs/year). The results of this study can be used for better planning and management of future available water in Rawal Lake.

Engr. Naseer Memon

Engr. Naseer Memon, is General Manager CSR, Public Affairs and Communications at Sindh Engro Coal Mining Company (SECMC)/Thar Foundation. He looks after community development projects under Thar Foundation which has pioneered new initiatives under Corporate Social Responsibility (CSR) that has resulted in an unprecedented local employment, women empowerment and local talent promotion. During past 15 years he has been working on senior management positions in reputed private and social sector organizations including Sindh Engro Coal Mining Company (SECMC)/Thar Foundation, Strengthening Participatory Organization (SPO), Leadership for Environment and Development (LEAD) Pakistan, Premier Oil International, WWF Pakistan, UNDP and Mehran University of Engineering and Technology, Sindh, Pakistan. Before joining SECMC, Mr. Memon was Chief Executive of the renowned national NGO Strengthening Participatory Organization (SPO) for more than seven years. Under his leadership SPO emerged as one of the leading development sector organization in all provinces of Pakistan. Mr. Naseer Memon also remained Chairperson of National Humanitarian Network, which is a leading network of national NGOs working on humanitarian matters/natural disasters in Pakistan. Mr. Memon writes on the subject of human development. These books are widely referred among humanitarian sector organizations and experts. He has authored more than a dozen books in English, Sindhi and Urdu languages. Apart from these publications Mr. Memon has authored ten books on issues pertaining to governance, human development and conflicts. IUCN Pakistan and Sindh Environmental Protection Agency awarded his writings on environment and conservation issues. Mr. Memon is also invited as resource person on regional and international forums. He has conducted trainings and delivered presentations in USA, UK, Thailand and Bangladesh on humanitarian issues. He has also been participating in international forums.

PAVING THE WAY TOWARDS SUSTAINABLE WORLD

Abstract: Making development sustainable is the real challenge of today's era. As resources are shrinking and human population is increasing, its needs are competing with resources at a greater pace, planners and engineers have to play greater role in future. Civil Engineers have a unique opportunity to contribute towards the agenda of sustainable development as civil engineers are meant to construct. As institutes like NASA are exploring options for developing human settlements on mars and moon, use of new light weight and high strength materials and innovative construction techniques will require Civil Engineers to pour in their creativity and skills. As auto industry is moving towards driverless cars and extensive use of artificial intelligence, civil engineers will have to discover new approaches towards town planning, transportation engineering and innovative human settlements meeting requirements of new era. As climate change is posing new challenges to life on earth, civil engineers will have to align development planning and approaches new realities to address consequences of rising temperature on earth.

Dr. Kiran Farhan

Dr. Kiran Farhan, a civil Engineer by profession, Dr. Farhan holds a masters in Environmental and Geotechnical Engineering from University of Grenoble (France) and a Doctorate in Environment and Earth Sciences from the same institution. She has nearly two decades of experience in national and international markets, where she acquired and honed the skill set matching, and even exceeding in certain ways, the expectations for her role. She has had the opportunities to work in close association with development agencies, public and private sectors, as team lead or in key positions on broadly varied technical projects. Relevant education and continual participation in trainings have enabled her to stay at par with evolving technological advances in the field. A few of achievements in her present role as Sector Head Environment include master planning of integrated solid waste management at city level in numerous Pakistani cities, design and execution of consumer survey for water, sanitation and solid waste management services in several areas and development of environmental and social safeguard framework for large cities of Punjab.

WASTE AMOUNT SURVEY AND PHYSIO-CHEMICAL ANALYSIS OF MUNICIPAL SOLID WASTE GENERATED IN GUJRANWALA-PAKISTAN

Abstract: Due to swift expansion in population, augmented industrial development and superior living standard, the per capita waste generation rates has been enlarged in the city areas. The composition of the solid waste differs from region to region subject to the level of income, climatic conditions, social behavior and industrial production; affecting the per capita waste generation. The current study attempts to highlight the waste generation rates, composition and physio-chemical characteristics of the municipal solid waste produced in the Gujranwala City. The study was carried out for 8 days from 9-16 February 2015. For all physio-chemical analysis and testing standard ASTM methods have been used. The outcomes of the study discloses that, all waste types contains 67 % to 99.1 % organic waste apart from street sweeping which have the lowest organic content (30%).Whereas, non-biodegradable fraction varies between 0.5 % to 4.5 % for all types of wastes. The accumulative apparent specific gravity was found 234 kg/m3. The chemical parameters (moisture, ash and combustible fraction) were found within optimum range.

Keywords: Wastewater, Composition of Solid Waste, City Areas

Prof. Dr. A. Jabbar Sangi

Dr. Sangi is Professor, Department of Civil Engineering, NED University of Engineering Technology, Karachi. He earned Ph.D. degree in Civil Engineering (Structures) from Heriot-Watt University, Edinburgh, United Kingdom. Dr. Sangi has been involved in teaching and research activities in the field of Structural Engineering for over 19 years. His areas of research include non-linear finite element modelling of reinforced concrete, dynamic behavior of structures, sustainable structures and built environment, masonry construction, earthquake engineering, vulnerability assessment and disaster mitigation. He has also been involved in various research projects in collaboration with industry in Pakistan and United Kingdom. He is PI of HEC funded project and Co-PI in HEC, Pakistan Science Foundation and National Natural Science Foundation, China funded projects. Dr. Sangi is member of TC-14: Sustainable Infrastructure of Asian Civil Engineering Coordinating Council (ACECC); Member-Local Council, Institution of Engineers Pakistan, Karachi Chapter; Member NCRC for Civil Engineering and Certified Program Evaluator (PEV) of Pakistan Engineering Council for OBE. He is recipient of NED Gold Medal and Dr.AT Khan Memorial Gold Medal.

REINFORCED CONCRETE STRUCTURES UNDER IMPACT LOADS AND EFFECTS ON OVERALL FOUNDATIONS

Abstract: The phenomenon of impact loading has been already tested and researched by numerous researchers around the globe. The research is, undoubtedly, important as it enables the overall process to be efficient and safe practices. All sensitive materials and sites which require safe practices are susceptible to different loading conditions. In order to make their existence simpler and safer, research in reinforced concrete is important. It also minimizes contradictory public choices and opinion. High-velocity impacts on structures are of grave concerns. But, at the same, research is also important in low-velocity impacts on reinforced structures. Following study shows different types of variation on slow-velocity impacts on structures by using LS-DYNA, a commercial finite element code that is used to perform three-dimensional finite element of beams. A very effective Langrange formulation is used in this element. It is modelled using eight-noded hexahedrons with one-point integration. Reinforcing bars have been explicitly modelled into concrete and a perfect bond was assumed. Two series of beams were subjected to falling weight impacting beams at the centre. The impact forces, accelerations, and crack patterns have been compared, and good agreement was found. The finite elements models were extended to include the effects of damage conditions. In order to analyse reinforced concrete slabs, analytical methods are usually developed to check their bearing capacity.

Keywords: Self-Compacting; Concrete; SCC; CFT; Concrete-filled; Structural; Engineering; Civil-Engineering.

Dr. Zainab Riaz

Dr. Zainab Riaz obtained her PhD in Construction Management from Lough borough University, UK in 2008. Her PhD research focuses on the use of Information and Communication Technology (ICT) as an enabler for process improvement in the construction industry. She was a Fulbright Scholar at the Department of Civil Engineering, Columbia University, USA in 2015 and her recent research inquiries into how huge contribution of data by systems, infrastructure, government and citizens can be processed for improved citizen well-being and effective city management. She received her MSc in Management and Information Systems from Nottingham Trent University, UK in 2004 and MSc in Electronics from University of Peshawar in 1999. Prior to joining LUMS, she was associated with National University of Sciences & Technology (NUST) as Assistant Professor.

TRANSFORMATION OF CONSTRUCTION INDUSTRY THROUGH DIGITAL TECHNOLOGY

Abstract: Traditionally, the construction industry has been slow to adopt new technologies and processes and over the past 50 years has undergone no fundamental change. Most of the existing collaborative approaches in the industry primarily rely on static information delivery approaches such as relying on static delivery of project data, plans, technical drawings, audit-lists etc., without taking into account mobile worker changing context and dynamic project conditions.

In contrast to the existing static information delivery approaches, the construction work, by its very nature, is dynamic. The context of field workers is constantly changing (such as location, task involvement, construction site situations and resulting hazards, etc) and so does, their information requirements. Thus, mobile construction workers require that supporting systems understand who they are (e.g. their role, language preferences, skills profile, etc.), where they are located and existing project conditions to deliver the right information at the right time on as-needed basis. New (digital) technologies, such as cloud computing, Building Information Modelling (BIM), Wireless Sensing, Big Data Analytics and Internet of Things (IoT), have begun transforming the way infrastructure and built assets can be designed and constructed and is producing huge volume of data. However, this also leads to a new challenge in the construction industry about asking the right questions when it comes to dealing with volume and variety of data.

Dr. Salah Ud din

Dr. Salah Ud din joined Balochistan UET Khuzdar as Lecturer. He awarded fully funded scholarship through Higher education commission Faculty development program worth Rs. 10 Million. After completion of PhD in geotechnical engineering from university of Nottingham, he continued teaching. During his Ph.D he develop interest in research especially in experimental geotechnical engineering. He is serving for last 5 years as Associate professor and Head of civil engineering department. He has strong administrative experience in academic management. He is also advisor to Vice Chancellor on Civil works and Chairman Procurement Committee. He. has been actively involved in teaching at undergraduate and postgraduate level. His expertise are in Geo-technical Engineering as well as administration in academic management.

BEHAVIOR OF FIBRE REINFORCED CEMENTED SAND AT HIGH PRESSURES

Abstract: Several well established techniques of soil stabilisation and soil reinforcement are available to improve properties of geotechnical materials. However, the addition of fibre into soils has its unique potential as a reinforcing agent. This is because a friction between fibre and soil particles increases the bonding between the particles of soils and this can improve the plasticity, stress-strain behaviour and failure characteristics of both cemented and uncemented soils. It also reduces the brittleness of the cemented sand. Numerous experiments on fibre-reinforced granular materials have been carried out by several researchers. However, the behaviour of fibre-reinforced cemented granular soils has not been fully understood yet. Furthermore, most experimental studies of fibre reinforced cemented materials have been carried out at relatively low confining pressures. As a result, more experiments are still needed to understand complicated behaviour of soil-cement-fibre composite materials. The main objective of this lecture is to enlighten the audience about the behaviour of fibre reinforced cemented sand under wide range of confining pressures.

For this GDS high pressure triaxial cell apparatus and Bishop and Wesley conventional triaxial cell apparatus have been used to carry out the tests at wide range of confining pressures from 50kPa to 20MPa. Drained and undrained tests have been carried out on polypropylene fibre reinforced sand with and without the addition of cement. Samples with varying fibre and cement content were prepared by the method of undercompaction and were cured for 28 days prior to testing.

The experimental results indicate that there is significant effect addition of fibre and/or cement contents and confining pressures on the mechanical behaviour of Portaway sand. Particularly, these effects were notified in drained and undrained triaxial tests, particularly peak strength, strength parameters, shear banding, particle crushing, yielding, and stress-dilatancy relationships. Addition of fibres increases the peak, yield, and ultimate strengths. Increase in confining pressure also increases the strength but the individual effect of addition of fibres was more pronounced at low confining pressures. Progressive suppression in the dilation by the gradual increase in confining pressures as well as increase in dilation with the addition of fibres during triaxial compression was also worth noticeable. Although, no noticeable affect was observed in isotropic compression due to the addition of fibre in both cemented and uncemented sand.


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PAPER ID: 19

FORMULATION OF A FRAMEWORK FOR COMMUNITY PARTICIPATION IN CONSERVATION OF BUILT HERITAGE IN PAKISTAN: A CASE STUDY OF WALLED CITY LAHORE

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ABSTRACT

Community participation in built heritage is a well-known phenomenon. However, in Pakistan, the application of a community-led approach in built heritage is not being utilized due to the lack of framework and coordination of all stakeholders. That resulted in the inappropriate conservation of the few world heritage sites as observed and documented by experts in literature. On the other hand, presently all the stakeholders (conservationists, local and government authorities) intends to be taken on board purposely to guide the community in all respects to participate in the built heritage conservation process. For this particular research, the case-study method is planned to be employed based on the successful projects done in various parts of the world. This method is effective because it provides a link between the hypothesis and the real-life situation, particularly in architectural research. This study intends to take an opportunity to formulate a framework for community participation in the built heritage conservation process in Pakistan to utilize the potential of the community and draw a road map for a successful built heritage conservation process based on a community-led approach.

Keywords: Community, Participation, Built heritage, Conservation, Framework

PAPER ID: 20

METRO INDUCED IMPACTS ON HISTORIC BUILDINGS: A CASE STUDY OF DAI ANGA TOMB

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[2] Department of Urban and Regional planning, NUST, Islamabad Pakistan
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ABSTRACT

The threats to historic urban areas generated by new infrastructure and urban development have been of apprehension to the communi-ties since the mid-1960s. Since that time, de-veloping perceptions of urban ritual conser-vation and its role in urban restoration and regeneration have been talked through glob-al, regional and local ideologies and direc-tion for the amalgamation of those new de-velopments into the historic environment. Over the last decade, the urban protection challenge has grown up to a critical scenario due to hasty urbanization that lead to into muddled development and revolution of cities globally. Conserving significant urban mi-lieus is at this time one of the most universally crucial and thought-provoking cultural herit-age conservation issues met by the communi-ties. The historic city Lahore, considered to be the cultural capital with large number of Mughal's monuments Unfortunately, affected by the Infrastructural development of the modern time period. Infrastructural development, environmental degradation, decay and aging along with negligence are being faced by the numbers of historic buildings in Lahore. One of the largest projects is orange metro train project in Lahore. The obtained result through GIS mapping depicted the increase in vehicular traffic and air pollution due to this new infrastructure development (27.1 Km orange line metro). This polluted environment severely damaged the historic buildings along the G.T road Lahore especially the selected case study area comprising of Gulabi Bagh Gateway and Dai Anga Tomb. It was further concluded that natural aging process is further activated due to this additional load on the historic environment.

Keywords: Urban development, Historic, Environment, Cultural, heritage, Vehicular traffic

PAPER ID: 21

PRELIMINARY STUDY OF SIGNIFICANT HISTORIC BUILDINGS IN BEGUMPURA COMPLEX, LAHORE

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ABSTRACT

Built heritage is the contextual reference to the society from its period of construction to the present identity along with the additions through the centuries. These valuable assets display the tangible/ intangible values that demands protection for future generations. The heritage conservation is the process comprising of the identification, protection and promotion of the significant threatened built heritage that reflects the identity, culture, values etc. The presented research encompasses the preliminary study of significant historic buildings of Begumpura complex in Lahore (Pakistan) for protection from threatening agents either natural or of anthropogenic origin. The research methodology comprised of documentation through photographic and textural data in addition to the visual analysis and surveys. The documented and surveyed historic structures in the studied area were found adversely damaged by natural as well as anthropogenic agents mainly due to neglect and ignorance on our part. The adoption of the proper conservation strategy can preserve the valuable heritage and helps in maintain their essence over time.

Keywords: Historic, Buildings, Begumpura, Lahore, Pakistan

PAPER ID: 61

EXPLORING VERNACULAR VENTILATION TECHNIQUES FOR ADAPTATION IN CONTEMPORARY BUILDINGS IN HYDERABAD, SINDH.

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ABSTRACT

The increase of technological development causes the vernacular design overlooked, especially in the urban areas of the world. The building sector is responsible for one-third of the global energy consumption and leads to a significant amount of greenhouse gas emissions. Hyderabad has hot and dry climate. The scorching heat of May to July season faces the extreme temperatures up to 50˚C which becomes unbearable for the residents. The application of natural ventilation is one of the main techniques to moderate temperatures inside the buildings. The vernacular architecture of the Hyderabad provides an economical means for creating thermal comfort utilizing only natural forms of energy. But the number and variety of vernacular housing decreases significantly and almost become extinct in Hyderabad. The study aims to provide solutions of natural ventilation from vernacular design that can be applied in modern architecture. The feasibility of incorporating traditional cooling techniques is justified through the comparative analysis of vernacular and contemporary buildings. The exploration of traditional techniques will provide opportunities for future designers towards designing contemporary buildings to be more thermally comfortable and energy efficient. The paper concludes that vernacular techniques can be successfully implemented to the contemporary buildings without compromising on its own identity.

Keywords: Vernacular architecture, Ventilation, Thermal comfort, Contemporary Architecture.

PAPER ID: 65

DESIGN AND DEVELOPMENT OF AN EFFICIENT STANDALONE SOLAR PARABOLIC DISH SYSTEM FOR BUILDINGS ELECTRIFICATION

Mohsin Ali Mari[1, 3], Zubair Ahmed Memon[1, 2], Pervez Hameed Shaikh[2] and Shafqat Hussain Memon[3,4]

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ABSTRACT

Pharmaceuticals are considered as emerging contaminants due to their frequent use, detection in different environmental matrices in high concentrations and the potential risk to the ecosystem. Sulfonamides such as Sulfamethoxazole (SMX) have been predominantly used to treat bacteria and other diseases because of their low cost and effectiveness in tackling bacterial infections. SMX are not acutely toxic but has chronic effects on organisms. Fish are highly sensitive to even slight environmental changes; their physiological and biochemical alterations reveal the health status of organism and its surroundings. Fish biomarkers such as Biochemical Parameters, Respiratory Burst Activity and Oxidative Stress in blood and organs were routinely analyzed after exposed with Sulfamethoxazole to assess the health condition of the fish in the present study. Acute toxicity of SMX in fish was measured by exposure to different concentrations ranging from 200-1200mg/l. Lethal dose (LD_{50}) finds out at <700 mg/l after 72 hrs. Sub-acute toxicity was calculated by exposing fish to different concentrations of SMX. The findings suggest that existence of a cause-and-effect relationship between exposure to sulfamethoxazole and Enzymatic Activity (Respiratory Burst Activity), change in biochemical parameters, and excess generation of ROS indicate that antibiotic exert oxidative stress and cause toxicity in fish tissues.

Keywords: Sulfamethoxazole, fish Toxicity, Biomarkers, Biochemical Parameters, Respiratory Burst Activity, Oxidative Stress

PAPER ID: 68

BUILDING-INTEGRATED SMALL SCALE STANDALONE SOLAR PV-WIND BASED HYBRID DC MICROGRID POWER SYSTEM

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ABSTRACT

Due to the rapid increase in industrialization, urbanization, population growth and changes in living style the energy demand has continuously been increasing. This tremendous increase in energy consumption throughout the world has raised serious concerns over the depletion of fossil fuels, climate change and scarcity in future energy supply, which leads to the development of renewable energy resources. Moreover, the energy consumption of domestic and commercial buildings has continued to increase in recent years, reaching 40-50% of total energy consumption. At present, some of the main concerns in urban areas are energy and building performance autonomy. Currently, in urban areas there is significant development in decentralized power plants which includes distributed energy resources mainly solar and wind energy. One of the ways to promote and integrate distributed energy resources in buildings is to develop microgrid power systems. Hence, in the context of sustainable buildings, this study proposes integration of solar-wind generation in DC microgrid setup. The proposed system is presented and modeled as small scale experimental setup. The performance analysis of proposed system is evaluated under various operating conditions of solar irradiance and wind speed. The proposed system aims to give better efficiency and satisfactory operation.

Keywords: Buildings, Distribution generation, Microgrid, Standalone, etc.

PAPER ID: 86

ASSESSMENT OF PROJECT QUALITY BY INCLUSION OF BIM (BUILDING INFORMATION MODELING) TECHNIQUES AND PMBOK PROJECT PROCESS.

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ABSTRACT

Starting with BIM, which despite of being a reliable, three dimensional and documented representation of the project built for the use in design decisions is not being implemented properly into the local projects in Pakistan. BIM is beneficial tool in a lot of ways to the concerned bodies included into the project I-e: stakeholders, managers, engineers and architects to read out accurate and improved data of the project. since BIM implementation requires changes within the systems (I-e: firms working on construction project) and adopting BIM techniques into their projects needs to have different project life cycle so it's becoming difficult for Pakistani firms to adopt it. Although we have BIM training courses offered and BIM councils are working for corrective measures to be taken in construction field but still there is research gap in adopting BIM. This study is designed to how can BIM implementation improve the overall quality of the project by following BIM supporting software's in contrast of adopting PMBOK project lifecycle.

Keywords: BIM techniques, project management life cycle, cost and scheduling.

PAPER ID: 98

ADAPTIVE REUSE MAIN STRATEGIES FOR HERITAGE BUILDING TO BOUTIQUE HOTEL-A CASE STUDY OF SAHIB MAHAL AT BADIN DISTRICT

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ABSTRACT

Adaptive reuse is the way toward reusing building to new purposes. The aim of my research is to investigate the existing condition of the "Sahib Mahal" and recommend the new guideline for adaptive reuse with respect to the four main strategies are, physical, economic, value change and social impact. Research method is mixed qualitative and quantitative with case study type. The three-story heritage mahal situated in a boutique town khadaro, tandobhago city, district Badin. For the data collection, physical, economic, value change and social impact collected from secondary data, surveys, in-depth interview and questionnaires from owner and 12 informants from surrounding community. The results showed that the level of physical, economic, and value changes of this heritage building to boutique hotel rose up after the reused, while the level of social impacts remains the decreased a bit less than the level before the reused. The four main strategies for investigative physical, economic, value, and social issues and the procedure utilized in this investigation can be a good guideline for producing another research procedure for different investigations of the changes and impacts of adaptive reuse.

Keywords: Adaptive re-use, heritage building, sahib mahal, boutique hotel

PAPER ID: 128

BARRIERS IN ADOPTION OF BIM IN CONSTRUCTION INDUSTRY OF PAKISTAN

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ABSTRACT

Building Information Modelling (BIM) is the new software-based technology that represents the development process and visualize the usage of n-dimensional models to simulate the planning, design, construction and operation of building in virtual environment. It is also used to identify conflicts in design, construction and operation of any construction projects. Construction industry is becoming complex day by day due to the less usage of information technology application tools in developing countries. BIM provides a lot of benefits to the players involved in construction such as saving of cost, reworking time, quick and earlier detection of clashes and errors. However, there are some barriers to implement BIM in the construction industry of Pakistan. The objective of this study is to identify the problems associated with the adoption of BIM in the construction industry of Pakistan. The Primary data were collected from literature review and the secondary data by questionnaire survey. SPSS 20 Software was used to interpret the data. The barriers identified were Lack of training skills, High cost of implementation, Legal and cultural issues, and In-appropriate government policies. The outcome of this study will help in enhancing the usage of BIM in construction industry of Pakistan.

Keywords: Building Information Modelling (BIM), Barriers, Adoption, Construction Industry.

PAPER ID: 141

A STEPPED WISE APPROACH AND BARRIERS TOWARDS IMPLEMENTATION OF BIM TOOLKITS FOR INFRASTRUCTURE PROJECTS IN PAKISTAN

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ABSTRACT

Building Information Modeling (BIM) has been playing a vital role in all over the world and got success in the vertical construction field. In Pakistan, so far it has been dominant in showing stepped wise approach for its adoption at each phase of Building projects. After its success in all aspects for vertical construction, BIM started to gain the attention for many researchers about its implementation for infrastructure projects. However, literature review reveals that study of BIM's implementation and its approach is still limited up to buildings only, especially in Pakistan. For this purpose, a stepped wise approach towards BIM's Implementation through collaboration of data by using software (AUTOCAD, GIS, INFRAWORKS-360, NAVISWORKS and BIM-360 DOCS has been proposed. A simple housing colony's infrastructure(Roads & Drainage) is modeled to better represent the capabilities as well as barriers of BIM in adoption for infrastructures in Pakistan. Hence, we believe that this proposed approach provides better way and awareness in Pakistan for acquiring BIM in Infrastructure as for buildings. In addition, the highlighted barriers in its implementation will be helpful for the researchers to make their studies more effective under this scope.

Keywords: BIM Toolkits, Stepped wise approach, Barriers, Colony's infrastructure

PAPER ID: 143

COST ANALYSIS OF GREEN BUILDING AND CONVENTIONAL RCC BUILDING THROUGH BIM

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ABSTRACT

The construction industry plays an important role in the economic growth of Country. It contributes about 2.4% to the Gross Domestic Product (GDP) of Pakistan. Due to its large size it is consuming the natural resources available in Pakistan and generates huge amount of construction waste, other problems like Emission of CO2, time overrun, cost overrun and has adverse impact on the environment. So the Green Building Construction is most important in the construction industry of Pakistan to reduce the consumption of natural resources. Because one day these natural resources of construction materials will deplete due to the rapid growth in the construction industry of Pakistan and without using the recycled materials or finding the new alternatives. Therefore, this research study is carried out to compare the cost of Green Building and Conventional RCC building to know the advantages of Green Building Construction. A ground plus one story building was taken for the case study. Autodesk Revit software was used to generate the 4D models and cost analysis. The outcome of this research study will help in adopting the Green Building Construction by knowing its advantages.

Keywords: Green Building, Conventional RCC Building, Construction Industry.

PAPER ID: 148

IMPACTS OF MIXED-USE CENTERS AND ITS EFFECTS ON INHABITANTS: A CASE STUDY OF HYDERABAD, SINDH

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ABSTRACT

Rural blended use focuses contain an assorted variety of exercises, with a solid office work and retail supplement, and be created at a thickness that is a lot higher than the rural standard. Urban zones are much of the time the result of market powers with insignificant arranging input. Mixed-use Centers provide more convenience and choice for residents and employees by emphasizing a mix-uses. Hyderabad is taken for the study is facing the improper infrastructure to accommodate the people migrated from rural to urban areas. Aim of study is to identify the impacts of mixed-use centers on the development of city. This research is based on evaluating the effects of increasing population on the acquisition of land. 12 sample size selected and ata were collected through questionnaire from locals and interviews from the officials of the concerned authority such as Hyderabad development authority (HDA) and Sindh Building Control Authority (SBCA), analysis was made through Statistical package for Social Sciences (SPSS) software. This research will give opportunities to solve these land issues by utilizing least space through mixed-use development.

Key Words: Mix-landuse, satisfaction, impacts.

PAPER ID: 154

STUDY THE BUILDING LINES ENCROACHMENT: A CASE STUDY OF FOUJDARI ROAD, HYDERABAD, SINDH

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ABSTRACT

An encroachment is a something that introduces and has the power to influence whatever it encounters. Encroachment carries the sense of something slowly carrying into something else' spaces either literally or figuratively. Encroachment creates the problems of congestion and traffic issues take place as a result beauty of the city goes vanished. Foujdari Road of Hyderabad, Sindh is taken as a study area because this road violating the building line (encroachment) in the sense of building byelaws. Primary data is collected in the form of questionnaires and frequency and descriptive analysis was done in SPSS as well as existing condition of the building lines were also digitized. Results show the major difference between digitize map and the base map. Approximately the value is in between 1ft to 20ft encroachment on the road by width on different locations. The reason of this encroachment is concerned authority is not taking interest to remove encroachment. There is immediate need of actions should be taken against encroachment.

Keywords: Beauty, Building line, Encroachment, Traffic congestion

PAPER ID: 156

SIMULATION TOOLS USAGE IN BUILDING'S INDOOR ARTIFICIAL LIGHTING

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ABSTRACT

While addressing the buildings' sustainability, the lighting system design is considered as major component. The energy conservation and waste savings can be tackle through buildings' sustainability. Indoor artificial lighting pays significant contribution in industrialized countries' rising energy costs. Thus the energy-saving strategies could affect the visual comfort within indoor environment. This paper comprises a systematic advanced review of the simulation tools for indoor lighting of building research. To optimize utmost usage of building's lighting systems, the artificial material and dynamical part deviations are offered by simulation. Thus the synthetic environment and equivalent lighting system design in virtual world is allowed. Therefore, to find out the widely used tools for simulation of lighting in building prototypes among the researcher is the main objective of this paper. Hence the simulation platforms are categorized in lone and cohesive tools used by the researchers. The survey is comprised of the seventy papers where were thoroughly reviewed. It has been observed that different researchers has carried out various relevant studies in the lighting in buildings and energy savings. This research can aid positively to the energy managers and researchers to decide the feasible simulation tool for the simulating their respective prototypes.

Keywords: Visual Comfort; Artificial Lighting; Simulation Design; Energy; Sustainability;

PAPER ID: 174

BARRIERS FOR BETTER INTEGRATION MANAGEMENT: A CASE OF CONSTRUCTION INDUSTRY

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ABSTRACT

Construction management deals with effective management of the project's schedule, cost, quality, time, safety, scope, and function. It is compatible with all project delivery methods. One of the valuable fields of construction management is Integration Management (IM). Integration represents the proper communication among different processes of project. Integration management is one significant fundamentals of project management that incorporates all the project aspects. IM projects ensures the effective collaboration among the project events. The construction industry despite being among the largest employment sources possesses a negative societal image because of non-existence employee friendly practices and denying the societal alarms in the development of projects. It has been observed that there is a lack in integration management and the literature also lacks in addressing this important issue. Therefore, this study attempts to highlight the key barriers in maintaining proper integration in construction projects. A quantitative research has been conducted followed by a qualitative research. This study will help in completing the construction projects successfully by managing and maintaining proper integration management practices.

Keywords: Construction Industry, Integration Management, Barriers

PAPER ID: 200

EVALUATION AND IMPROVEMENT OF PERFORMANCE OF DAMP PROOF COURSE IN RESIDENTIAL BUILDINGS

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ABSTRACT

The quality of construction projects can be enhanced by reducing the defects in the projects during construction and operation stages. Some defects in the construction projects are harmful for the durability and structural stability and some of them are harmful for the indoor air quality and building aesthetic. Dampness is main defect that reduces the life of building as well as the comfort level for the resident of the building. Improper construction of damp-proof course (DPC) creates lots of problems in buildings. An attempt was made to find out the effectiveness of DPC in residential buildings through comprehensive data collection. With help of literature some useful methods of construction and evaluation of DPC were used to check the effectiveness of DPC in the selected sites. Almost, 80% buildings were damaged due to failure of DPC and major reason for that failure was the technical assistant during the construction of DPC. In this research evaluation of concrete mix was carried out by variating the concrete mixture ratios and also by adding one percent of Pudlo powder as an admixture to improve the efficiency of DPC. It has been observed that performance of DPC was improved by using of Pudlo powder in concrete mixture. This study will helpful in finding the best technique of construction of DPC and also in finding out the suitable polymer to improve damp proof ability of DPC of residential building.

Keywords: Damp-Proof Course, Residential Building, Pudlo Chemical, Synthetic Polymer and Concrete mixture.

PAPER ID: 245

THE SPATIAL ANALYSIS OF FRACTAL GEOMETRY IN MUGHAL ARCHITECTURE: A CASE OF WAZIR KHAN MOSQUE LAHORE, PAKISTAN

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ABSTRACT

Geometry has played very substantial role for Mughal architecture in various spatial and ornamental systems. The distinguishing features of Mughal architecture have always been ordered repetition, radiating structures and rhythmic patterns. This paper focuses on the fractal geometry which has the same attributes with reference to design and urban planning. The three salient features of fractal geometry such as similarity, iteration and change in scale are the main characteristics of the Mughal structures. The purpose of this study is to study the occurrence of fractal geometry in Mughal architecture in two and three dimensional features Mughals used ornamental patterns which are close to the nature and its rules to show their thoughts of unity in diversity. The core objective is to investigate the relationship between the fractal geometry and historic architecture of Mughals with decorative symbolic expressions. The case study of Wazir Khan Mosque Lahore represents the use of fractal geometry in the Mughal architecture and measurement of fractal dimensions through Box Counting Method also inclined towards the existence of fractals. Therefore, assuming the existence of fractal geometry in Mughal architecture is a possible and realizable issue and it deserves research and analysis.

Keywords: Fractal geometry, Fractal Dimensions, Box Counting Method, Mughal Architecture

PAPER ID: 252

BUILDING INFORMATION MODELING 4D INTEGRATION OF RESIDENTIAL BUILDING USING BIM, PRIMAVERA 6 AND POWER PROJECT "A CASE STUDY OF NON-MPT RESIDENCE BUILDING –JHANG"

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ABSTRACT

4D Planning and Scheduling of the Construction Project Using Project Management Software and BIM In contrast with the past, presently construction industry concerned about optimal execution of project. For this to achieve, the construction industry needs a systematic planning, scheduling and management process which in turn permit the overall optimization of cost, time and resources. Usage of conventional project management software tools for explaining the status of the vast projects to the various parties involving in the construction is not up to the mark. Direct usage of schedule sheets prepared from conventional tools with drawings is difficult to follow the schedule activities. Instead, drawings along with the schedule progress can be integrated on a geospatial platform to create a 4D view of the project progress with the help of BIM and Primavera P6 integrated with Power Project. Geographical Information Systems (GIS) as a spatial platform can be linked with drawings along with its corresponding project management software derived schedule in order to successfully execute the construction of a project.

Keyword: Power Project, BIM, Primavera P6

CLIMATE CHANGE / DISASTER MANAGEMENT / REGIONAL PLANNING & URBAN ENGINEEIRNG


ICSDC
2019

PAPER ID: 33

RECREATIONAL FACILITY AS SOURCE OF HUMAN HEALTH

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ABSTRACT

Recreational facility is an important part of human life. It attracts people as it offers greater pleasure in life. It develops a strong healthy environment for a better life style of public. Various facilities in recreational area are the source of human comforts. This research investigates the important facilities in a recreational center that affects human physical and mental health. These facilities were identified from literature review, discussion with Planners, Architects and Physician and Physiatrists through unstructured interviews. A detail questionnaire survey was carried out from different age people who visit various recreational facilities in their routine lives. The result concludes that the top three facilities for better physical health are jogging track, gym and fun land however for achieving good mental health, food streets, restaurants and musical zones are the top three important facilities for any recreational facility. This research can be helpful for planner, designer as well as for clients, local Govt. to provides such facilities for a recreational center during planning & designing phase.

Keywords: Mental health, Physical health, Recreational Centers, Planners, Pakistan.

PAPER ID: 84

ASSESSMENT OF CLIMATE CHANGE IMPACT ON HYDROLOGY OF HUNZA RIVER BASIN

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ABSTRACT

Assessment of climate change impact on streamflow is crucial for the Hunza River, which contributes significantly to the Upper Indus Basin. Projected changes in streamflow will affect the agriculture, and hydropower potential of the Hunza Basin under climate change. This study aims to detect the changes in streamflow in response to climate change in the semi-arid region. Historical climate and flow gauging data were collected from various departments, and bias correction was performed on future climatic data using five Regional Climate Models (RCMs) under two Representative Concentration Pathways (RCPs 4.5 and 8.5) including the ensemble of RCMs. The Soil and Water Assessment Tool (SWAT) was developed for the Hunza River Basin and was successfully calibrated and validated. Afterward, the impact of climate change on streamflow in the near-future (2020~2044), mid-future (2045~2069) and the long-term future (2070~2099) were examined using historical baseline data (1981-2010). Results show that the peak flows, average flows, median and low flows and time to peak, are expected to change significantly under the influence of climate change. These results suggest that it is crucial to consider the impact of climate change on the hydrology of the Hunza River Basin to form suitable strategies for planning and management.

Keywords: Climate Change, Hunza River Basin, Hydrology

PAPER ID: 124

CAUSES OF SLUMS IN URBAN AREAS OF QASIMABAD

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ABSTRACT

As a result of rapid urbanization in a context of economic constraints, the majority of urban residents lives in slums often characterized by a lack of basic services. Slum is typically utilized for casual settlements with poor living conditions and deficient foundation offices. As per UN-HABITAT surroundings meaning, slum mentions to gathering of individual's lives below one roof in city site which need lasting lodging, or sufficient living capable space, or arrangement of consumption water and legitimate cleanliness framework. Like many other countries in the third world, Slums are formed in Pakistan, due to increased urbanization and inability of government to provide necessary living accommodation to rural migrants in urban centers. Hyderabad is one of the fast growing city of this country and has under gone rapid industrialization where Qasimabad sub-local was most influenced sub-area by the procedure of urbanization in Hyderabad region. In which 3508 sections of land of agriculture changed over to housing scheme.

Data collection included, specific observation, and report review. The secondary information in the shape of census reports, master design and different reviews have been referred to analyses the slum problems. However, the outcomes expose that the major cause of over slums and environmental degradation in metropolitan areas is terminate of secondary cities.

Keyword: Rapid Urbanization, Slums areas, unplanned settlements, migrations.

PAPER ID: 131

SOCIAL SUSTAINABILITY IN THE STREETS OF WALLED CITY, LAHORE

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ABSTRACT

Over the last two decades, sustainability has become a key consideration for city governments. However, many projects have been dogged and overlooked the important component of sustainability i.e. social sustainability. The Walled City Lahore Authority (WCLA) has initiated the project with Agha Khan Trust for Culture (AKTC) in the nucleus of Lahore, Pakistan with the name of Royal Trade. Walled City is the home of numerous monuments and iconic buildings built in the Mughal Era and has not only a wealthy cultural heritage but also has a strong relationship between living cultural heritage (folklore, traditional values, and related items) and urban ensembles. The life is still sustaining in the heart of Lahore city. The word sustainability surrounds the human state of wellbeing. This paper is an attempt to see the consequence of the Royal trade concerning the Social life of WCL which was the famous entity of this area. This research explores how the restoration of façade has affected the social wellbeing of people who are residents of this area from decades.

Keywords: Walled City Lahore, Social Sustainability, Cultural Heritage, Royal Trail.

PAPER ID: 176

REPERCUSSIONS OF CLIMATE CHANGE ON GLOBAL ECONOMY

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ABSTRACT

There is no doubt that climate change is one of the alarming concerns of the world. It can be the prime reason behind prospective devastation of the globe. Owing to rapid climatic variations, there has been paradigm shift in the global financial system. This paper evaluates the causative factors behind such transformation in global economy owing to climate change. It further examines about the natural calamities and catastrophes detrimental ramifications on disaster affected zones and how this lead to the shrinking of economy. Furthermore, this research indicates why state should opt for solid roadmap to endorse modern resilience system to avert any deprivation in economy. The methodology followed for this research that four quality books of foreign authors were studied meticulously and five quality research papers were reviewed. The results of this analysis are that Disaster management institutions are not executing the tasks efficiently and are not provided with adequate machinery to minimize financial imbalance, modern resilience system is deficient and there is a dearth of structural adjustments such as auditing and monitoring in NGOs. Likewise, some substantial recommendations such as modern rehabilitation and reconstruction framework should be originated, advanced resilience system should be introduced and promulgation of laws is required.

Keywords: Climate Change, Global Economy, Resilience System, Financial system

PAPER ID: 229

AFTER THE FLOOD: A NOVEL APPLICATION OF IMAGE PROCESSING AND MACHINE LEARNING FOR POST-FLOOD DISASTER MANAGEMENT

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ABSTRACT

Floods are natural disasters and pose a threat to the lives, property, and infrastructure of an urban area. Though their risk cannot be fully eliminated, several methods can be used to manage floods, once they occur. This includes identification of flood-prone areas, timely detection of the affected areas, mapping rescue routes and arranging logistics to carry out the rescue as soon as possible. The use of advanced innovative technologies for flood management such as image detection and machine learning can assist in effective flood management. This paper presents a novel approach through the integration of image processing and machine learning to detect flood-affected areas using a set of images. The three-step approach proposed in this study is based on landmark detection from images, training of a machine learning algorithm and classifying images from an area as flooded or non-flooded. The results based show an accuracy level of 90% depicting the significance of the proposed model for image-based flood detection.

Keywords: Flood Detection, SVM, Machine Learning, Edge Detection, Landmarks Detection, Disaster Management.

PAPER ID: 247

CARBON DIOXIDE EMISSION TRAPPING THROUGH CARBON CAPTURE AND STORAGE TECHNIQUE

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ABSTRACT

The extreme raise level of carbon dioxide emissions in past is due to combustion of fossil fuels. It creates the drastic changes in the environment. The extreme high level of emissions from the industries, power plants and burning of fossil fuels for the electricity generation can creates the adverse impacts on the living things. The substitute energy source is not valuable for the reduction of the emissions. The carbon capturing and storage is a procedure to reduce the emissions of carbon dioxide from the atmosphere. Carbon capturing and carbon storage is the only method to reduce the climate change. The CCS plays very important role in decreasing the greenhouse gases emissions. It is estimated that it can reduce 80 to 90 % of the gases from the power plants. The technology consists of the three steps. Capturing the carbon dioxide from the source, Transport the gases through the pipe lines, and underground immunization of the carbon dioxide. The aim of this paper is to determine the CCS technologies to elude the carbon dioxide emissions from the atmosphere and create the carbon free environment. The IPCC authorize this technology and this technology has several different benefits.

Keywords: Carbon dioxide, Carbon capture and storage

PAPER ID: 249

RETROFITTING OF AN EXISTING INDUSTRIAL BUILDING (AVARI TOWERS, KARACHI)

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ABSTRACT

Now-a-days retrofitting is expanding its legs in the world like a wild fire, as many of the historical, public and private important structures get really old and become weak due to flow of time. Retrofitting is one of the best options to make an existing inadequate building safe against future probable earthquake or other environmental forces. Retrofitting is the process of addition of new features to older buildings, heritage structures, bridges etc. Retrofitting reduces the vulnerability of damage of an existing structure during a near future seismic activity. It aims to strengthen a structure to satisfy the requirements of the current codes for seismic design. In this respect, retrofit is beyond conventional repair or even rehabilitation. It is the modification of existing structures to make them more resistant to seismic action, motion of ground, and failure of soil due to earthquakes or other natural calamities such as tornadoes, cyclones, and winds with high velocity caused by thunderstorm, snowfall, hailstorms etc. Structures lose their strength in due course of time, some structures are important in view of public, social or past importance. Retrofitting helps to increase the strength, resistivity and overall lifespan of the structure.

Keywords: Earthquake, Earthquake Proof, ETABs, Retrofitting, Seismic Waves

CONCRETE TECHNOLOGY


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PAPER ID: 12

USE OF SUGARCANE BAGASSE ASH AS CEMENT REPLACEMENT MATERIALS IN CONCRETE

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ABSTRACT

In the present era, a number of researchers are using either industrial or agriculture priceless products as a basic source of raw materials for the construction industry. These waste products are economical and helpful in producing a sustainable environment and reducing environmental pollution, which is called handling waste products. It is proposed to study that cement is partially replaced the material of 0%, 5%, 10%, 15% and 20% of Sugarcane Bagasse Ash. In this research, total 60 concrete samples (30 cubes and 30 cylinders) were made water/cement ratio of 0.5 with 1:1:2 mix ratio of concrete and cured after 7, and 28 days. The main purpose of this research study was to observe the indirect tensile strength and compressive strength of concrete blended with various proportions of sugar cane bagasse ash. In this experimental work, for each curing days of 03 cubes and 03 cylinders were cast and finally taken as an average value of three as a final result. The result showed that the indirect tensile strength and compressive strength of concrete made with 10% SCBA increased by 15.40% and 8.50% respectively at 28 days. The workability of concrete is reduced with increases in the amount of SCBA in concrete

Keywords: Sugar cane bagasse ash, Utilizing waste product, reducing environmental pollution, increasing strength of concrete.

PAPER ID: 17

EFFECT OF SUGARCANE BAGASSE ASH AS FINE AGGREGATES ON THE FLEXURAL STRENGTH OF CONCRETE

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ABSTRACT

Assessment of climate change impact on streamflow is crucial for the Hunza River, which contributes Concrete is a material widely used in the world. According to global use, it is located in the second position after the water. River sand is costly due to the high cost of transportation from a natural source. In concrete production the most commonly River sand used as fine aggregate, which creates a serious shortage in many areas and continuous use has become a major problem in terms of its availability, cost, and environmental impact. So, the engineer started searching for alternative materials to fine aggregate. The main purpose of this study was to identify alternative sources of high-quality aggregates. Studies are currently underway to know the effects of sugarcane bagasse ash on mechanical characteristics when replacing various percentages of fine aggregates in concrete. A total of 30 concrete samples were made of (1:2:4) mix ratios with 0.50 water-cement ratio blended with a various proportion of 0%, 10%, 20%, 30% and 40% sugarcane bagasse ash in concrete. These concrete specimens (500mm x 100mm x 100mm) were used to determine the flexural strength of concrete on UTM at 7 and 28 days. It was noted that the flexural strength of concrete enhanced by 14.41% by using 10% of SCBA as a fine replacement material in concrete. The flow of fresh concrete decreased with an increase in the content of SCBA.

Keywords: Sugarcane Bagasse Ash, Sand Replacement Materials, Strength of Concrete, Utilization of natural resources.

PAPER ID: 40

INFLUENCE OF MAIZE COB ASH ON THE COMPRESSIVE STRENGTH OF CONCRETE

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ABSTRACT

In present time, many researchers are concentrating on ways of utilizing either industrial or agricultural wastes in the construction industry. The consumption of waste would not only be economical, but may also help to create a sustainable and pollution free environment. The agricultural waste product like Maize cob ash (MCA) is used as alternate binding material in the concrete. In this experimental work, total 45 concrete cubes (100mmx100mmx100mm) ware prepared of 1:2:4 mix proportions with 0.50 water/cement ratios by using various percentages i.e. 0%, 5%, 10%, 15% and 20% of MCA as cement replacement material. These concrete specimens were tested for compressive strength after 3, 28 and 90 days in the age of curing. The result was showed that the crushing strength increased by 7.0% blended with 5% MCA after 28 days.

Keywords: Maize Cob Ash, Cement Replacement Material, Compressive Strength of Concrete

PAPER ID: 44

STRENGTH CHARACTERIZATION OF SOORH MODIFIED CEMENT MORTAR

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ABSTRACT

Growing demand of cement day by day has greatly impact the environment and human life as its production releases tones of CO2. In order to reduce this problem Pozzolanic materials are used as full or partial replacement of cement in concrete or mortar which doesn't only reduce the production of cement but also the cost of making concrete and mortar. In this research an investigation is carried out on a locally available material in the Vicinity of Thatta ,Sindh, Pakistan"Soorh" and Metakaolin developed by calcinating the Soorh used as cement replacement material at different replacement percentage level in preparation of mortar in terms of its workability, compressive strength. The investigation revealed that Soorh modified mortar and Metakaolin modified mortar decrease the compressive strength with the increase percentage of Soorh and Metakaolin and Workability of soorh modified mortar and metakaolin modified mortar was decreased when cement was replaced with soorh/metakolin up to 15% and then increased.

Keywords: Compressive Strength, Metakaolin, Soorh, Tensile Strength

PAPER ID: 48

COMPARATIVE STUDY OF REINFORCED CEMENT CONCRETE AND PRESTRESSED CONCRETE

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ABSTRACT

The purposed research work is an effort to determine why the PSC is better than RCC, but instead of being better we still use RCC at some places due to economic reasons and limited resources. Nowadays Reinforced Concrete structures and Pre-stressed Concrete Structures are mostly used. The reinforced concrete structure have many advantages as compare to steel structures so most of the high rise buildings are constructed by using reinforced concrete frame structures. Similarly most of the overhead bridges construction use pre-stressed concrete .It is very important to have a well knowledge about both RCS and PSC before the construction of structures for to avoid the failure of structure in the future. The cracking and deflection are common problem faced in design of reinforced concrete and pre-stressed concrete structure. Due to that reason the before the start of construction work proper structure design needs to be completed. So in this research work we are going to discuss the detailed study on Reinforce Concrete and pre-stressed Concrete, there advantages, disadvantages, properties and in the end there comparison with each other.

Keywords: PSC: Pre-stressed Concrete, RCC: Reinforced Cement Concrete, HRB: High Rise Building

PAPER ID: 51

THE EFFECT OF WATER QUALITY ON WORKABILITY OF THE CONCRETE

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ABSTRACT

This research investigates the effect of water in terms of pH value on the workability property (Slump) of the concrete. Five water samples were prepared as pH 5, pH 6, pH 7, pH 8 & pH 9 to study the effects. The study was carried out by employing the same water for mixing water as well as for curing water. The workability was tested with two mix design ratios (1:2:4 and 1:1.5:3) via Slump cone test method. The research showed that the maximum workability had been achieved by the mix having water of pH 7, while the workability achieved by water having pH value of 8 and 9 was greater than that of mix having water with pH value of 5 and 6.

Keywords: Concrete, Employing, Slump cone Test.

PAPER ID: 78

COMPARATIVE STUDY OF THE COMPRESSIVE STRENGTH OF CONCRETE BY PARTIALLY REPLACING COARSE AGGREGATE WITH COCONUT SHELL AGGREGATE

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ABSTRACT

This study examined the structural behavior of lightweight concrete made with crushed coconut shell aggregate (CCSA) and normal weight concrete with aim to investigate the effect of partial replacement at 5%, 10% and 15% with coarse aggregate. Coconut Shell is an Agricultural waste available in adequate quantity in the coastal regions of Sindh, Pakistan. This paper is focused on performance parameters such as workability, compressive strength and unit weight. The experimental results showed that workability decreased with increase in percentages of CCSA. The compressive strength also decreased with increasing percentage but at acceptable values. Compressive strength of plain concrete (M25) at 28 days was found to be 34.850 MPa, whereas compressive strength of 5%, 10% and 15% CCSA Concrete at 28 days were found to be 23.894, 22.765 and 21.740 MPa respectively. The density of CCSA concrete produced at above mentioned percentages lies in the range of medium lightweight concrete, which is 2100-2250kg/m^3, whereas, density of normal concrete is about 2400 kg/m^3. This shows that coconut shell aggregate can be used when there is a light structure and high strength is not needed.

Keywords: Crushed Coconut Shell Aggregate (CCSA), Slump, Compressive Strength, Light weight Concrete

PAPER ID: 81

EFFECT OF DIFFERENT TYPES OF SAND AND THEIR MIX RATIOS ON COMPRESSIVE & TENSILE STRENGTH OF CONCRETE

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ABSTRACT

The utilization of three types of sands and their mix ratios for concrete work is investigated in this project. Normal concrete is being produced from different types of sands and this imparts different property to resulting concrete. The most important property of concrete is its compressive strength. To evaluate compressive strength, three different types of sands with individual as well as mix proportion of sands were used. These types of sands obtained from different places such known as Ravi sand, Chenab sand and Lawrencepur sand. Preliminary laboratory investigation was conducted to ascertain the suitability of using the different sands and their mix ratios for construction work. Tests conducted include sieve analysis, bulk density and specific gravity. Nominal mix (1:2:4) was adopted for this work and mix compositions were calculated by absolute volume method. For each type of sands and mix ratio perform slump test, compaction factor test, compressive strength test by casting cylinders (300mm x 150mm) sizes and using machine to determine maximum compressive strength of concrete of the different mix at 7, 14, 28 days. Test result show that concrete made from Lawrencepur sand has the highest compressive and tensile strength and after the Chenab sand and Ravi sand respectively. Highest compressive strength also varies on different sand mix ratios according to percentage of Lawrencepur. We observe that when Fineness Modulus of Sand increases the Compressive Strength of Concrete also increased and other factors are also affect the Concrete strength which Connect with sand properties.

Keyword: Sand, Compressive, Tensile, Concrete

PAPER ID: 82

EFFECT OF CRUSHED OVER-BURNT BRICK ON THE COMPRESSIVE STRENGTH OF CONCRETE BY PARTIALLY REPLACING COARSE AGGREGATE

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ABSTRACT

Normal concrete contains 70-80% natural aggregate by volume, which has drastically raised the use of coarse aggregate resulting into diminishing of natural resources and affecting environment. So, it is necessary to use an alternate material which will also reduce the cost. This research investigates the effect of 20%, 25% and 30% replaced natural coarse aggregate with locally available crushed Over-burnt brick aggregate (OBA) on workability and compressive strength of concrete. The experimental tests showed non-linear results for workability as well as compressive strength. OBA concrete has density of 2270-2300 kg/m3 which lies in the range of medium lightweight concrete as compared to normal concrete having 2400 kg/m3 density. The slump value in 20%, 25% and 30% OBA concrete was 53mm, 55mm and 47mm respectively, whereas, slump value of normal concrete was 69mm. Plain concrete compressive strength(M25) was found to be 34.9MPa at 28 days of curing, whereas, compressive strength of 20%, 25% and 30% OBA concrete, at 28 days, was found to be 28.666 MPa, 26.600 MPa and 27.470 MPa respectively. This shows that over-burnt brick aggregates can be used for structural concrete when natural coarse aggregate is not easily available.

Keywords: Coarse-aggregate, Compressive Strength, Over-burnt Brick, Slump.

PAPER ID: 87

AN INVESTIGATION ON COMPRESSIVE STRENGTH OF CONCRETE BLENDED WITH GROUNDNUT SHELL ASH

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ABSTRACT

Concrete is frequently utilized infra-structural construction material all over the world. Cement is the main part of the concrete, during its manufacturing emission of gases such as carbon dioxide (CO2) from cement factories create greenhouse effect. In these days, various natural pozzolanic materials are used as partial replacement of cement to enhance strength and durability and to reduction in consumption of cement consequently reduction in carbon dioxide (CO2) emission. The aim of this research is to investigate the effect of groundnut shell ash as a cement replacement material on workability and compressive strength of concrete. One mix of ordinary concrete and five mixes of modified concrete were prepared, where cement is replaced by groundnut shell ash from 3% to 15% by weight of cement, with 3% increment with 1:2:4 binding ratio mixed with 0.5 water/cement ratio. The workability and compressive strength of concrete was investigated. The obtained outcomes demonstrated that, groundnut shell ash as a cement replacement material have significant effect on compressive strength of concrete.

Keywords: Compressive Strength of Concrete, Workability, Partial Replacement of Cement

PAPER ID: 89

AN INVESTIGATION ON MECHANICAL PROPERTIES OF CONCRETE REINFORCED WITH NYLON FIBERS

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ABSTRACT

Nylon is a synthetic fiber, which is used in various places because of its high flexibility, durability and strength however, it is discarding pollutes the environment. An alternative way of discarding the nylon fibers is to use it in concrete as reinforcement, which in turn enhance the mechanical properties of concrete. The aim of this research is to investigate the effect of Nylon Fibers on workability & mechanical properties of concrete. In present study, different fractions of nylon fibers of length 10mm & 20mm used in concrete and the effects of nylon fibers on mechanical properties of concrete reported. It observed from the conducted research, that the workability of Nylon fiber reinforced concrete decreases with increasing the content of nylon fibers. The maximum compressive strength of 28.82MPa obtained at fibers content of 1% for fibers of length 20mm, which is 31% more than that of control mix. The maximum tensile strength of 3.5MPa obtained at fiber content of 1% for fibers of length 20mm, which is 66.67% more than that of control mix. Based on conducted research, the inclusion of 1% of nylon fibers of length 20mm is optimum.

Keywords: Nylon fiber, Compressive Strength, Flexibility, Durability

PAPER ID: 105

MECHANICAL PROPERTIES OF RUBBER FIBRE REINFORCED CONCRETE

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ABSTRACT

Rubber waste generation is a huge problem in the entire world which poses enormous threats for the inhabitants in various forms endangering them critically from environmental as well as health perspective. The rubber waste generation in developing countries like Pakistan is not only a threat but a huge menace because of the absence of necessary essentialities. This research presents a sustainable approach which not only reduces rubber waste but also enhances the properties of concrete to our benefit. The rubber waste used in this research is in the form of fibres which is introduced inside the concrete mix at different percentages to alter the properties of concrete. The flexural strength test was performed for rubber fibre reinforced concrete at different rubber contents of 0.5%, 1.0%, 1.5% and 2.0% for both the mix designs of 20 MPa and 30 MPa. The number of samples i.e. beams casted for both the mix designs were 30 of dimensions 4”x4”x20”. The curing period for all the samples was fixed at 28 days in normal water. Conclusively, the rubber fibre reinforced concrete provided increased flexural strength at an optimum rubber content of 2.0% for 20 MPa and 1.0% for 30 MPa.

Keywords: Rubber Waste, Sustainable Concrete, Mechanical Properties, Rubber Fibre Reinforcement, Rubber Fibre Reinforced Concrete

PAPER ID: 118

EFFECT OF EFFECTIVE MICRO-ORGANISM ON TEMPERATURE VARIATION IN CONCRETE

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ABSTRACT

To promote sustainability in concrete, Effective Micro-Organism (EM) has been used in the construction industry for the last few years. The aim of the study is to identify the effect of EM on the properties of concrete, i.e. fresh, hardened, durability and monitor the temperature variation in concrete. The research is based upon the addition of 5%, 10%, 15%, 20%, 25% and 30% of EM by replacing water during the mixture of concrete. Concrete cube samples with the size of 100mm x 100mm x 100mm were prepared and tested for 3, 7, 14 and 28 days. The curing method was followed by water curing method. Laboratory tests had done which was temperature variation test, density test, Ultrasonic Pulse Velocity test, Initial Surface Absorption Test (ISAT) and compressive load test to identify the effects of effective micro-organisms in concrete. The result showed that compare to control sample EM sample offered better quality in term of all test. Using 10% of EM in the sample shown the highest compressive strength and also the lowest water penetration. It also increases the early strength of concrete that is really impressive. On the other hand, containing 15% of EM in concrete shows the lowest temperature during the hardening of concrete. In conclusion, the addition of EM in concrete shows a better positive effect on the properties of concrete, especially in temperature and durability.

Keywords: Durability, Effective micro-organisms, Water absorption, Hydration process, Temperature, Ultrasonic pulse velocity.

PAPER ID: 129

STRENGTH VARIATION IN STRUCTURE CONCRETE MADE WITH COARSE AGGREGATE AVAILABLE IN THE VICINITY OF KARACHI

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ABSTRACT

A Systematic research work was carried out in this regard to study the basic properties of aggregate in the vicinity of Karachi. Study also included research of concrete mix such as 1:2:4 (Normal concrete mix) with water cement ratio 0.5 along with different curing ages (3, 7 ,14 and 28 days). Bholari fine aggregate (hill sand) and Lucky cement contents were employed to study the behavior of two different coarse aggregate sources My Garri and Raise goth locally available in the surrounding of Karachi. My Gari based source crusher plants are Mubarak , Madina and Tanaawal . Raise goth based source crusher plants are Margala and Abaseen. Basic tests of all the coarse aggregates were carried out as per guide line of British Code. Structural concrete research study was carried out on the controlled specimens, such as standard cubes (6"x6"x6"). Compressive strength of all five different coarse aggregate made structural concrete were compared along with constant Bholari hill sand and Lucky cement with configurations of material ratio1:2:4, water/ cement ratio 0.5 and curing ages 3,7.14,28 days. Results of the present findings of five coarse aggregates are generally good for the use of this coarse aggregate material in construction. Nevertheless, test results are confirming the suitability of My Gaari based crusher plants coarse aggregate than the Raise goth based coarse aggregates.

Keywords: Aggregate, Concrete, Compressive strength, Karachi

PAPER ID: 132

POTENTIALITY OF COAL BOTTOM ASH AS SAND AND CEMENT REPLACEMENT MATERIAL IN CONCRETE

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ABSTRACT

Concrete construction offers great opportunities to replace natural sand and cement with industrial waste such as coal bottom ash (CBA), which brings environmental and technical benefits for the sustainable development. This study evaluated the potentiality of CBA as sand and cement replacement in concrete. In the experiments, three group of concrete mixes were prepared; one is control mix (CM), second group with sand replacement at a proportion of 5% to 20% by weight of sand and third group with cement replacement at a proportion of 10% to 30% by weight of cement. Total 48 specimens were cast to evaluated compressive strength performance at 7 and 28 days. It was found that the workability was decreased with the increases in the amount of CBA as sand or as a cement in the concrete mix. However, the highest concrete compressive strength was recorded with 15% CBA utilization as a sand replacement, which gives almost 29.5% higher than the CM at 28 days. Subsequently, concrete containing 10% proportion of CBA as cement replacement was declared as optimum, which gives 9.5% higher compressive strength than the CM. Hence, this study acknowledged that incorporation of CBA in concrete could enhances its strength performance.

Keywords: Cement replacement, Compressive strength, Concrete, Sand replacement, Workability.

PAPER ID: 153

FRESH AND HARDENED PROPERTIES OF SELF-CURING CONCRETE AND ITS COMPARISON WITH CONVENTIONAL CONCRETE

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ABSTRACT

Concrete technology is a rapidly advancing field. Over the passage of time numerous innovations in concrete have led to the alleviation of its users. Water is a chief constituent of concrete. It bears paramount importance even after the placing of concrete; as it requires water to carry its strength developing reactions. Due to its exposure to atmosphere, the water in concrete is evaporated, which causes shrinkage cracks and compromises strength. To prevent this, 'Curing' is performed. Curing is the maintaining of suitable moisture content and temperature in concrete. The time required for curing is a stagnation for building time, increasing both the cost and efforts. The idea of Self-curing concrete proved to be a promising solution. The purpose of Self-curing agents is to minimize the water evaporation from concrete, thereby increasing the ability of concrete to retain water, as compared to conventional concrete. Over decades, these agents have become a growing demand in the field of concrete technology. These 'Self-curing' agents affect properties of concrete like; Strength, Workability and durability-both indulgently and drastically. This study includes the examination of the effect of Polyethylene glycol (PEG-400) in ratios of 0%, 0.5%, 1%, 1.5%, 2% on compressive strength, split tensile strength and workability of concrete. It has been observed that ratios 1% and 1.5% have yielded satisfying results.

Keywords: Curing, Self-curing concrete, Hydration, Polyethylene glycol (PEG), Strength and Workability

PAPER ID: 167

EFFECT ON MECHANICAL PROPERTIES OF CONCRETE BY PARTIAL REPLACEMENT OF CEMENT WITH MARBLE POWDER AND ITS COST EFFECTIVENESS

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ABSTRACT

Construction industry plays an important role in the development of infrastructure of a society. Concrete is the utmost used construction material in modern construction industry having high strength, durability, stability and resistance to withstand severe weather and environmental conditions. Cement as a binder, provides strength properties to concrete. Marble is also used in the modern age as supplementary/additive in the concrete industry. This research was carried out to check the properties of concrete when cement was replaced with waste marble powder. In this research work, water to cement ratio was selected as 0.56. All other requirements were met according to the related international standards. The mixed samples of concrete were prepared by partial replacements as 0%, 3%, 6%, and 9% of ordinary Portland cement (OPC) with marble powder. Observations revealed that slump value of mixed samples were reduced by increasing the percentage of marble powder, moreover, it was found that compacting factor also has the adverse effect after the partial replacement of cement with marble powder. The compressive strength of concrete increased with the increase in marble powder content up to 6% and then reduced. Overall, the compressive strength of concrete increased due to low workability caused by the addition of marble powder. It is also concluded from this research that the marble powder, as an additive enhanced the properties of fresh and hardened concrete and reduced the overall cost of research work up to certain level. This research work fully endorses that marble powder is environmental friendly material in nature and can be used as a potent partial replacement of cement in construction industry.

Keywords: Marble Powder, Concrete, Workability, Compressive Strength, Cost Analysis

PAPER ID. 188

BEHAVIOUR OF TENSILE STRENGTH ENERGY TO CONTROL CONCRETE SPALLING IN RIGID PAVEMENTS BY USING RICE STRAW CONCRETE

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ABSTRACT

Roads and pavements are very essential for the development of any country. Flexible pavements are used for light weight traffic while rigid pavements are used for the movement of heavy vehicles. Many flaws are erected in rigid pavements by means of historical activity, containing early age microcracks, crazing, spalling and surface erosion. Due to these defective flaws, the durability and serviceability of rigid pavement will be reduced. The spalling of rigid pavements can be controlled by controlling compressive strength, tensile strength and flexure strength of concrete in rigid pavement. The aim of this research is to evaluate the effect of rice straw as reinforcement in concrete. It has been noted that properties of concrete improved by adding rice straw in concrete due to its low density, more ductility, lightweight, and resistant to heat. The general aim of the research is to enhance tensile strength of concrete to control the spalling in rigid pavements through rice straw fibre concrete (RSFRC). The tensile strength of RSFRS and plain cement (PC) concrete has been compared. The design mix ratio of 1:2:4 has been used along with 0.6 water to cement ratio while 5cm rice straw at 0.5% has been added in that concrete. The workability of RSFRS concrete was reduced as compare to PC. The production of cracks was reduced in RSFRS concrete as it can absorb more energy as compare to simple concrete. The toughness index of this concrete has been improved to 27% as compare to ordinary concrete which may help in reducing spalling of concrete in rigid pavement. Future research can be done by adding suitable admixtures in RSFRS to improve more properties of concrete.

Keywords: Concrete, Rice Straw, Plain Concrete, Split Tensile Test and Toughness Index

PAPER ID: 190

EVALUATION OF PROPERTIES OF CONCRETE BY USING MARBLE DUST AS PARTIAL REPLACEMENT OF SAND

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ABSTRACT

High demand of infrastructure has generated enormous focus on the concrete industry to produce a large amount of high strength concrete. The concrete strength depends on its constituent and their properties and qualities. Sufficient mixing of the constituents in desirable quantities gives reasonable strength to concrete. Due to fast-growing concrete structures, natural resources are depleting and consequently concrete industry giving devotion towards a suitable fine aggregate that can replace the natural river sand. Utilization of factory by-products or aggregates obtained as waste material probably decrease the adverse environmental impact and waste management cost, reduction in concrete cost and possibly improve concrete strength. The optimum percentage of marble dust to replace sand is determined on the basis of compressive strength and splitting tensile strength of concrete. This investigation is done to contemplate the impact of marble dust on compressive quality and elasticity when fused in concrete as a halfway substitution of sand. In this study, sand is partially replaced with marble dust in the ratios of 0%, 3%, 6%, 9%, 12%, and 15% to improve the performance and quality of concrete. The results show at 12 % of replacement of sand by marble dust, the compressive strength of concrete increased 13.34 % and splitting tensile strength increased 21.19 %. When increased in marble dust percentage the slump value of concrete decreased due to water absorption properties of marble dust. At optimum percentage of replacement of marble dust, some other mechanical properties of concrete like binding properties, spalling resistance, cracks and micro cracking control have also improved.

Keywords: Compressive Strength, Splitting Tensile Strength, Partial Replacement of sand

PAPER ID: 191

EVALUATION OF ORDINARY CONCRETE HAVING CERAMIC WASTE POWDER AS PARTIAL REPLACEMENT OF CEMENT

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ABSTRACT

Cement is the most important ingredient of concrete mix. Cement is useful as well as an environmentally hazardous material. Huge amount of CO2 is emitted during its manufacture. Present study aims to partially replace the cement in concrete by ceramic waste powder (CWP). CWP from local ceramic factory was acquired. The chemical composition of CWP confirmed that it possessed the pozzolanic characteristics. Control concrete specimens along with those containing 10 % and 20 % partial replacement of cement by CWP were cast and tested against slump, density, compressive and flexural strengths. The results revealed that the compressive strength reduces by a margin of 11% and 23 % of that of control specimens for 10 % and 20 % replacement respectively. However, there is an increase in workability, density and flexural strength of the concrete. Based on the results, it is recommended that finer ceramic particles passing through ASTM sieve # 200, with an admixture may be used to counter the reduction of compressive strength of the concrete containing partial replacement of the cement by CWP. This will reduce the environmental hazards, posed by the CO2 emission by cement and environmental burden due to deposition of CP in landfills.

Keywords: Concrete, Cement, Ceramic Powder, Workability, density, Compressive Strength, Flexural Strength, Environment.

PAPER ID: 209

USE OF POLYPROPYLENE FIBERS IN CONCRETE MIXTURES PRODUCED WITH CRUSHED STONE SAND AS FINE AGGREGATE

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ABSTRACT

Effect of polypropylene fibers on the rheological, mechanical and durability characteristics of concrete mixtures produced with crushed stone aggregate as fine aggregate was experimentally investigated in this project. Slump and density of fresh concrete mixtures and compressive, flexural and split tension strengths of hardened concrete mixtures were investigated. While durability characteristics of these concrete mixtures were tested, using moisture sorption test. Four concrete mixtures were produced using polypropylene fibers of 0.35 in. length with fiber-volume fractions of 0%, 0.25%, 0.50%, and 0.75%. In all mixtures, crushed stone sand was used as fine aggregate. Test results showed that slump values of fresh concrete dropped with increase in dosage of polypropylene fibers, while no appreciable change in fresh concrete density was recorded as a result of incorporation of polypropylene fibers in the concrete mixtures. Compressive and flexural strengths of hardened concrete increased with increase in dosage of polypropylene fibers. On the other hand, concrete mixture with 0.50% fiber-volume fraction showed the highest split tension strength. Moisture sorption characteristics of polypropylene fibers concrete mixtures were comparable to that of control mixture. The use of polypropylene fibers in concrete mixtures produced with crushed stone sand as fine aggregate is thought to be a good practice towards enhancing the compressive, flexural and split tension strengths resulting concrete mixtures without compromising the durability attributes of these admixtures. The use of crushed stone sand replacing normal sand in concrete mixture also proved to be a viable practice.

Keywords: Concrete, Polypropylene Fibers, Strength, Durability

PAPER ID: 216

A REVIEW ON REPLACEMENT OF STEEL WITH GFRP REBARS IN FIBER REINFORCED CONCRETE ECCENTRIC RECTANGULAR COLUMN

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ABSTRACT

GFRP longitudinal rebars is utilized as a substitute to steel rebars in reinforced concrete (RC) structures. Although international design codes does not suggest the use of GFRP rebars in RC compression members. But recent studies showed improvement in performance of GFRP RC in compression members. The aim of this research paper is to present a brief literature review on effectiveness of GFRP rebars in RC rectangular columns for better understanding of the performance under eccentric load conditions. An overview of different natural fibers in enhancement of ductility and dynamic properties of concrete has been also reported. Different parameters are considered and categorized according to column cross section sizes, spacing, concrete types, load eccentricity and reinforcement ratios. The analyzed data indicated that some of the researches revealed enhancement in the performance of GFRP RC rectangular columns under eccentric loads while others revealed reduction in capacities. The output of utilization of natural fibers for improvement of various properties of concrete has been discussed to draw conclusions. GFRP rebars can be used in different manners but still there is more investigation needed to explore the behavior under different load conditions.

Keywords: Ductility, eccentricity, GFRP rebars, natural fibers, rectangular Columns

PAPER ID: 268

USE OF WHEAT STRAW ASH AS CEMENT REPLACEMENT MATERIAL IN THE CONCRETE

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ABSTRACT

Many researchers are conducting experimental studies that focus on finding the possibility for alternatives to be used as cement substituting materials that are eco-friendly, economical and effective. The alternatives include industrial and agricultural wastes, whose potential benefits can be appreciated through recycling, reutilizing and renewing processes. With utilization of these wastes as supplementary and replacement materials there is considerable energy conservation and reduction in the consumption of cement which aids in the reduction of release of carbon dioxide in the environment. In this research work, wheat straw ash an agricultural waste is used as cement replacement material. The cement replacement percentages are 0%, 5%, 10%, 15% and 20%. A total 45 cubical specimens were cast, cured and tested at the curing ages of 7, 28 and 90 days and compressive strength of concrete was determined. The results showed maximum compressive strength at 10% cement replacement and minimum strength at 20% cement replacement.

Keywords: Agricultural Waste, Cement Replacement, Wheat Straw Ash


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PAPER ID: 22

INVESTIGATION OF THE USERS' INTERACTION WITH ONLINE REAL ESTATE PLATFORMS IN AUSTRALIA

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ABSTRACT

Online Platforms (OP) are increasingly being used for e-business in different sectors. With the advances in the internet-based business, OPs are increasingly being used for increasing global outreach and attracting more users in different industries. Real Estate industry, following the global trends, has developed multiple OPs that are currently being used for property-related business and purchase decisions. Although increasing used in the industry, Real Estate Online Platforms (REOPs) have never been investigated from the user's perspective to document their experience of online property information search. The current study explores the REOP based information from the users' perspective in Sydney Australia. Based on 108 responses collected on a 20 questions survey, three hypotheses pertinent to REOPs are formulated and investigated. The results show that most of the users are aware of REOPs and are using it easily. Further, the OP design and context is giving a good impression to the users. However, when it comes to decision making based on the OPs, the users are not necessarily making better decisions. This is giving rise to post-purchase regrets among the real estate users. This anomaly is linked to a lack of information provided on the REOPs such as the property photos, neighborhood insights, and real estate agencies' delayed response. The results are expected to lay the foundation for OP based technology acceptance in Real Estate.

Keywords: Real Estate Online Platforms (REOPs), Property Information, Online Platforms Acceptance, Technology Acceptance Model (TAM), User's Perception, Real Estate Management.

PAPER ID: 23

REAL ESTATE STAKEHOLDERS TECHNOLOGY ACCEPTANCE MODEL (RESTAM): USER-FOCUSED BIG9 DISRUPTIVE TECHNOLOGIES FOR SMART REAL ESTATE MANAGEMENT

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ABSTRACT

Digital disruptive technologies are an integral component of the modern world. These technologies are transforming the global industries from traditional to more innovative and adaptive. However, the state of global real estate is yet to improve and is currently lagging the technology curve. Because of this lag, useful information is either not made available to the end-users or is shared too late that is raising concerns among the online real estate platform users. This results in larger vacancy rates and post-occupancy regrets among the service consumers. The current study based on the concepts of Technology Acceptance Models (TAM), presents a conceptual Real Estate Stakeholders Technology Acceptance Model (RESTAM) for addressing the key needs of the four important stakeholders of the real estate industry including the end-users or consumers, government & regulatory authorities, agents & agencies and complementary industries. Based on comprehensive literature review of 213 articles, the needs of these stakeholders are assessed and addressed through the Big9 technologies namely drones, the internet of things (IoT), clouds, software as a service (SaaS), big data, 3D scanning, wearable technologies, virtual and augmented realities (VR & AR), and artificial intelligence and robotics. The resulting RESTAM framework with a specific focus on the online platform based real estate users are expected to lay the foundation for introducing the missing technology acceptance model for real estate stakeholders whereby these Big9 disruptive technologies are implemented in real estate industry to uplift it from traditional to smart real estate. This will reduce the post-occupancy regrets of the real estate service users and improve the relations between various real estate stakeholders.

Keywords: Smart Real Estate Management, Technology Acceptance Model (TAM), Real Estate Stakeholders Technology Acceptance Model (RESTAM), Big 9 Technologies, SISQual Approach.

PAPER ID: 52

DEVELOPING CONCEPTUAL FRAMEWORK TO IMPROVE THE EFFICIENCY OF DISPUTES AVOIDANCE IN PUBLIC SECTOR ROAD PROJECTS IN PAKISTAN CONSTRUCTION INDUSTRY

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ABSTRACT

Pakistan construction industry is one of the fastest growing economic industry in the construction and development of infrastructures. It has become the second largest industry in the country's gross domestic products (GDP) and labor force. This sector includes a verity of projects in road developments sector like, smart motorways, highways and other major districts road in last decades, unwillingly many disputes in road construction projects has been seen. Hence disputes have bad consequences over time, quality and cost of the project, which may fail the successful completion of the project. However there is a clear gap in literature, not focusing on disputes avoidance in the construction sector of Pakistan. The main aim of this research is to improve the efficiency (outcomes) of disputes avoidance in public sector road construction projects, through the development of a disputes avoidance framework. To achieve this aim data was collected through qualitative and quantitative methods. Semi-structured and structured interviews were conducted. Totally 150 questionnaire were sent to the relevant stakeholders from which 105 were successfully received in which most significant issues were identified which are leading to disputes in public sector road construction projects of Sindh province. And suggested some disputes avoidance strategies to overcome from disputes during road construction projects. Furthermore critical success factor and mutually relationship with disputes avoidance strategies were also identified. Finally a conceptual framework was developed for better understanding in disputes avoidances and to improve the efficiency of disputes avoidance in public sector road construction projects.

Keywords: Construction Industry, Road Projects, Disputes, Problems which are leading to disputes, Disputes avoidance strategies and conceptual Framework.

PAPER ID: 88

CAUSES OF HEAT STRESS AND THE CONSEQUENCES ON CONSTRUCTION PROJECTS IN EXTREME HOT WEATHER: A CASE STUDY OF SINDH

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Highly concerned issue of global warming is affecting the workers of several outdoor industries including construction. Health and safety parameters of such industries are extremely important to be assessed and tackled. Current research work presents a crucial aspect of the regions having hot weather i.e., causes and consequences of stress generated due to heat, affecting the construction projects. Case-based analysis was conducted within the planned scope. Numerous causes of heat stress are categorized in four group i.e., metrological, personal, working practices, protective equipment. The analysis also revealed that 'Productivity losses', 'Bad quality work' and 'Delay in project completion' are the top-most critical consequences of heat stress.

Keyword: Heat Stress, Consequences, Construction Manpower, Health & Safety, Extreme Hot Weather, Sindh

PAPER ID: 90

RISKS, CHALLENGES, BENEFITS AND OPPORTUNITIES ASSOCIATED WITH BOT PROJECTS IN PAKISTAN: A CASE STUDY ON M-9 MOTORWAY PROJECT

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ABSTRACT

The trend of BOT projects is increasing in Pakistan day by day. Such projects provide good opportunity for clients to invest their resources in other programs and also provide good opportunity for contractors to increase their revenues during the concession period. But, on the other hand, there are also some risks and challenges which are faced by the concerned parties in these projects. This study identifies the major risks and challenges faced as well as the major benefits and opportunities obtained from recently constructed BOT project in the country M-9 motorway and interviews have been conducted from various professionals related to this project from the concerned parties. The major risks, challenges, opportunities and benefits obtained from this project by all parties are identified and recommendations are given to mitigate those risks and challenges for successful execution of future BOT projects to be constructed in Pakistan.

Keywords: BOT, Risks, Challenges, Execution, Management

PAPER ID: 91

ASSESSMENT AND DEVELOPMENT OF FRAMEWORK OF BUILDING MAINTENANCE MANAGEMENT PRACTICES IN CONSTRUCTION INDUSTRY OF PAKISTAN

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ABSTRACT

In a modern era where construction industry keeps on booming at high rate, the proportion of building maintenance is also growing in parallel because of increasing awareness of current need to manage condition of the building stock more efficiently. Not only the Life span of buildings can be increased by proper implementation of maintenance management practices, but premature failure of building elements can be catered as well. In the light of rapidly increasing demand of building stocks in a developing country like Pakistan, maintenance of buildings and the assessment of their management practices is the main objective of this paper. The study of this paper is based on assessment of maintenance processes, policies and practices by carefully inspecting residential and commercial buildings in Lahore. Data collection was done through field survey, interviews from the building users, visual inspections and photographic & Observational studies. The results showed that maintenance management practices of buildings are the most neglected part and buildings being in the state of disrepair become a continues threat to its users. Furthermore, this study has concluded all maintenance management practices by introducing an implementation framework for Construction Industry of Pakistan.

Keywords: Construction Industry, Maintenance framework. Maintenance management,

PAPER ID: 95

IMPACT OF LEAN CONSTRUCTION TECHNIQUES ON EFFICIENCY OF TIME AND COST IN COMMERCIAL BUILDINGS

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ABSTRACT

The traditional construction practices have not been successful to deliver projects timely and with-in budget completion. That's the reason, more than 90 % of projects gets over budgeted or completely uncontrolled. This reason is enough to question the conservative industry and consider what possibilities there might be in the future to solve these problems. Thus, new methods like "Lean Construction" have been developed in recent years to overcome these problems. Lean construction focusses on the reduction of waste and effectiveness of time and cost of projects. Many developed countries have adopted lean construction techniques to overcome the planning and waste management issues. Pakistan has not yet planned to shift to lean construction techniques. So, this study focusses on identification of appropriate lean tools for construction industry of Pakistan and their implementation on existing project along with their benefits in construction management system. Moreover, this study provides a framework for the implementation of lean philosophy in construction industry so that one can attain maximum benefit out of lean as well as this study will be valuable to create consciousness among the professionals in the construction industry of Pakistan to plan for executing lean technology for pre-construction analysis, visual coordination and better performance of the project rather traditional approaches in order to reduce waste in terms of time and cost of the project.

Keywords: Cost Conservation, Lean Construction, Lean Tools, Traditional Construction, Time Conservation

PAPER ID: 121

INVESTIGATION OF CONTEMPORARY PROCUREMENT METHODS IN PUBLIC CONSTRUCTION PROJECTS IN PAKISTAN

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ABSTRACT

Procurement method is indispensable in achieving the performance of construction projects. Several studies found that projects are failed owing to defects in procurement methods. Henceforth, this study aims to investigate the present condition of Pakistan's public projects in connection to procurement method selection. Data collection instrument was devised in the form of a questionnaire. Frequency analysis was employed to analyze the data in MS Excel. The study found that traditional and management types of procurement methods are more familiar and frequent methods in public projects. Furthermore, the study concludes that traditional and design-build methods are preferred in buildings and roads projects. The management method is mostly adopted for building and irrigation projects and public-private partnership employed to roads and irrigation sector.

Keywords: Traditional, Design &Build, Management oriented, Public-private partnership

PAPER ID: 127

ATTRIBUTES IDENTIFICATION FOR PERFORMANCE LEVEL ENHANCEMENT IN SUPPLY CHAIN MANAGEMENT

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ABSTRACT

Globally, Construction Industry plays a fundamental role in the development of all domains of the life, from more than two decades Supply Chain (SC) is the one of most important area in the field of construction engineering. In today's extendable market, competitive globe the demand of 3M (Materials, Manpower & Machinery) management from manufacturer to consumer is increasing day by day. Many researches have carried out their research work in Supply Chain Management (SCM) but it is still lacking in the subjects of Attributes Identification for Performance Level Enhancement in Supply Chain Management in building construction sector. Hence the purpose of this research is to investigate the factors improving the importance level of construction industry players (Client, Consultant, Contractor). A detailed literature review has been carried out to identify the factors and the factors are validated by unstructured interviews from the experts working in the industry. The outcome of this study will help to augment the Attributes Identification for Performance Level Enhancement in Supply Chain Management in building construction sector practices in construction projects, total 150 questionnaires were sent to respondents working in the building construction sector and hence 111 received form succeeded respondents the collected data were analyzed through SPSS software for the analyses of mean and standard deviation values according to Rogers Adoption classification Highly Effective (HE) value were taken as 4.1 mean value.

Keywords: Supply Chain Management (SCM), Importance of various attributes influencing SCM, Construction Industry.

PAPER ID: 163

THE IMPLEMENTATION OF QUALITY MANAGEMENT SYSTEMS IN CONSTRUCTION INDUSTRY, SINDH

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ABSTRACT

This paper explores the implementation of quality management systems (QMS) in the construction industry of Pakistan. Manufacturing companies have widely applied (QMS) to improve their organizational performance by standardizing their processes. There is lack of literature related to implementation of QMS in construction companies of Sindh. Therefore, principal objective of the study is to assess the level of implementation of QMS in construction companies of Sindh. Questionnaire survey was conducted to collect the data. The results show that the majority of firms have a quality manager in their companies and have adopted some concepts related to QMS. However formal implementation of well recognized approaches (ISO 9001, OHSAS18001, Lean Management, and TQM) is reasonably less. The study suggests that formal implementation of QMS will not only help construction organization in improving product, quality but it will also provide competitive advantage.

Keywords: Quality Management System, Construction Industry, TQM.

PAPER ID: 178

AN ASSESSMENT OF HEALTH & SAFETY MEASURES AT CONSTRUCTION SITES: A CASE STUDY OF QASIMABAD & LATIFABAD, HYDERABAD

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ABSTRACT

Health and safety issues have always been a major problem and concern in the construction industry especially in developing countries like Pakistan. The main aim of this research is to investigate the health and safety measures adopted on different construction sites of Qasimabad and Latifabad, Hyderabad. In order to collect the data, a questionnaire survey and interviews were conducted from different stakeholders from sixteen projects in Qasimabad and Latifabad. The results revealed that all construction sites have a lack of health and safety facilities such as safety officer, first aid box, permit to work, PPE's, signboards, mobile elevated working platforms, and awareness. Therefore, it is highly recommended that prior to the execution of any construction work, proper training and all health and safety facilities must be provided so that human life can be saved from different accidents.

Keywords: Construction Industry, Health and Safety, Qasimabad and Latifabad, Hyderabad.

PAPER ID: 189

EVALUATION OF BARRIERS AND OPPORTUNITIES FOR INTEGRATED MANAGEMENT SYSTEM IMPLEMENTATION IN CONSTRUCTION INDUSTRY OF PAKISTAN

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ABSTRACT

Construction industry not only improve the infrastructures of the country but also increase the overall economy of the country by increasing the gross domestic products GDP. Almost 60% to 70% of the overall GDP of the country is dependent on the construction industry. This industry deals with the construction of small structures like houses, apartments, offices to multistory buildings like shopping malls, skyscrapers and institution buildings. It also covers the infrastructures like dams, roads, airways railways and motorways. The integrated management systems cover the management of quality, environment effects and health and safety of crew workers during and after the construction projects. This trend got significant increase in the interest of researchers to work over this topic. In this research various models of integration of management systems from academics and construction industry of Pakistan were used and then the barriers were identified in the implementation if integrated management system in construction industry of Pakistan. The results show that only few organizations are using integrated management systems for the betterment of organization and other organizations are not using any well-known management system. Similarly, smaller organizations do not have integrated management systems and these organizations are not even willing to adopt the management system rather these organizations refer only quality management system to satisfy the client. Only few large organizations are providing trainings to their worker and trying to implement integrated management systems along with quality management systems while the medium scale organizations are only focusing the safety and quality management systems and not willing to use integrated management systems. It is recommended that the governing bodies must force the organizations to implement these integrated management systems to save the workers as well as environment. Timely trainings must be provided to the staff for the betterment of industry and country.

Keywords: Integrated Management System, , Construction Industry In-practice Procedures, Improvemnet in Construction Quality and Standards Procedures.

PAPER ID: 201

AN ASSESSMENT OF PERCEPTION OF ENGINEERING STUDENTS TOWARDS ENTREPRENEURSHIP INCUBATION

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ABSTRACT

This research aimed at identifying the role of business incubators in developing entrepreneurship and creation of startups. Furthermore, it also studied the perception of Engineering Students towards incubation centers. As Mehran UET, has a very progressive incubation center that attempts to help, and inculcate entrepreneurial spirit among the university students. Data was collected from 635 students in various departments of the University. As Mehran UET consists of 5 faculties with various departments therefore Random sampling was used. The Reliability was analyzed by cronbach alpha and was within High in range, Normality Analyzed through Histogram bell shape then One-Way ANOVA, was performed to test hypotheses. As the Mehran UET students are more technically versed therefore the results were varied in several dimensions and had both positive and negative perception towards incubation. But that could be explained in the manifestation of entrepreneurship itself as they were less familiar with the business concepts. The implications for education managers are that inclusion of enterprise courses into the study plans of engineering students should be considered. The study extends insights from also considering the perception of students and has a key limitation as it was cross-sectional data and collected from only one engineering University.

Keywords: Incubation Centers, Engineering Students, Perception, Entrepreneurship

PAPER ID: 227

IMPACT OF LEAN CONSTRUCTION TECHNIQUES ON EFFICIENCY OF TIME AND COST IN COMMERCIAL BUILDINGS

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ABSTRACT

The traditional construction practices have not been successful to deliver projects timely and with-in budget completion. That's the reason, more than 90 % of projects gets over budgeted or completely uncontrolled. This reason is enough to question the conservative industry and consider what possibilities there might be in the future to solve these problems. Thus, new methods like "Lean Construction" have been developed in recent years to overcome these problems. Lean construction focusses on the reduction of waste and effectiveness of time and cost of projects. Many developed countries have adopted lean construction techniques to overcome the planning and waste management issues. Pakistan has not yet planned to shift to lean construction techniques. So, this study focusses on identification of appropriate lean tools for construction industry of Pakistan and their implementation on existing project along with their benefits in construction management system. Moreover, this study provides a framework for the implementation of lean philosophy in construction industry so that one can attain maximum benefit out of lean as well as this study will be valuable to create consciousness among the professionals in the construction industry of Pakistan to plan for executing lean technology for pre-construction analysis, visual coordination and better performance of the project rather traditional approaches in order to reduce waste in terms of time and cost of the project.

Keywords: Cost Conservation, Lean Construction, Lean Tools, Traditional Construction, Time Conservation

ENVIRONMENTAL POLLUTION & CONTROL


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PAPER ID: 06

ASSESSMENT OF TOXICITY POTENTIAL OF SULFAMETHOXAZOLE (SMX) IN GRASS CARP USING MULTI-BIOMARKER APPROACH

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ABSTRACT

Pharmaceuticals are considered as emerging contaminants due to their frequent use, detection in different environmental matrices in high concentrations and the potential risk to the ecosystem. Sulfonamides such as Sulfamethoxazole (SMX) have been predominantly used to treat bacteria and other diseases because of their low cost and effectiveness in tackling bacterial infections. SMX are not acutely toxic but has chronic effects on organisms. Fish are highly sensitive to even slight environmental changes; their physiological and biochemical alterations reveal the health status of organism and its surroundings. Fish biomarkers such as Biochemical Parameters, Respiratory Burst Activity and Oxidative Stress in blood and organs were routinely analyzed after exposed with Sulfamethoxazole to assess the health condition of the fish in the present study. Acute toxicity of SMX in fish was measured by exposure to different concentrations ranging from 200-1200mg/l. Lethal dose (LD_{50}) finds out at <700 mg/l after 72 hrs. Sub-acute toxicity was calculated by exposing fish to different concentrations of SMX. The findings suggest that existence of a cause-and-effect relationship between exposure to sulfamethoxazole and Enzymatic Activity (Respiratory Burst Activity), change in biochemical parameters, and excess generation of ROS indicate that antibiotic exert oxidative stress and cause toxicity in fish tissues.

Keywords: Sulfamethoxazole, fish Toxicity, Biomarkers, Biochemical Parameters, Respiratory Burst Activity, Oxidative Stress

PAPER ID: 10

INVESTIGATION ON CLINICAL WASTAGE ISSUES OF HYDERABAD CITY

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ABSTRACT

Increasing population & urbanization enhanced several facilities for public; health facilities are among such top priority of human being. Beside these health facilities, an immense amount of clinical waste is generated everyday throughout Pakistan. There are more than 150 health facilities in Hyderabad City only. As per past findings, the total clinical solid waste generation rate in Hyderabad city is 8 tons/day. Moreover, the clinical waste management has become a critical environmental concern in the city. This study illustrates the existing clinical waste management issue of Hyderabad city including; classification of different types of clinical waste, its generation rate and contribution of public & private organization involved in clinical waste management. The research also focusses on generated amount of recyclable and non-recyclable clinical wastage. To investigate the data, three major hospitals of Hyderabad city were targeted i.e. Rajputana hospital, Civil hospital & Bhittai hospitals. The data collection involves various interviews with the authorities of these hospitals, and unstructured interview with personnel involved in the management of clinical waste. Furthermore, several personal visits on waste disposal sites of the hospitals took place to have more data. This study results in unfolding several issues involved in clinical waste and the concern problems of the facilities. This investigation is a road map for the concerned authorities to pay attention over these serious growing issues of the city and the country, and resolve the consequences of such wastages on human health.

Keywords: Clinical wastage, Clinical waste management, Hyderabad

PAPER ID: 11

CONDUCTING A STUDY TO TACKLE THE ISSUE OF PLASTIC SHOPPING BAGS- A CALL FOR GREEN ENVIRONMENT- A CASE STUDY OF HYDERABAD

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ABSTRACT

Plastic pollution involves the accumulation of plastic products in the environment that adversely affects humans. Plastic pollution can unfavorably affect lands, waterways, oceans, living organisms and marine animals can also be affected through direct ingestion of plastic waste. According to a study, about 8 million tons of plastics are deliberately dumped into the environment globally. Minister for Climate Change Senator Mushahidullah Khan said in the Senate that as many as 55 billion plastic shopping bags are being used each year in Pakistan with their use increasing by 15 percent per annum. Today, Pakistan is the second largest consumer of plastic with the domestic consumption of 2.7 kg, the aim of research paper is to briefly discusses about the types of plastic it's usage and threats to biodiversity and to provide possible measures & practical solution to reduce usage, threats and risks of plastic pollution. The research focuses majorly on plastic shopping bags. The research methodology which author adopted include field survey regarding the types of plastic, their different usage and the measures to reduce it, this paper will also help in providing the alternate of plastic bags which will not only help in reducing the plastic pollution but also will help in making the environment more organic.

Keywords: Bio diversity, Environment, Organic, Plastic pollution, Shopping bags.

PAPER ID: 71

EFFECT OF SEPTIC TANK EFFLUENT ON THE QUALITY OF GROUNDWATER

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ABSTRACT

Groundwater contamination is the main problem that is faced by various countries of the world including Pakistan. Maintaining the quality of drinking water extracted from various resources is very crucial as it directly affects public health and the surrounding environment. The main factor affecting groundwater quality is the handling of wastewater. To collect the domestic wastewater, underground septic tanks are used that serve as the onsite treatment systems. Due to the lack of maintenance of these tanks, the wastewater discharged into these tanks makes its way through the underlying layers of soil and pollutes the groundwater. The aim of this study is to analyze the effect of domestic wastewater on the quality of groundwater aquifer. In this regard, samples were collected from the handpumps and tube-wells in the vicinity of the septic tank. The selected site is Mirani Village situated at 5km east of Hyderabad, Sindh. A series of physical, chemical and biological tests were carried out for all the samples. It was observed that the quality of water is badly affected due to the intrusion of domestic wastewater in the groundwater aquifer. The obtained results show that pH, Calcium, Nitrate and Microbial contamination were beyond the permissible limit of WHO guidelines for drinking water.

Keywords: septic tank, treatment, wastewater, groundwater.

PAPER ID: 76

EFFECTS OF PESTICIDES ON THE QUALITY OF SHALLOW GROUNDWATER IN THE SUBURBS OF HYDERABAD CITY

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ABSTRACT

This study was carried out to assess the effects of pesticides on the quality of groundwater in the suburbs of Hyderabad city. The water quality was assessed in terms of physicochemical, and microbiological parameters. To determine the water quality parameters, fifteen samples were collected from the different locations/villages in the suburbs of Hyderabad city. To know the present status of groundwater quality, the physicochemical parameters such as pH, Turbidity, Total Dissolved Solids (TDS), Total Hardness, Calcium, Magnesium, Sulfate, and Chlorides were analyzed. The obtained results were compared with WHO guidelines for drinking purposes. It has been observed that the groundwater of most of the samples were found contaminated, this means quality parameters were exceeding WHO guideline for drinking purpose. A significant concentration of Chlorpyrifos (pesticide residues) has also been observed in groundwater samples of some villages.

Keywords: groundwater, suburbs, physicochemical, WHO, chlorpyrifos, pesticides.

PAPER ID: 104

ASSESSMENT OF HEAVY METALS IN POULTRY FEED OF HYDERABAD, SINDH

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ABSTRACT

Poultry is used worldwide as one of the food items and continuously growing throughout society. It is fact that the growth of poultry depends upon the feeds and that feeds contain different pollutants including heavy metals. This study investigates the concentrations of heavy metals; Lead and Chromium in chicken feed, obtained from commercial markets of poultry feed and local poultry farms of Hyderabad city. A total of seven samples of poultry feeds from which two were commercial feed samples and five were local feed samples were collected in polyethylene bags. The samples were analyzed via Atomic Absorption Spectrophotometer (AAS) Aurora Al1200 for heavy metals; Lead (Pb) and Chromium (Cr). Relatively higher concentrations of Lead (Pb) were found in commercial feed samples. The results obtained from present study for lead and chromium were found within the range of acceptable limits, i.e. 5ppm as prescribed by European Union (2003) and 10ppm as set by NRC (2005), whereas there is no acceptable limit for chromium is given by European Union (2003) but 500ppm as set by NRC (2005).

Keywords: Atomic Absorption Spectrophotometer, Bioaccumulation, Wet-acid digestion, and the European Union

PAPER ID: 139

USE OF BIOSENSOR TECHNOLOGY IN BACTERIAL DETECTION

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ABSTRACT

This review article demonstrates recent progress in the utilization of biosensors for bacterial determination. Morbidity and mortality are commonly caused by a bacterial infection. Pathogens are causative agents of various infectious diseases. Such diseases growing at an alarming rate and threatens millions of people around the world. Health experts estimated that these diseases cost around 5 to 6 billion per year. Therefore, it is an urgent need for the development of rapid components and reliable methods to deal with harmful bacteria associated with food safety and public health. At present, bacterial detection method relies upon laboratory-based techniques such as cell culture, micro-scope analysis, and biochemical assays. However; these measures are time-consuming, expensive, and require distinctive equipment as well as trained users. Thus, in terms of ease of miniaturisation, lack of reagents, sensitivity, and low cost and rapid detection, biosensors can facilitate all these parameters. Recent developments in bio-sensing technologies that uses electrochemical, piezoelectric, optical, acoustic, thermal and high-density microelectrode array, to detect E-coli, biosensors are used for detection of pathogenic bacteria. This paper attains focus on principle concepts, applications, and examples from analyst to configuration of potential biosensors that have been achieved up until now to detect potential pathogens.

Keywords: Bacteria, Infection, biosensors, pathogen, detection.

PAPER ID: 144

REMOTE MONITORING OF AIR & NOISE POLLUTION THROUGH ANDROID APPLICATION

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ABSTRACT

Major factors of environmental pollution as air and noise pollution have long been a genuine issue of every nation whether it is developed or developing like Pakistan. As Pakistan is far-off updated analyzing and monitoring air and noise pollution equipment's. Modern urbanization and industrial societies are vastly growing and causing harmful impacts on human health. In order to tackle off this bad situation the advanced, portable, cheap and real time monitoring system for Remote Monitoring of Air & Noise pollution through Android Application is proposed here. The system consist of 8 sensors (MICS-4514, MQ-135 136, 9, 5, 4, DHT-11, LM-393 and Dust) which monitors SO_2, NO_2, CO, CO_2, CH_4, PM $_{2.5}$, temperature, noise, combustible and leak gases present in surrounding and transfer this data towards the microprocessor which analyze and transmit the data over server through the WIFI connectivity for 24-hours/day. But when there is the unavailability of WFI the GSM module transfers the data towards the end user in the form of SMS and Email. If the value of contamination increases from guideline values then the buzzer beeps and email or SMS is sent towards the end user. That will enable the User to get live readings in any weather at any time anywhere in the world.

Keywords: Internet of things, Air and Noise pollution, Water quality, Remote monitoring system, Sensors Based, Raspberry pi.

PAPER ID: 151

STABILIZATION & OPTIMIZATION OF SEWAGE SLUDGE IN CSTR FOR ANAEROBIC CO-DIGESTION OF BANANA PLANT WASTE & SEWAGE SLUDGE

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ABSTRACT

In Pakistan waste generation is a rising issue. As Pakistan is an agricultural country so it contributes about 57 % of crop waste in total waste generated annually. Huge amount of crop residues such as banana plant waste are generated and they are wasted without any use. Generally, there is no any use of Banana plant waste (BPW) in Pakistan. Almost 100 % of BPW is burnt without being utilized. The crop residue can be used in order to overcome the issue of energy crisis as well. Therefore, the anaerobic co-digestion of Banana plant waste with sewage sludge is the most suitable way to utilize both the crop residue and sewage sludge for fulfilling the needs of energy. As biogas is the best source of renewable energy that leaves a safer impact on the environment. A study was conducted where Sewage sludge was stabilized in CSTR in order to maximize the energy potential and analyze its energy potential for using it further for methane enhancement by measuring the steady conditions of digester on daily basis by pH, Alkalinity, Volatile fatty acids, Moisture content, Volatile solids, Total solids etc. Throughout the study it was observed that Methane was generated & sewage sludge was stabilized at the conditions when pH was at range of 8 - 8.3, Alkalinity was 3000 - 4000 mg/l $CaCO3$ while VFA to TA ratio was less than 0.5. Hence the results showed that sewage sludge has the potential of producing methane if steady conditions are maintained. Once the material is stabilized it would be further used for production of biogas by optimization of different ratios of banana plant waste & sewage sludge in order to enhance methane production & to obtain the best ratios (conditions) at which maximum methane would be produced.

Keywords: Anaerobic Co-digestion, Banana plant waste, Biogas, Sewage sludge

PAPER ID: 152

STABILIZATION OF 1:1 RATIO OF BUFFALO DUNG AND WATER IN CSTR FOR ANAEROBIC CO-DIGESTION OF BANANA PLANT WASTE AND BUFFALO DUNG

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ABSTRACT

In a number of regions in Pakistan, crop residues are leading to a solid waste problem. The waste from Banana plants is one of them as it has absolutely no use and is directly burnt. Also, the ineffective management of waste of animals may lead to a number of environmental problems. Therefore, the anaerobic co-digestion of crop residues along with animal waste can prove to be a suitable way for utilizing the crop residues and animal waste and convert them into renewable energy. In this study, stabilization of 1:1 ratio of Buffalo Dung and water was carried out in CSTR for HRT of 20 days in order to analyze its methane potential by measuring the steady conditions of the digester on daily basis. The steady state condition of the digester was tested by frequently examining the slurry for pH, total alkalinity (TA) and volatile fatty acids (VFA). The pH was maintained by adding $Ca(Oh)_2$ until the pH was stabilized. Throughout the study it was thoroughly observed that gas was being produced and also it was observed that with the increase of pH, the TA increased and VFA decreased. The study also revealed the increase in Total Alkalinity and decrease in Volatile Fatty acids lead to stabilization of the slurry because the VFA/TA ratio is required to be less than or equal to 0.5 for stabilization. The best results were observed at the pH 8.6 on which the VFA/TA ratio was 0.31. Further in this study, different organic loading rates containing banana plant waste and buffalo dung will be added to get the optimum results.

Keywords: Anaerobic Co-Digestion, Banana Plant Waste, Buffalo Dung, CSTR

PAPER ID: 159

PROPOSAL OF A MOBILE ECOSYSTEM FOR EFFICIENT COLLECTION OF MUNICIPAL SOLID WASTE

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ABSTRACT

In smart cities, communication and information sharing among various smart devices is performed using ubiquitous sensor networks (USN). In this paper, we propose a novel concept of Mobile Ecosystem (MES) for municipal solid waste (MSW) collection over a wireless sensor network (WSN), which utilizes mobile communication networks (MCN). This MES identifies MSW components such as bins/skips and garbage collection points, etc. through Internet Protocols (IPs) and shares real-time information with municipal authority (MA) on a platform of Information and Communication Technology (ICT). ICT enables the IPs to share the waste-related data with main server (MS) where it is analyzed and processed and is send to the Mobile Ecosystem- Database (MES-DB). Subsequently, the aggregated information is shared with the end-users on their smart mobiles. Our proposed platform develops ubiquitous computing for municipal waste collection and uses ICT to connect MA to the main server through assigned IPs. From a communication standpoint, information sharing among smart devices is an important aspect of smart cities, therefore, our proposed MES platform is expected to be a major development in smart waste collection from urban cities.

Keywords: Solid Waste Smart Space, Real-time data sharing, Information and Communication Technology

PAPER ID: 183

ANALYSIS OF THE ENVIRONMENTAL IMPACTS OF BUILDING USING LIFE CYCLE ASSESSMENT APPROACH: A CASE STUDY OF AN INSTITUTIONAL BUILDING IN PAKISTAN

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ABSTRACT

Modes of building construction and use of modern building materials have accelerated its contribution towards degradation of the environment. Buildings throughout its life cycle from material extraction till demolition generates enormous environmental impacts. This study aims to assess and analyze the environmental impacts of building from raw material extraction to construction phase using Life Cycle Assessment (LCA) methodological framework. The environmental profiling for different impact categories of a case study building has been performed. Direct and indirect energy consumption i.e. the cumulative energy used in the manufacturing of raw materials, transportation and construction and its contribution to emissions has been assessed by using SimaPro software. Results show that dominant contribution of the environmental impacts originates from glass and chipboard out of all selected building materials. 41891.82 kg CO_2 eq emissions per m^2 floor area of building have been observed to emit and ultimately contribute towards global warming. Furthermore, Results of cumulative energy demand shows most of the non-renewable energy generated and consumed via fossils i.e. 482,336 MJ. Analysis of different impact categories show that the global warming potential accounts 4.11E4 Kg CO_2-eq, human toxicity 4.61E4 Kg, metal depletion 2.81E4 Kg and fossil fuel consumption 1.08E4 Kg. Thus, the study identifies the opportunity for use of LCA in the building industry. This would help to target hotspot areas to minimize environmental impacts and simultaneously move towards sustainable development in the society. Further studies with more detailed inventories for building materials are recommended.

Keywords: building construction, environmental impacts, Life cycle assessment, sustainable development

PAPER ID: 208

INTEGRATED SOLID WASTE MANAGEMENT SYSTEM IN KARACHI

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ABSTRACT

Solid Waste management has been a fundamental amount of every human civilization. Waste Management is bone of contention presently in Karachi. Karachi is the largest mega metropolitan city of Pakistan and the capital of Sindh province. Positioned on the Arabian Sea, Karachi is also known as "City of Lights" and "The Bride of the Cities" with a population of about 24 million which makes it the 7th largest urban agglomeration and the largest city in the Muslim world. Karachi is generating approximately 15,000 tons of waste per day, where waste management system was observed and calculations were done for the amount of waste generated per day, per month and per year using life cycle assessment methodology.

Keywords: Solid Waste Management, Life Cycle Assessment, Karachi, Waste generation


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PAPER ID: 14

EFFECTS OF SUGARCANE BAGASSE ASH ON THE STRENGTH CHARACTERISTICS OF BENTONITE CLAY

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ABSTRACT

The economic development of a region depends on the infrastructure that the region has. As every structure stands on the soil therefore, it must be strong enough to bear the stresses caused by it. But sometimes the soil of interest is not of desirable strength. Hence, engineering techniques have to be applied in order to make it useful. On the other hand, our eco-system is being damaged continuously and resources being depleted for the sake of economic development. Thus, to overcome this problem, a solution is required that would help the infrastructure of a country to grow without depleting its resources and without damaging the environment. One of the solutions is to utilize the agricultural waste products such as Sugarcane Bagasse Ash (SCBA) for soil improvements. This study is focused on SCBA; a waste product of sugar mills and utilization of such material for the improvisation of strength characteristics (CBR and UCS) of Bentonite Clay. Different proportions of SCBA i.e. 5%, 10%, 15% and 20% by dry weight of soil are mixed with the soil to observe the changes in strength characteristics of soil. The results showed that with the addition of SCBA, the MDD decreased and the OMC increased. Furthermore, it has been observed that CBR (Soaked) increases with the addition of SCBA and reaches a maximum value on the dosage of 5% of SCBA. Also, CBR (Unsoaked) and UCS tests shows decrease with the addition of SCBA in the bentonite clay.

Keywords: Sugarcane Bagasse Ash, Bentonite Clay, Infrastructure, Economic Development.

PAPER ID: 27

SUBGRADE STABILIZATION USING LIME AND WHEAT STRAW ASH

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ABSTRACT

Soil stabilization is carried out not only to enhance soil strength but also for economical pavement design. In case of subgrade stabilization, increase in strength of subgrade results in reduction of pavement thickness, this in turn is the primary reason for cost reduction in pavement construction. The research work is carried out to inspect the effect of lime and wheat straw ash (WSA) on a weak subgrade soil. The testing on the samples included Atterberg's limit, unconfined compressive strength (UCS) test, compaction test and California bearing ratio (CBR) tests. These tests were performed on natural soil and soil treated with lime and wheat straw ash. Optimum quantity of stabilizer was selected based on highest improvement in unconfined compressive strength (UCCS). The results obtained clarified that geotechnical properties of soil were improved with addition of lime and WSA. Highest value of UCCS was observed at 6% lime and 15% WSA. Also increase in CBR was observed and swell of soaked CBR sample reduced to almost zero. Cost analysis for modified and unmodified subgrade soil was also

Keywords: Soil stabilization, Wheat Straw Ash, Lime, Subgrade

PAPER ID: 31

CORRELATIONS BETWEEN RELATIVE DENSITY AND COMPACTION TEST PARAMETERS

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ABSTRACT

Being the oldest construction and probably engineering material soil is one of the most complex fields in civil engineering. Soil is naturally occurring, uncemented or unaggregated deposits of minerals so it is difficult to maintain its properties while bringing representative sample in laboratory for testing. Also the testing methods in soil engineering are mostly of empirical nature and as a result, the properties of soil are highly variable and cannot be estimated so accurately. So the project involve developing a suitable correlation between different parameters (these parameters help us in using various equations) by using SLR and MLR. For this purpose we used non cohesive sandy soil(c=0) from different places of Sindh, and performed different physical and mechanical tests on that soil for determining its condition such as , sieve analysis for determining (coefficient of uniformity ,coefficient of curvature), specific gravity ,water content , relative density , standard proctor, modified proctor ,sand equivalent etc. From this research it is concluded that equations we made by comparing these results can be utilized on (A-3) Soil with confidence. Equations developed by using MLR are more reliable than SLR.

Keywords*:* Single Linear Regression, Multiple Linear Regression, Relative Density, Sand Equivalent, etc

PAPER ID: 32

EFFECT OF DATE PALM FIBER ON THE ENGINEERING PROPERTIES OF EXPANSIVE JAMSHORO SHALE

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ABSTRACT

Construction of structures on soft soil is troublesome because of their weak nature and having so many problems just like High volumetric change, low compressibility as well as low strength. This type of soil must be upgrade with better material before its use for the construction of various projects such as construction of roads, buildings, dams, airports etc. Soil reinforcement is an effective technique to enhance the engineering properties of various geotechnical works. In present time, there are so many materials for the reinforcement that are found to be an effective source of improving the geotechnical properties of soil Geofibers are one of them. The geonatural fibers are consider as an attractive reinforcement material as compare to geosynthetic fibers due to its multiple applications and cost efficiency. Hence, the feasible health effect can be minimizing by using geonatural fibers. The fibers can be obtained from so many waste products and the utilization of waste can assist to resolve the issue of waste disposal otherwise so much amount of landfills can be generating from these wastes. In this research, the date palm fiber which is naturally available material in most of Asian countries is used to enrich the engineering properties of Shale. To evaluate the effect of fiber on the properties of shale, the date palm fiber is mixed in soil with different percentages 1%, 2%, 4%, 6%, 8% & 10% by weight of air dry shale to check the effect of fiber on the shear strength parameters, moisture density relationship, consolidation parameters.
Thus it can be said that the Date Palm fiber showed superior results to enhance the properties of shale.

Keywords: Date Palm fiber; Geo fibers; Consolidation Parameters; Geo reinforcement.

PAPER ID: 34

EFFECT OF FLY ASH ON CONSOLIDATION CHARACTERISTICS OF COMPACTED CLAY

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ABSTRACT

One of the most important parameters is to study the geotechnical properties of the soil for the construction of geotechnical structures on the clay. Clayey soil can cause a lot of problems to geotechnical engineers while designing the structures. Consolidation properties are very important for the construction of any structure above the soft clay, so therefore the behavior of the soil is an important parameter for the settlement of clay. The structure may be settling down up to some extent, which may cause settlement problems and damage the structures. Therefore, it is necessary to study and to identify the behavior of the soil which will help to reduce the settlement problems. A laboratory one-dimensional consolidation test was performed to understand the settlement parameters and to strengthen the properties by soil stabilization with fly ash. Fly ash is the byproduct which may modify the geotechnical properties of soil. This study is to carry out to improve the consolidation properties and to reduce the settlement of the clay, by using fly ash at different contents.

Keywords: Geotechnical properties, Consolidation characteristics, Fly ash, Settlement.

PAPER ID: 35

PERFORMANCE OF MECHANICALLY STABILIZED EARTH (MSE) WALL REINFORCED WITH CRUMB TIRE RUBBER

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ABSTRACT

Nowadays, Walls and embankments of highway are mostly made with the help of Mechanically Stabilized Earth (MSE). In this research, crumb tire rubber (CTR) is used as a reinforcement to analyze the changes in the stability of MSE wall. The rubber tire was acquired from Tire Rubber Factory, Korangi Industrial Area, Karachi while the sand used in this research was obtained from the Indus River near Jamshoro. Direct Shear Box Test, Compaction Test and Sieve Analysis was done on the CTR mixed sand to obtain parameters used to model MSE wall in finite element program, PLAXIS 2D. Direct Shear Box Test was simulated in the PLAXIS 2D to check the results and verification was also done on the Chungsik's two-tier wall. The wall was subjected to surcharge load of 25, 50, 75 and 100 kPa in order to observe the changes in the parameters like horizontal, vertical and total displacement and finally presented in graphical form. It was concluded that the 15% by weight of crumb rubber tire mixed sand shows the optimum results for the construction of MSE wall. Moreover, by using rubber in wall, we can reduce the harmful effects produced due to dumping and burning of tires.

Keywords: Crumb tire rubber, MSE wall, PLAXIS 2D, horizontal displacement, direct shear box test.

PAPER ID: 37

AN ASSESSMENT OF THE IMPACT OF CCA ON THE POWER PARAMETERS OF BENTONITE CLAY

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ABSTRACT

It is of major reflection to with clean geotechnical research outcomes. There are numerous techniques for improvement of soil which consists of a variety of strategies like excavation and refilling of grouting, nailing and so forth. These methods are valuable within their limits but require a certain quantity of mechanical and chemical paintings to be used which in terms harms the environment or is not always usable for spread of soils. If the soil on which structure goes to be built is not having big bearing capability, soil stabilization strategies are to be carried out. So, we must look towards the techniques which are environment friendly to progress forward within the field and have extensive variety of utility. Among them one is our topic "An assessment of the impact of CCA on the power parameters of Bentonite Clay". We can use CCA as improvement technique on Bentonite Clay which as hassle of water absorption and swelling. CCA will be mixed with Bentonite Clay at varying percentages of 0.5%, 1% and 2% of the dry weight of the soil. Soil-CCA composite samples now will be subjected to Modified Proctor Compaction tests and CBR (Soaked and Un-Soaked). From the results it is found that as the proportion of CCA increases as a result of this there is increase in MDD and decrease in OMC. Also, with this it is found that the sample with 0.5% of CCA offers higher value of CBR in both (Soaked and Un-Soaked).

Keywords: Bentonite, CBR, CCA, Modified Proctor.

PAPER ID: 42

EFFECT OF JUTE FIBER ON STRENGTH BEHAVIOR OF BANTONITE

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ABSTRACT

In the modern days of civil engineering it became so important to conduct a thorough and detailed study of the soil on which the foundation of any project rests and it is impossible to acquire a land for any project which possesses all the required engineering properties. So, to overcome this issue and to acquire all those desired engineering properties every minute around the world a non-stop research is being performed in order to get an easy, economical, efficient and optimized method to stabilize the weaker soils. And in this regard many soil improvement techniques are introduced in the world such as Chemical stabilization and soil reinforcement using geotextiles and other artificial and natural fibers to stabilize the soil and attain the required properties of the soil. So in this study soil reinforcement technique is adopted to improve the properties of bantonite "the most problematic soil" and jute fiber as reinforcement agent. This study reveals that with the inclusion of jute fiber in bantonite the MDD increases gradually throughout and OMC shows some ups and downs.

Keywords: Maximum Dry Density, Optimum Moisture Content, Jute Fiber, Bantonite.

PAPER ID: 69

AN EXPERIMENTAL STUDY OF EFFECT OF SUGARCANE BAGASSE ASH ON THE PERMEABILITY OF SHALE SOIL

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ABSTRACT

To make soil feasible and durable for construction, stabilization is one of the most productive techniques. It is economical and easy to put into service inside the body of soil. Permeability plays a vital role among all the geological properties; it creates unwilling settlements in the structure if not examined properly. The purpose of this study is to check the effect of sugarcane bagasse ash on the permeability of shale soil, as per the situation one may treat that soil. Utilization of these waste deposits as a soil stabilizer gives us two benefits first one is to control the environment became pollute other is to use as a construction material to strengthen the existing soil. The shale soil is collected from Jamshoro was mixed with Sugarcane Bagasse Ash (SBA) in variable quantities i.e. 0%, 2%, 4%, 6%, 8%,10 and 12%. Laboratory test of permeability on each sample of soil and SBA had conducted by falling head method of permeability, to get value of hydraulic conductivity (K). Before knowing the hydraulic conductivity, each sample was subjected to modified proctor test from where, one may obtain Optimum Moisture Content and Maximum Dry Density. In accordance with obtained OMC and MDD, samples were then prepared for permeability test. Eventually, experiment study came to an end with the graph of variation of permeability with respect to quantity of sugarcane bagasse ash.

Keywords: soil stabilization, permeability, optimum moisture content, maximum dry density, sugarcane bagasse ash.

PAPER ID: 70

UTILIZATION OF CEMENT CONTENT FOR STABILIZATION OF JAMSHORO SOIL

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ABSTRACT

Soil in the vicinity of Jamshoro is expansive (expands when gets moist and contracts when becomes dry). Due to this unique behavior, the soil of Jamshoro cannot be used directly for foundations of major constructions (i.e. roads and buildings) because it will cause rutting and excessive deformation in motorway (M-9, Hyderabad to Karachi, Pakistan) and will affect other road networks running in the vicinity of Jamshoro. It will also cause differential settlements in the foundations of the buildings constructed in the Jamshoro region. Because of that it is obvious that Jamshoro soil cannot be used directly for subgrade material for roads and foundations of buildings. This type of soil can be stabilized by using chemical additives and geo reinforcements. Therefore it is necessary for this type of soil to be stabilized. In this research basic geotechnical properties of Jamshoro soil were observed. Then various proportions of cement content that was 0%, 1%, 2%, 4%, 6%, 8%, 10% and 12% were added and mixed by dry weight of soil to examine the effect of cement content on California Bearing Ratio and Swelling potential. It was observed that cement content can be utilized to improve California Bearing Ratio and Swelling potential for this type of soil.

Keywords: California Bearing Ratio, Swelling Potential, Jamshoro soil..

PAPER ID: 113

POTENTIAL OF WASTE PLASTIC (PET) BOTTLES STRIPS AS REINFORCEMENT MATERIAL FOR CLAYEY SOIL

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ABSTRACT

One of the most often visible type of plastics in open dumps and landfills is the waste plastic bottles made of Polyethylene Terephthalete (PET). It causes serious environmental problem until and unless completely decomposed. On the other hand, construction of any structure on weak or problematic soil is highly risky. To reinforce the soil with synthetic material is considered as one the reliable techniques which not only improves soil performance but also leads to the use of waste plastic bottles as a construction material instead its dumping causing environmental hazards. This research study aimed to assess the potential of the PET strips as reinforcement in the clayey soil. The strips of 8mmX35mm were mixed in the soil with 0.5%, 1.0%, 1.5% and 2.0% by dry weight of the soil to investigates soil bearing strength. The results are encouraging and showed a pronounced enhancement in bearing strength as it was obtained as high as two times due to PET strips (1.5%) when compared to that of the soil without strips.

Keywords: Soil reinforcement, Plastic Strips, Bearing Strength.

PAPER ID: 116

A COMPARATIVE STUDY OF VARIOUS LIMIT EQUILIBRIUM METHODS (LEMS) AND FINITE ELEMENT METHOD (FEM) FOR SLOPE STABILITY ANALYSIS USING GEO-STUDIO: A CASE STUDY

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ABSTRACT

The Evaluation of the stability of slopes is one of the most important yet challenging aspect of Geotechnical Engineering. There are many Limit Equilibrium Methods to find out the Factor of Safety. This study utilizes GEOSTUDIO for conducting slope stability analyses of a case study by using most commonly used limit equilibrium methods which include Ordinary Methods of Slice, Bishop Simplified Method, Janbu Simplified Method, Spencer Method and Morgenstern-Price Method. The main difference between various Limit Equilibrium methods of slopes stability analysis is different assumptions on interslice forces (i.e. Shear force and normal force) and also the type of equilibrium satisfied (i.e. force equilibrium or moment equilibrium). The results obtained from various LEMs and FE method are compared to know the difference of FOS for our particular case study. The simplified Bishop (BS), Morgenstern-Price (M-P) and Spencer methods yield almost identical FOS for circular Slip Surface. However, the simplified Janbu (JS) method may underestimate the FOS from 2 - 5% for the circular CSS obtained by this method. However when the results are compared with Finite Element Methods. It was observed that all LE methods, estimated higher FOS than FE analysis. In our case, the LEM gave about 4-5% more Factor of Safety than LEM. Therefore it was concluded that among the LEMs any method can be utilized among the simplified Bishop (BS), Morgenstern-Price (M-P) and Spencer methods unless the Finite Element Modelling is available.

Keywords: Finite Element Methods, Limit Equilibrium Methods, Slope Stability Analysis.

PAPER ID: 122

EVALUATION OF COMPACTION CHARACTERISTICS OF A-7-5 SOIL USING DYNAMIC CONE PENETROMETER

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ABSTRACT

The engineering properties of soil are highly variable which makes this material unpredictably complex. Also, some of its properties like maximum dry density (MDD) and optimum moisture content (OMC) are too laborious and time consuming to determine. Therefore there is always a need to develop correlations between different properties of soil so that indirect measurements of difficult properties can be made. This study aims to develop correlations between compaction characteristics (MDD & OMC) of A-7-5 soil & its dynamic cone penetration index value (DCPI). For this purpose, soils samples from different areas of Jamshoro have been collected and proportionally mixed to obtain different specimen of A-7-5 soil as per AASHTO soil classification. A number of modified proctor compaction tests and dynamic cone penetration tests have been performed on each soil sample. On the basis of test results, different correlations have been developed between maximum dry density, optimum moisture content and dynamic cone penetration values of soil. The resulting coefficients of determination suggest that the correlations obtained can be used with confidence. The developed correlations will guide the local industry for estimating the compaction characteristics of A-7-5 soil from DCP test resulting in time and resource saving.

Keywords: Dynamic Cone Penetrometer Index (DCPI), Compact Characteristics, Compressive Strength.

PAPER ID: 123

SOIL STABILIZATION BY LIME AND BRICK DUST

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ABSTRACT

Over the previous hundreds of years men have been articulating houses in which they dwelt, setting up streets, railroads and waterways along which to travel and move merchandise, and manufacturing plants and different structures from which they built up their industries. Soil provided with the support of getting the physical establishments of the houses, plants, streets, railroads and different structures. It is found that soils do not have the safe bearing capacity to carry the Infrastructural loads. Soil Stabilization is the change of soils to improve their physical and chemical properties. It refers to the way toward changing soil properties in order to improve strength and durability. There are numerous methods for soil Stabilization, including compaction, dewatering and by adding material to the soil. This research work is based on soil stabilization by adding some percent of lime and brick dust with respect to total volume of soil to increase the strength of the soil and soil stabilizing agent for improving the max dry density (MDD) and Shear Strength. The result shows that by adding of5% -10%of lime and 15%-25% of brick dust of its dry weight improves dry density and shear strength. Ergo the use of brick dust and lime is preferable for stabilization not only because it gives positive results as stabilizer but also as a waste utilization.

Keywords: Stabilization, Lime and Brick Dust, Expansive soil

PAPER ID: 179

PARAMETRIC STUDY OF PILE RAFT FOUNDATION

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ABSTRACT

Pile raft foundation has become the most suitable type of foundation for high rise buildings because of the characteristics that it can reduce both total and differential settlement, the combined action of pile and raft can increase the bearing capacity and considerably affect the size of foundation. Piled raft foundation is a new concept in which the total load coming from the superstructure is partly shared by the raft through contact with soil and the remaining load is shared by piles through skin friction and base resistance. In this research study a numerically analysis was performed on changing the magnitude of different parameters such as raft thickness, Raft dimension, Stiffness of Soil layer, Poisson ratio, Changing the number of Piles and Spacing to Diameter ratio (S/D) of Pile and its effect was observed on Bending Moment in Raft, Settlement of Overall Pile Raft System and Percentage load distribution in pile raft system. This study will help the readers to take into account the effect of varying the magnitude of different parameters on its overall demand, contribution of piles and raft to a total load of structures and the effect of soil properties on this contribution.

Keywords: Bending Moments, Finite Element, Pile and Raft Capacity, Settlement.

PAPER ID: 219

UNCONFINED COMPRESSIVE STRENGTH OF JET-GROUTED COLUMNS WITH AND WITHOUT FIBRE-REINFORCEMENT

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ABSTRACT

This research studies the unconfined compressive strength, tensile reinforcement and the ductility performances of soil-cement columns with and without fibre-reinforcement. This experimental setup consist of Unconfined-Compressive-Strength test on 72 specimens. The columns were casted at various proportions of materials with w/c ratio of 1:1 before conducting the UCS tests. These columns can be simulated as the vertical drains. Columns were casted with various fibre contents for comparison with columns without fibre-reinforcements. Relationship between binder content and compressive strength at different percentages of fibre had been evaluated through UCS test. The results indicated that the increase in binder or cement content cause an increase in the unconfined compressive strength of jet-grouted columns. Whereas by increasing the polypropylene fibre content the ductility and tensile strength of columns increases. However, the results indicated that up-to the polypropylene content of 0.5% of the dry weight of sand the unconfined-compressive-strength of columns has increased. Now further the increase in fibre content, e.g. polypropylene content of 1% of the dry weight of sand decreases the unconfined-compressive-strength of jet-grouted columns with fibre-reinforcements. Failure of columns was characterized by compression.

Keywords: Columns, Ductility, Fibre, Jet-Grouted, Unconfined Compressive Strength

PARER ID: 254

GEOTECHNICAL PROPERTIES OF SILTY SAND REINFORCED WITH POLYPROPYLENE WOVEN BAGS

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ABSTRACT

In today's world, there is growing concern about environmental pollution, overflowing landfill sites and rising depletion of non-renewable materials. More than ever, there is the need for effective waste management and recycled materials to be used that are eco-friendly. At present, plastic waste is considered as one of the major pollutants of environment as most of the plastic waste is non-biodegradable and requires a huge amount of effort and energy for its disposal. To overcome the problem, efforts are being employed by civil engineers to utilize plastic waste in the geotechnical field. During the recent years, untraditional methods are being used for soil stabilization which include different plastic waste such as Polyethylene Terephthalate (PET), Poly Propylene (PP), High/Low Density Polyethylene (HDPE/LDPE) etc. Their use as a stabilization agent is one of the solutions to recycle these materials in a useful and effective manner. This paper aims to assess the potential of Plastic Woven Bags (for packing of sugar, fertilizers etc.) as a reinforcement material for soil. For this, silty sand (A-2-4 soil) is selected as base soil and 10 different plastic bags varying in weight are utilized and placed in layers to prepare the soil-plastic composite specimens. The tests employed to analyze the behavior of plastic reinforced soil are Modified Proctor Compaction tests and California Bearing Ratio tests under un-soaked and soaked conditions. From the obtained results, it is observed that the inclusion of plastic bags can improve the strength of soil.

Keywords: Renewable Materials, Silty Sand, Modified Proctor, Plastic Woven Bags, CBR

PAPER ID: 261

CHARACTERIZATION OF INDIGENOUS BENTONITE AS A POTENTIAL DRILLING MUD

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ABSTRACT

Minerals are the most important source of the life in our earth. Mud bentonite is also one of them abundant and near to the ground price naturally occurring substance originate largely in whole earth. Bentonite mud is produces after volcanic ash has weathered and old in presence of water. It has some exceptional properties. Bentonite has a physically powerful negative electromagnetic charge and when stimulated inside to the water. In the current research, two samples of bentonite were taken, one is indigenous raw bentonite from Pakistan and other is industrial bentonite. The indigenous raw and industrial bentonite was analyzed in terms of viscosity, gel strength, density. Later on, indigenous raw bentonite was purified and in last step these two bentonites are compared in terms of given parameters. The samples were analyzed by XRD. From the results obtained from experimental work, it was revealed that the two bentonites have similar results. However, as the indigenous bentonite is easily available & saves foreign exchange so it has a very good potential for use in oil & gas industry in Pakistan.

Keywords: Bentonite, Drilling Mud, Purification, Pakistan

GREEN ENGINEERING / GREEN ENERGY TECHNOLOGY


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PAPER ID: 09

GREEN ROOF CONCEPT- NEED OF HOUR FOR HEALTHY ENVIRONMENT

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ABSTRACT

As forests, agricultural fields, and suburban and urban lands are replaced with impervious surfaces resulting from development, the necessity to recover green space is becoming increasingly critical to maintain environmental quality. Vegetated or green roofs are one potential remedy for this problem. Establishing plant material on rooftops provides numerous ecological and economic benefits, including energy conservation, mitigation of the urban heat island effect, and increased longevity of roofing membranes, as well as providing a more aesthetically pleasing environment in which to work and live. The aim of providing the green roof concept is to minimize the temperature of building and to decrease the effect of global warming. The Method of research include local and international case studies, which will provide the data regarding the comparative temperature with those buildings without green roof, survey of nurseries and material shop in order to collect data regarding the cost estimation & a deeper approach towards its installment on roofs. This paper is a review of current knowledge regarding the benefits of green roofs, plant selection and culture, and barriers to their acceptance in Hyderabad. This paper will help in providing the practical approach and concluding the valuable effect of green roof on environment and internal temperature of house & will conclude how the proposed concept help in challenging the effect of global warming within our structures through reducing the direct exposure of building roof towards sun.

Keywords: Global warming, Green roof, Green space, Temperature reduction.

PAPER ID: 36

DESIGN AND FABRICATION OF A PYROLYSIS REACTOR FOR PRODUCTION OF OIL BY USING WASTE PLASTIC

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ABSTRACT

The development of alternative fuel technologies is made possible to provide the replacement of fossil fuels. Focused technologies are Bioethanol, Biofuels derived from Biodiesel lipids, recycling of waste oils, Pyrolysis, Gasification, Dimethyl ether and Biogas. Recycling and refining are petroleum-based plastic waste (PBPW) that convert it into reusable products like petrol and heavy oil. The goal is to design and fabricate a pyrolysis reactor for oil production or the conversion of plastic waste into oil through a pyrolysis process. The pyrolysis reactor is composed of stainless steel. The pyrolysis process consists of thermal degradation of waste in the absence of air. In this study Polyethylene terephthalate **(**PET) type of plastic is used. Under the conditions of pyrolysis, plastic waste can be decomposed into three fractions of liquid or oil production, gases and solid waste or black residue or ash. First different samples of oil and ash were collected and then analyse their different characteristics such as moisture content, boiling point, density, volatile solids etc. in laboratory and flue gases were analysed by using Gas chromatography device. In this study four experiments of oil production have done and it was observed that the yield of oil in first experiment was 270-300 ml at 290 ºC, similarly in second experiment the yield become 370 ml at 205 ºC and in third experiment it was calculated as 2.8 litres at 120 ºC temperature similarly in fourth experiment oil production was 2.789 at 127 ºC temperature. But first two experiment produce less oil because of high fumes as compare to last two experiments with high production of oil. The very less emissions were produced in last two experiments so the pyrolysis process generate less toxic and harmful gases unlike incineration.

Keywords: Incineration, Gas Chromatography, Pyrolysis, Polyethylene terephthalate.

PAPER ID: 62

TO INVESTIGATE THERMAL EFFECTIVENESS OF GREEN ROOFS AT HYDERABAD

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ABSTRACT

Expeditious changes in environmental behavior is a significant task for the contemporary built environment. Green roofs are becoming a premier characteristic for its energy efficiency and sustainable evolution. Building energy-saving, production of urban wildlife domain and eco-friendly designs are its foremost concerns. Hyderabad is contemplating as the hot and dry climatic region of Sindh. The paramount percentage of electrical energy is being consumed by the building sector in Hyderabad because of its environmental performance and climatical changes, therefore, the abstraction of green roof not only furnishes energy efficiency for the built environment but also exertion for its sustainability, aesthetically and thermally comfortable for its users. For the implementation of the green roof, it is necessary to investigate the thermal effectiveness of green roofs at Hyderabad by case-studies. The green roof system is responsible for the thermal effectiveness of climate to provide the utmost cooling in summer and increases the heating effect in the winter season and also helps in the increment of outdoor temperature by about 42% and about 8% of indoor temperature throughout the daytime while about 17% of the temperature is maintained in the night. This concept has been demonstrated as an essential abstraction of green roof design.

Keywords: Green Roofs, Thermal effect, Energy-efficient.

PAPER ID: 102

LABORATORY CHARACTERISATION OF SAND-TYRE RUBBER MIXTURE USED AS BEDDING MATERIAL FOR UNDERGROUND PIPES

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ABSTRACT

Underground buried pipes are essential components that serve the basic need of our daily life includes drainages, electricity, gas and underground water pipes. Recent statistics have created eye-opening situations for researchers on the failure of underground pipes. As per latest data provided by Water Services Association of Australia (WSAA), annually the average rate of failure of only pressurized pipes in Australia was around 20% per 100km of water main underground pipes that are causing billions of Australian dollars to be spent as maintenance cost. Among the many causes (i.e. design and installation), it was identified that such failures were essentially due to vibrations induced by massive traffic flows and/or intense construction activities. Improving the damping characteristics of surrounding soil using tyre crumb specifically at bedding portion could potentially be the solution to mitigate the failure caused by vibrations. In this paper, 10%, 20% and 30% of tyre crumb mixed with sand were used and tested in the laboratory as per Australian Standards (AS) for characterisation of Sand-Tyre Rubber mixture. In this paper, basic test-gradation, compaction, shear strength, and permeability are presented.

Keywords: Bedding Material, Sand, Tyre-Rubber, Underground Pipes.

PAPER ID: 160

STRATEGIES TO FOLLOW FOR MAKING A BUILDING GREEN

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ABSTRACT

The overall impact of the built environment on the habitat health and natural environment is reduced with the help of Green buildings. The concept and idea of green building architecture has been gaining significance in majority of countries. The green buildings ensure the minimization of waste at every stage starting from construction till the result of lower operation cost with the help of technology experts. The architecture efficiently uses the water energy and other resources. The design protects the health of occupants and in the commercial buildings it ameliorates the productivity of employees. Its design reduces the waste production pollution and the degradation of the environment.

There are number of factors involved to make a building green. It incorporates sustainable and reusable construction materials which are made from the renewable sources. The green buildings produce healthy environment for living of the occupants by minimizing the product emissions. Native plants are used in the landscape of green buildings that may survive extra without providing much water. A specific criteria s required to design green buildings which involves the indoor are quality, resource efficiency water conservation energy efficiency and affordably. This paper will discuss the various strategies to follow, that makes the building green.

Keywords: Green Building; Sustainable Building; Energy Efficient;

PAPER ID: 206

SOLAR ENERGY AND ITS THERMAL APPLICATION: A CASE STUDY OF PAKISTAN

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ABSTRACT

This paper is an endeavor to debate and focus the use of solar energy in Pakistan and to overwhelm the power demands in the state. The energy usage in all urban cities of Pakistan with the cost reduction and future technological developments along with its thermal applications. Energy crisis has resulted as a consequence of trends in globalization and increase in advancement of technology and industrialization. The need of energy based industries has increased the demand for energy resources. It is however, crucial to recognize and accept the fact that energy resources are on the verge of not only depletion but their degradation; exploitation and extensive use can also put them on the road to extinction. Sustainability of energy resources can build up a nation's base towards development and long-lasting survival. The paper will discuss the solar energy usage in all urban cities of Pakistan as alternative fuel and clean energy with the cost reduction and future technological developments.

Keywords: Solar Energy, Clean Energy, Alternative Fuels, Environment, Sustainable Development

PAPER ID: 213

THERMODYNAMIC ANALYSIS OF COMBINED COOLING AND POWER (CCP) SYSTEM OPERATED BY IC ENGINE WASTE HEAT

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ABSTRACT

This study presents a detailed energy analysis of a Combined Cooling and Power (CCP) plant operated by waste heat of IC Engine. The integrated cycles; Organic Rankine Cycle (ORC) and Vapor Absorption Refrigeration Cycle (VARC), are used to produce power and cooling, respectively. Four organic working fluids, namely R113, R142b, R245fa, and n-pentane were selected for ORC, while LiBr-H_20 solution in VARC. Three key performing parameters, work output, cooling rate, and energy utilization factor (EUF) were related to varying temperatures of evaporator/condenser in ORC, and generation/evaporator in VARC with power only, power and cooling and cooling only modes of operation. Results enunciated that R113 given the highest thermal efficiency of 12.72%, while R142b gave the least thermal efficiency of 12% at power mode of operation, hence R113 was chosen as organic working fluid for further study. The maximum EUF was found in the cooling mode of operation which increased from 12.79% to 78.43%. During the combined cooling and power mode, maximum power output, cooling rate, and EUF were 82.08 kW, 505.10 kW, and 45.58% respectively.

Keywords: IC Engine, ORC, VARC, Waste Heat.

PAPER ID: 222

WASTE HEAT UTILIZATION FOR POWER GENERATION USING ORGANIC RANKINE CYCLE (ORC)

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ABSTRACT

Energy in from of waste heat is liberated from industries in huge amount. The usage of waste heat for generation of electrical power is very important because of depleting fossil fuels and increasing environmental pollution. Organic Rankine cycle (ORC) provides suitable solution for transformation of low grade energy. This study aims on first law and second law analysis of basic ORC scheme with toluene as a working fluid and Nitrogen stream at temperature of 3000C as waste heat source. The ORC is simulated in engineering equation solver (EES). The performance of the ORC is analyzed by varying turbine inlet pressure ranging from 1 MPa to 3.9 MPa. The first law efficiency is found to be 20.98% for the minimum pressure and 24.02 % for the maximum pressure. Similarly, second law efficiency for the minimum pressure is 30.05% and 35.15% for the maximum pressure. The ORC scheme is further analyzed by superheating toluene at turbine inlet pressure of 2 MPa. The degree of superheat ranges from 40C to 240C. The results reveal that the first and second law efficiencies for minimum value of degree of superheat, are 22.84% and 32.95% respectively, and first law and second law efficiency, for maximum value of degree of superheat, slightly drops to 22.75% and 32.77% respectively. It is evaluated that increasing turbine inlet pressure improves performance of the ORC, whereas, superheating slightly declines the performance.

Keywords: First Law Analysis, Organic Rankine Cycle, Second Law Analysis.

PAPER ID: 230

SIMULATION FOR HEAT GAIN RATE THROUGH WINDOW GLAZING IN HYDERABAD, PAKISTAN

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ABSTRACT

Building design plays pivotal role in energy consumption. Buildings in Pakistan consume over 40% of the entire electricity produced. Significant energy reserves are attained in buildings if they are appropriately planned, built and functioned. The objective of this research is to analyze the impact of type, medium and thickness of glass on transfer of heat flux through building envelope and cost estimation of optimized window glazing for a building in Hyderabad, Pakistan. For this purpose, different types of glazing with window-to-wall ratio of 25% has been analyzed. A simulation software Energy Plus has been used to determine zone windows total heat gain rate per area of non-air-conditioned room. The result shows that zone windows total heat gain rate per area by double low-e (pyrolytic coating) clear 6mm/13mm air is lower as compared to other glazing considered in research, which means it has tendency to reduce zone air temperature. In cost study, it has been estimated that double low-e (pyrolytic coating) clear 6mm/13mm air is cost effective than other glazing.

Keywords: Energy efficient building, Window glazing, Window-to-Wall Ratio, Energy Plus.

PAPER ID: 236

MULTI OBJECTIVE MODELLING OF BIOMASS SUPPLY CHAIN IN KARACHI CATTLE COLONY CONSIDERING ECONOMIC, ENVIRONMENTAL AND SOCIAL ASPECTS

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ABSTRACT

Biofuels are the potential energy solution due to increasing oil prices, depleting fossil fuels, renewable and clean energy requirements. Therefore, utilization of biomass, especially dairy farm animal manure is a profound substitution for bioenergy production. The major barrier to develop bio refineries in developing countries is lack of infrastructure and their respective supply chain. This research aims to develop an optimal supply chain network to produce biogas considering economic, environmental and social aspects. A mixed-integer linear programming (MILP) model is proposed for the optimization of biomass supply chain and optimal plant location and purification technology. The proposed model and solution methodology are implemented using a case example of a dairy farm-based biomass supply chain network design in Karachi, Pakistan.

Keywords: Biomass, Supply chain network, Multiobjective optimization, MILP model, Bioenergy

PAPER ID: 244

BIO METHANE PRODUCTION FROM FOOD WASTE AND SEWAGE SLUDGE USING MICROBIAL FUEL CELL

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ABSTRACT

To achieve the quick start-up and steady process of microbial fuel cell, an efficient inoculum is required. The correlation of bio electricity with methane production from food waste and sewage sludge in a double chamber microbial fuel cell (DCMFC) was studied. Three different ratios of food waste with sewage sludge was run to analyze the best ratio among food waste and sewage sludge. The best ratio among all were found to take equal amount of both, food waste with sewage sludge. Results showed that the electricity generation starts at 4th day whereas, the maximum output voltage 600 mv noted on 17th day. Similarly, methanogens in the anode chamber of DCMFC, results in an enhanced methane yield of 168 mL.

Keywords: Microbial fuel cell, Bio-Methane, Bio-electricity, Bio Fuel, Food Waste, Sewage Sludge.

PAPER ID: 251

DEVELOPING A GREEN BUILDING ASSESSMENT CRITERIA FOR CONSTRUCTION INDUSTRY IN PAKISTAN

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ABSTRACT

Growing concerns about the adverse effects of construction industry towards environment have increased the popularity of green building (GB) certification systems globally. Numerous international GB rating tools have been developed providing a yardstick for measuring building sustainability. However, there is a clear lack of research on establishing a baseline to develop a new credit criterion for a specific country according to its own local context. Therefore, by integrating criteria from different rating tools used globally, this research proposed a key credit criterion for assessment of GB in Pakistan. An extensive literature review was carried out to develop the basis for selecting a credit criterion based on widely used GB rating tools namely – BREEAM, LEED, CASBEE, IGBC, GREEN STAR, GREEN MARK, BEAM PLUS and GBI at international level. The outcome of this research was a green building assessment tool, consisting of seven credit criteria based on triple bottom line method. Later the questionnaire and unstructured interviews were conducted for assessment and applicability of proposed credit criteria. The results showed that the respondents (main players of the construction industry) did not have the same level of knowledge regarding the GB concept. Most of them were unable to name leading assessment tools and very few had an idea about the credit criteria of these assessment tools. However, most of the respondents rate energy efficiency as the main criterion followed by materials and water efficiency respectively. The presented research provides insight into GB rating systems and broaden the understanding of stakeholders on GB benefits and encourage them to adopt it.

Keyword: Green Star, Beam, yardstick and Bream.

PAPER ID: 255

POTASSIUM BASED CALCIUM OXIDE CATALYST SYNTHESIS FOR EFFICIENT TRANSESTERIFICATION OF WASTE COOKING OIL

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ABSTRACT

Biodiesel production from waste cooking oil is indeed an efficient and environment-friendly way to overcome environmental pollution and energy crisis owing to nontoxic nature of Biodiesel synthesized by Heterogeneous Catalyst (K-CaO). Utilization of waste cooking oil participates both in reducing the overall greenhouse gas emissions to minimum level and further in obtaining economical biodiesel. During synthesis, the crushed waste eggshells were calcined in muffle furnace with optimum conditions (temperature of 950 ^{0}C, retention time of 3 h). Transformed calcium species in the shells into active CaO were impregnated with Potassium i.e. K-(CaO) for transesterification. The catalyzed reaction was proven to be most efficient with molar ratio of 12:1 and temperature 64 ^{0}C in the presence of 7% catalyst. The biodiesel yield from transesterification was approximately 92% of Fatty Acid Methyl Ester (FAME) produced in an hour. Furthermore, the catalytic activity in transesterification of waste cooking oil and its physicochemical properties were examined by Scanning Electron Microscopy (SEM), Brunauer Emmett Teller (BET) and X-Ray Diffraction (XRD). Hence the biodiesel production from waste cooking oil was proven worthy aided by catalyst K (CaO) synthesized using waste eggshells.

Keywords: Transesterification, Waste egg shell, Biodiesel, Heterogeneous catalyst, Waste cooking oil


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PAPER ID: 53

THE SUITABILITY OF USING RECLAIMED ASPHALT PAVEMENT IN THE WEARING COURSE OF FLEXIBLE PAVEMENT

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ABSTRACT

Since Pakistan is a developing country where the highways and roads are mostly constructed as flexible pavements. when the road is reconstructed, the removal of wearing course through milling process produces waste containing aged bitumen bound onto the aggregates called as Reclaimed asphalt pavement (RAP). Economical challenges, disposal problems and environmental hazards are always emerging issues when existing road is demolished. All the above mentioned problems can be minimized by making use of RAP in the wearing course of new flexible pavements which leads to the sustainable development. The purpose of this study is to investigate the suitability of using RAP partially in wearing course of flexible pavements. The determination of residual bitumen content in RAP and gradation of reclaimed aggregates according to the procedure given by AASHTO was initial part of the study, where after the OBC of the asphalt mix containing 100% fresh aggregates and asphalt mix containing 50% RAP using the method of Marshal mix design, was found to be 4.0% and 2.5% respectively. The bitumen content present in RAP was 3.0%. Further results shows that RAP can successfully be used along the neat bitumen and fresh aggregates in new bituminous wearing course as the stability increases by 46% when fresh aggregates are replaced by 50% RAP. On the other hand, fresh aggregates are saved to 50%, fresh bitumen is reduced by 37.5% at optimums which leads to reduction in overall cost of the project making the project economical and sustainable.

Keywords: Reclaimed Asphalt Pavement (RAP), Optimum bitumen Content (OBC), Marshal Mix Design

PAPER ID: 66

COMPARABLE STUDY OF SEMI-FLEXIBLE PAVEMENT WITH VARIABLE GROUTS (CEMENT VS HYDRATED LIME)

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ABSTRACT

Semi-flexible pavement is a composite pavement that unifies the advantages of flexible and rigid pavement by producing open porous asphalt skeleton and filling the voids with selected fluid grouts. Almost 95% of pavements are flexible pavements, due to less initial cost, although for heavy traffic and repeated loads, rigid pavement is commonly used, because of its durability. Semi-flexible pavement is exercised due to its cost effectiveness (in comparison with concrete pavement). It is composed of Open-graded asphalt and fluid grout. Open-graded Asphalt is made in such a way that it contains air voids about 25-30%, while fluid grout is a mixture of cementations material and water that penetrates in the voids of Open-grade asphalt. Our present study involves designing of pavement which is beneficial for the environment and is sustainable with respect to strength, aimed at these targets we fabricated Semi-flexible pavement with grout of lime, It is the binder that fulfills a purpose of reducing pollution by hardening (as it absorbs carbon). Furthermore to check its feasibility for strength, we compare its compressive strength and indirect tensile strength with Semi-flexible pavement made with cement grout. The results shows us that there was slight variation in both the strength (compressive and indirect tensile). So using Semi-flexible pavement with lime grout for roads as wearing course will be feasible for the environment.

Keywords: Semi-flexible Pavement, Open-graded-Asphalt, fluid grout, Lime and Cement

PAPER ID: 80

ANALYSIS OF AXLE LOAD PATTERN OF FREIGHT TRANSPORT ON SELECTED LOCATIONS OF N-5 (PAKISTAN)

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ABSTRACT

Paved road network is a valuable asset of transportation system, which had been deteriorated by overloaded vehicles. At present in Pakistan, the pavements are designed by converting axle weight data and then combine them into an equivalent single axle load (ESAL), which cannot be used to reflect the response of the road. To overcome this problem analysis of axle load pattern were conducted in this research work. About 15000 vehicles were analyzed. It was observed that existing design EALF used was not representing the actual loading conditions and is towards lower side and truck factors need to be revised in Pakistan according to current traffic scenario, the result shows that 3-axle truck were most potential axle, damaging the road sections and result in high value of average EALF, which is the major cause of accelerating road deterioration resulting an increase in road traffic accidents & requires huge amount of budget for preservation and restoration.

Keywords: Overload, truck factor, traffic, freight transport, axle load.

PAPER ID: 126

EVOLUTION OF PEDESTRIAN FACILITY WITHIN UNIVERSITY CAMPUS; A CASE STUDY OF MUET JAMSHORO

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ABSTRACT

Pedestrian and factors related to pedestrian have received somewhat less attention in literature compared to other road users, although it is often underlined that road and traffic factors appear to explain only small part of pedestrian walking and crossing behavior. University campuses considered as major trip attractor. Such level of activities indulges more traffic causing more problems for pedestrian. With university enrollment increasing substantially, making the condition more unsatisfactory. The understanding of pedestrian behavior in universities may assist in the enhancement of design and planning of road and traffic environment, and subsequently the improvement of pedestrian safety, comfort and level of service. The objective of this study is exploration of factors related to pedestrian walking behavior in university campus. More specifically, the research aims to capture and analyze key components affecting pedestrian mobility on daily basis namely pedestrian's attitude, perception, behavior, preference and habits. A questionnaire was designed aiming to record prime human factors of pedestrian walking behavior and perception. The net total of 485 responses were recorded and analyzed through SPSS software.

Keywords: Behavior and Perception, Pedestrian Facilities, Sustainable Campus, Walkways.

PAPER ID: 136

LABORATORY EVALUATION OF COLD MIX ASPHALT MIXTURES FOR LOW VOLUME ROADS

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ABSTRACT

An efficiently designed highway pays a pivotal role in boosting the economy of developing country like Pakistan. Roads in Pakistan are almost designed as flexible pavement using Hot Mix Asphalt (HMA) mixtures. Besides its prompt adaptability, it encompasses some serious drawbacks as well such as; higher temperature requirements for sufficiently reducing the viscosity of mix for its ease in mixing, handling and compaction which contributes fuel requirements almost 15% of total cost of the project. Additionally, it consumes more natural resources, its non-feasibility in colder region, more transportation charges due to central plant recycling, deficient allowance for recycling and above all it imparts adversely to the environment due to the effect of the greenhouse gases. Cold Mix asphalt (CMA) on the contrary is mixed at the ambient temperature and hence fuel cost is optimized almost to nil, it saves natural resources requirements like aggregates, bitumen by using higher rates of recycling, it facilitates construction in any weather, overall it becomes more cost-efficient and above all it is environmentally friendly. This research aims to use CMA mixture to be utilized for low volume roads, rural roads, in remote areas and for reinstatement works where HMA mixtures will be uneconomical and will rise the risk of environmental pollution. Marshall mix design method is utilized in which mechanical and the volumetric properties of both the HMA and CMA mixtures are investigated and compared, these include; Marshall stability, unit weight and flow value, VMA, VFA and VTM. The results of this research suggest that CMA mixtures were sufficiently rich in the both mechanical and volumetric properties equivalent to 50 to 60% to HMA mixtures and hence these can be utilized for reinstatement works, low volume traffic roads and remote rural roads.

Keywords: HMA Mixture, CMA Mixture, Marshall Stability, Marshall Volumetric Properties.

PAPER ID: 146

IMPACT OF WASTE RICE HUSK AS FILLER ON MECHANICAL BEHAVIOR OF HOT MIX ASPHALT

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ABSTRACT

The mixture of coarse aggregate, fine aggregate, filler and bitumen is known as Hot Mix Asphalt in which filler having size less than 0.075 mm, is an integral ingredient that not only fill the voids but also provides stability against mechanical actions coming over the top most layer of flexible pavements. By observing unwanted failures in the flexible pavements like as rutting and cracking before the design life, the need has been occurred to improve the properties of Hot Mix Asphalt by replacing conformist filler by a waste mineral fillers, such as rice husk as a partial replacement. The aim of this research is to investigate impact of waste rice husk as mineral filler on mechanical behavior of Hot Mix Asphalt. Usage of such material is also a way of reducing waste from the environment. To achieve the aim of research, fifteen controlled hot mixes were prepared at variable bitumen percentages 3.0% to 5.0% with an interval of 0.5%. The properties of conventional hot mixes were assessed and optimum bitumen content was obtained, at which fifteen modified samples containing variable percentages 5.0% to 15% of waste rice husk were made and inspected to relate the results with conventional hot mixes and to obtain optimum filler content. From outcomes of Marshall Tests, waste rice husk was found optimum at 10%.

Keywords: Hot Mix Asphalt, Waste Mineral Filler, Mechanical Behavior.

PAPER ID: 147

MANAGING TRAFFIC CONGESTION PROBLEM (THE CASE STUDY OF KARACHI)

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ABSTRACT

Since last few decades there is substantial increase in the urban population of developing countries. In these urban populations, there are cities having fragile infrastructure and vulnerable road transportation system. Pakistan facing a serious road traffic congestion throughout the metropolitan cities. Traffic congestion causes delay longer trip, unreliability, increased fuel consumption, comfort and environmental problems over an extensive urban area. The fatality rate on the country's road network remains among the highest in the world around 5565 fatalities per year (over 30 accidents per 10,000 registered vehicles). Karachi is the metropolitan city of Pakistan in term of economic and population also faces pervasive traffic congestion problems. It was estimated in a research that one million rupees are lost daily due to traffic congestion, which is extrapolated for whole Karachi. This research is to analyses the traffic congestion status and factors involving traffic congestion. This study identifies best measures to overcome the congestion problems in the selected site of Karachi. The data were collected from the concern authorities of transportation and general public. In the end the study highlights the need for intelligent transport components for the management of transport system.

Keywords: Traffic congestion, Management, satisfaction

PAPER ID: 157

DYNAMIC ANALYSIS OF SUBMERGED FLOATING TUNNEL UNDER A HIGH-SPEED TRAIN

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ABSTRACT

Submerged floating tunnels (SFTs) are innovative structural solutions to waterway crossings, such as sea-straits, fjords, and lakes. As the width and depth of straits increase, the conventional structures such as cable-supported bridges, underground tunnels or immersed tunnels become uneconomical alternatives. The SFT dynamic behavior under real train load is not evaluated well to date. This study considers a high-speed train using the data from the China-star high-speed train to evaluate the dynamic responses of SFT tunnel and cables under high-speed train. The time-domain dynamic problem of SFT is formulated considering 3D tunnel and 3D geometric nonlinear cables. The tunnel is modeled by 3D beam elements and the cables are modeled by 3D catenary elements. The dynamic responses of SFT are evaluated under waves, currents and high-speed train. The SFT displacements, bending moments and cable top tensions were significantly influenced by moving trains.

Keywords: Submerged floating tunnel (SFT), Dynamic Responses, Catenary Cable, High-speed train

PAPER ID: 193

ANALYSIS OF ROAD TRAFFIC VIBRATION ON SURROUNDING BUILDINGS

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ABSTRACT

Rapid increase in Vehicles and axle loads on roads have grown many traffic related problems. The traffic-generated vibrations and their effect on buildings, particularly masonry-built and historical buildings, has been the center of interest in recent years. The vibrations generated by passing vehicles cause the movement in building foundations and forced vibrations in the buildings. Traffic-induced building vibration may cause unacceptable nuisance for people living close to roads or railways. Often the vibration originates from heavy traffic disturbs residents mostly at night and damages the aesthetic view of buildings due to cracks and spalling. This research analysis the effect of road traffic vibrations on surrounding buildings. Assessment is based on literature review and surveys of different research areas. Different measurements of traffic vibrations from road traffic source to the buildings were noted by digital vibration meters. The result shows that vibration produced by heavy vehicle like; Trucks, Trailers, Buses and Cars, exceeds the normal reading level which is physically painful, unpleasant and dangerous.

Keywords: Axle Load, building vibration, Aesthetic view of buildings

PAPER ID: 196

EFFECT OF WASTE POLYETHYLENE BAGS ON BITUMEN AND ASPHALT

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ABSTRACT

Plastics are everywhere in today's lifestyle and are growing rapidly throughout particularly in a developing country like Pakistan. As these are non-biodegradable there is a major problem posed to the society with regard to the management of these solid wastes. Low density polyethylene (LDPE) has been found to be a good modifier of bitumen. Even, the reclaimed polyethylene originally made of LDPE has been observed to modify bitumen. However the disposal of the waste polythene materials in large quantities has been a problem all over the country. This study was therefore designed to investigate the effect of polythene in the asphalt concrete properties. Polythene was added in grinded state as binder modifier. It was introduced to the mixture by melting it in the bitumen used in preparing the asphalt concrete mix. Marshall Mix design method was used to test the modified mixture properties. In total, 18 samples were prepared (03 samples for each proportion). Six proportions of polyethylene by weight of the optimum binder content were selected to be tested (0%, 0.5%, 1.0%, 2.0%, 3.0% and 4.0%). The properties tested include Ductility, softening point, specific gravity, flash and fire point, penetration test, bulk density, stability and flow of the concrete mix. The proportion of the modifier was taken as 4.0%. Findings from this study suggest that polythene modifier increases the stability and other basic properties of bitumen to a considerable extent, thus polyethylene bags can be used as modifier in asphalt concrete mixes.

Keywords: Asphalt Mixture, Bituminous Binder, Bulk Density, Flow, Stability, Waste Polythene.

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PAPER ID: 79

COMPARATIVE STUDY OF ROLLED STEEL SHAPES AND REBARS, MANUFACTURED IN LAHORE

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ABSTRACT

Steel is an alloy of iron and non-metallic elements like carbon, Phosphorous Silicon and Manganese. By the variation of carbon percentage and addition of the above compounds in different proportions the properties of steel are affected. Although the elements have a great effect on the property of steel yet their quantity in steel is very small. For example the carbon content in steel is 0.20% to 0.3% only. This study has been carried out to make a comparison of rolled steel shapes and rebars manufactured in Lahore and to check the percentage values of different elements in them. The investigation consists of two phases. First phase pertains to collection of samples of steel from different government approved manufactures in Lahore. In the second phase samples are tested for tension, compression, impact and hardness. Chemical analysis has also been performed to know the percentage values of different elements in each sample. These values are then compared with standard ASTM values to determine variation, if any. The effect of variation of the elements like C, Mn, Si, P, S, Cu and Fe upon the strength and ductility and other properties of steel are observed. It is noticed that variation from standard values is very small.

Keywords: Rolled Steel Shapes, Manufacturing of Steel, Steel Rebars

PAPER ID: 125

TO DETERMINE THE STRENGTH PROPERTIES OF CEMENT MORTAR CYLINDER REINFORCED WITH "PET" BOTTLE BRICKS.

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ABSTRACT

As construction industry today is increasingly focusing on environmentally sustainable construction by incorporating different waste materials in civil engineering practices. One such waste treatment strategy that is gaining momentum in developing countries is using disposable plastic bottle filled with soil, as a partial substitute for construction bricks. By 2015 world has produced 7.8 billion tons of plastic, and only 20 percent of it was ever recycled. As cement is one of the most used materials in the construction today, integrating plastic bottle filled with soil will largely aid in recycling of plastic waste, and will subsequently reduce the CO_2 emission caused by cement. The study was conducted to find out compressive and splitting tensile strength of plastic bottle filled with locally available soil (cohesive and cohesion less) reinforced cylinders of cement mortar and comparing the results with cement mortar cylinders of the same ratio without any plastic bottle reinforced in specimens. The compressive and splitting tensile strength test results obtained from the plastic bottle reinforced cylinder were approximately 80 percent of the results obtained from cement mortar specimens.

Keywords: Sustainable Waste Recycling, Soil filled Plastic Bottles, Compressive and Tensile Strength

PAPER ID: 162

MECHANICAL AND DURABILITY PROPERTIES OF SUPER STABILIZED MUD BRICKS

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ABSTRACT

In Pakistan, burnt bricks and cement are the two mostly used building materials. Its production also causes CO2 emission which is hazardous for environment. Generally, earthen construction is less water resistant and required its continuous maintenance. So, different stabilizers and additive are using in order to enhance its strength and durability which includes cement, lime, straw, and cow dung etc. This research focus on super stabilized mud bricks which are made by using special chemicals as stabilizer in mud. In this research different chemicals are used at different proportion, for production of super mud bricks, and unlike burnt bricks, these bricks are sun drying which is usually prepared in 3-7 days. A number of tests had been performed on these super mud bricks in order to evaluate its strength and durability. A super mud brick of standard size 9"x4.5"x3" withstand for compression loading varies from 2.70Ton to 4.92Ton because these bricks are vulnerable to rain during its drying period that's the reason that it resisted less compression load compared to the completely sundried bricks whose compression loading were varies from 9.0Ton to 24Ton. In water absorption test, its water absorption varies from 12% to 20% which is within the specified limit of ASTM (American Society of Testing Material) standards. So, on the basis of experimental tests, PVA (Polyvinyl Alcohol) are one of the most effective stabilizers (Chemical), that's to be used in mud. These bricks are in affordable cost, sustainable, recyclable, and good outward appearances. More importantly, this chemically stabilized super mud bricks is both steps towards sustainability and also to enhance its performance for severe weather condition.

Keywords: Super Brick, Sustainable, Ductile, Cost effective, Super Stabilized, PVA, Air Dried

PAPER ID: 187

QUALITY ANALYSIS OF ASH FROM LIGNITE COAL AND ITS UTILIZATION AT THAR POWER PLANT

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ABSTRACT

Trillion of tons lignite coal is deposited under the surface of tharparkar zone had been started utilizing in its own mine mouth power plant. Tharparkar is rich in coal resource and have the potential to energize the Pakistan for atleast 200 year with the deposited coal fuel of 175 trillion tons. Recently, Block II (have 1% of 175 trillion tons of coal has the capability of produce 5000 MW for 50 years) had just set its 2 Units which will capable for 2x330 MW with consumption of 280 t/h. With the time, the increase in power plant will results in increasing problems with the disposal of solid residues from combustion and off gas cleaning (Bottom ash and Fly ash). The aim of this research is to analyze the properties of as fired coal i-e volatile matter, sulfur & nitrogen contents and solid residues from combustion and off gas cleaning (Bottom & Fly Ash). Furthermore environmental effects, health effects and disposal and recycling of ash is also discussed.

Keywords: Ash, Coal, Thermal Power Plant, Quality Analysis

PAPER ID: 194

SYNTHESIS OF CAPSICUM ANNUM L CAPPED GOLD NANOPARTICLES AND THEIR APPLICATION IN SENSOR

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ABSTRACT

Different research studies have been performed to synthesize metallic nanoparticles using different techniques. The green synthesis method of nanoparticles or the ''eco-friendly method'' is one of these methods that have got great attention. The commonly used sources for the green fabrication of nanoparticles are extracts of plants, leaves, fungi, and microorganisms. Green synthetic methods are easier, cheaper, environmentally sustainable and can result in the manufacture of Nano objects with regulated size and shape. In the present study, AuNPs were synthesized by using green bell pepper or Shimla Mirach extract as reducing as well as capping agent after mixing with aqueous HAuCl4 as precursor and NaOH used as accelerating agent to speed up the reaction. Synthesized gold nanoparticles were confirmed through the color change from yellow to ruby red. The optimization study included a variety of parameters such as plant extract concentration, sodium hydroxide, chloroauric acid, and solution pH to achieve a blue-shifted spectrum. The surface Plasmon resonance band was controlled at 519 nm. Synthesized gold nanoparticles have been characterized by UV / Vis spectroscopy, FT-IR, AFM, ZPA, and DLS to check the stability, morphology, crystallinity, and size of nanoparticles. Synthesized nanoparticles were successfully applied as colorimetric sensor for detection of selected metal ion Fe2+. The linear range of Ferrous ion was 3.3-8 ppb based on increase in absorption intensity with R2 value of 0.987 using UV-Vis spectrophotometer. The sensor was successfully applied to real water samples regarding the detection of Fe2+.

Keywords: Capsicum, SEM, AuNPs, gold, nanoparticles.

PAPER ID: 203

FABRICATION OF SELECTIVE COLORIMETRIC SENSOR FOR HG^{2+} USING GREEN SYNTHESIZED SILVER NANOPARTICLES

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ABSTRACT

This study demonstrates a green route, environmental friendly and cost effective colorimetric method for quantitative analysis of Hg2+ using plant extract capped silver nanoparticles. Citrus Japonica Leaves for the first time used as bioreductant which acts as the reducing and capping agent. The formation of AgNPs was noticed as yellowish-Golden color appearance showing Surface Plasmon Resonance (SPR) band at 403 nm in visible region under optimized parameters, including pH, reaction time, and concentrations of silver salt, sodium hydroxide, and leaf extract. The fabricated green extract based AgNPs were characterized by UV-visible spectroscopy, FT-IR Spectroscopy, SEM, XRD, AFM, DLS and Zeta-Potential analyses. The green synthesized AgNPs proved to be highly selective calorimetric sensor for Hg2+ showing visible color change from yellowish golden to light brown color in aqueous medium. The prepared silver nanoparticles were highly selective to detect Hg2+ on the basis of the linear relationship between SPR band intensity. The linear range of developed method was found as 9.4-90 µM with an R2 value of 0.997 and limit of detection (LOD) and limit of quantification (LOQ) of 3.0 and 9.4 µM, respectively. The selectivity of prepared AgNPs for Hg2+ was also studied in the presence of Ni2+ Zn2+, Cu2+, Co2+, Pb2+, Cd2+, Cr2+ and Fe2+. The obtained results did not show any significant interference by competitive ions.

Keywords: Silver Nanoparticles, Colorimetric Sensor, Toxins, Mercury.

PAPER ID: 238

INDIGENOUS NATURAL INDIGO DYE FOR DENIM INDUSTRY

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ABSTRACT

Presently, denim industry is the fastest growing textile manufacturing sector in Pakistan and it has a promising local and international market for work and fashion clothings of all age groups. Synthetic indigo dye is widely used for denim dyeing which is toxic due to presence of aniline compounds. Due to increasing awareness and control for sustainable manufacturing, products and fashion brands, manufacturers and scientists have been looking for the alternatives. Natural indigo dye has been one of those alternative options. However, the natural indigo dye has been used only in the cottage industry so far. The present research includes the application of natural indigo dye extracted from indigenous indigofera tinctoria plants for dyeing of undyed denim fabric. The indigo dye extraction process was developed in collaboration with Archroma Pakistan Ltd. to make the dye suitable for dyeing procedures practiced in denim industry. The dyeing parameters of industrial scale dyeing procedure (i.e. pre-wetting, dyeing and rinsing) were optimized using the developed dye. The colour strength (K/S value) and colourfastness properties of the fabric dyed with the developed natural indigo dye were better than the synthetic dye.

Keywords: Denim fabric, Dyeing, Indigofera tinctoria, Natural Indigo Dye, Sustainability

PAPER ID: 239

ENVIRONMENTALLY-FRIENDLY DYEING OF COTTON YARN WITH NATURAL INDIGO DYE

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ABSTRACT

At present, the textile industrialists of Pakistan are increasing their capital investments into denim manufacturing and processing due to increasing export value for international brands. Denims are usually dyed with synthetic indigo dyes which are harmful to the environment. This is because the wastewater discharge from denim indigo dyeing contains a high amount of biochemical oxygen demand (BOD), chemical oxygen demand (COD), total dissolved and suspended solids contents (TDS and TSS respectively). Therefore, the wastewater must be treated before it is drained to main streams to reduce the pollutants to the level which can be tolerated by the environment itself. Due to negative effects of synthetic dyes on human health and environment, the use of natural dyes has been reviving from cottage to mass industrial scale. This is because natural dyes are biocompatible with the environment, non-toxic, and particularly non-carcinogenic. The aim of the work presented in this paper was to dye cotton yarn lea with natural indigo dyes using indigenous indigo plants for denim dyeing industry of Pakistan in collaboration with Archroma Pakistan Ltd. The dyeing of cotton warp yarn for denim was carried out by existing dyeing methods adopted by denim manufacturing industry. Dyeing and wastewater characterization results of natural dye were compared with the synthetic indigo dye. It was found that natural indigo dye shows better color strength (K/S value) as ever before; and the COD and BOD contents were reduced from 1410 mg/L to 783 mg/L (44% reduction) and from 384 mg/L to 176 mg/L (54% reduction) respectively, which makes the natural indigo dye more environmentally-friendly.

Keywords: environmentally-friendly dyeing, Cotton Yarn, Dyeing, Natural Indigo dye, Wastewater pollution.

PAPER ID: 250

NUMERICAL SIMULATION FOR FLUID FLOW ANALYSIS OF A WAVY AIRCRAFT WING

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ABSTRACT

This research focuses on 3D fluid flow analysis of the wing having tubercles on its leading and trailing edge. These protuberance act as passive flow control devices, enhancing their performance at a higher angle of attack when compared to the smooth leading edge wing. The present study aims to investigate the effect of heterogeneous waviness on the aerodynamic performance of the rectangular aircraft wing. For that purpose, three-dimensional models of the wavy wing are analyzed and compared its performance with regular smooth leading edge wing. The two wavy wing models were designed one with the increasing wavelength from root to tip and the second with decreasing wavelength from root to tip. The numerical simulation is performed at Reynolds Number Re= 2.4×10^5 and 20^o angle of attack. The Computational Fluid Dynamics (CFD) simulation is performed to solve Reynolds Average Navier Stokes (RANS) equations through employing $k-\omega$ Shear Stress Transport (SST) model. The numerical simulation results reveal that wavy wing with the increasing wavelength from root to tip showed favorable results whereas the second model with decreasing wavelength from root to tip achieved lower Lift-to-Drag (L/D) ratio than smooth leading-edge wing at 20^o angle of attack.

Keywords: Passive flow control; Aerodynamic performance; Heterogeneous leading-edge waviness; Reynolds number; Finite wing

PAPER ID: 257

EXPLORING PRODUCTIVITY ENHANCEMENT OPTION FOR PULP AND PAPER INDUSTRY IN PAKISTAN

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ABSTRACT

In pulp and paper industry the major part of energy is consumed in paper drying process. The objective of this research work is to find energy saving potentials in drying section. The methodology of retrofitting (improvements in existing technologies) is adopted for the dryer section, since pulp and paper industry is a capital intensive industry and inducting new technology requires huge capital cost. The data is collected from a local pulp and paper integrated industry. Potential energy savings and equivalent productivity enhancement are obtained by incorporating process improvement. The improvements in conventional multi cylinder drying section include providing optimized air flow, temperature, and humidity through closed hood dryer system and installation of heat recovery system. For proposed technological improvements for dryer section, it is found that the total energy saving is 2.481 GWh which is around 18% of the total energy use of 13.578 GWh by the paper mill per annum. Also, the productivity enhancement obtained through the energy saving is around 17% (6,539 tons per anum or 18 tons per day) of the total annual production of 40k tons. The payback period for the suggested retrofitting for the paper mill is approximately 11 months.

Keywords: Paper Industry, Productivity, Energy efficiency, Sustainable development

STRUCTURAL ENGINEERING


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PAPER ID: 49

STUDY OF RCC BEAMS DAMAGED BY FIRE

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ABSTRACT

Object of this study was to check the strength of fired standard size beams .In this regard 36 beams were constructed, 18 were constructed without plaster and 18 have ¾" thick plaster .The total specimens be cure in similar controlled circumstances in the laboratory for the age of 28 days, while 18 plastered were further cured for 7 days after their plaster. Beams were placed under the fire for different intervals of time. These beams were tested in the Universal Testing Machine (UTM) of the Department at MUET. The changes appeared in color consider as the first impact in the structure due to fire became dark black and grey. Including irregular cracks, spalling and breaking off surface.

Reduction in compressive strength of concrete due to severe heat was detected. All the information regarding to the behavior of both type of beams are studied. Significant effects of fire on strength and aesthetic view of concrete are observed.

Keywords: Concrete, reinforcement, fire, plaster, spalling, cracks

PAPER ID: 107

STUDY OF RIGID BOND ADMIXTURE ON THE STRENGTH OF RCC BEAMS

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ABSTRACT

In Structural Analysis and Design Bond strength between steel and concrete plays an important role. Beams are constructed to withstand the load to support slab and transmit load to columns. An admixture namely Sikadur 31-CF introduced by Sika Pakistan Pvt. Ltd were spread over steel reinforcement of concrete beams. Total 36 (Thirty Six)number of beams were cast to evaluate bond strength as well as chemical attack protection. A set of 3 RCC beamsat mix ratio of 1:2:4 and 1:1.5:3 were cast with curing ages of 3, 7 and 28 days and tested up to failure at central point loading system. Difference of ultimate strength was not significant in all 36 beams of normal and rigid bond admixture spread steel beams. Sikadur 31-CF which was spread over the steel bars, placed in open environment and submerged into water for certain days shown better for protection against corrosion and other chemical attacks as compared to normal steel bars which showed rusting(corrosion) in water and normal environment.

Keywords: Structural Design and Analysis, Rigid Bond Admixture, Chemical Attacks.

PAPER ID: 119

FINITE ELEMENT MODELING OF CRUMB RUBBER CONCRETE LUMPED MASS COLUMN

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ABSTRACT

Production of sustainable concrete is the most crucial factor to be considered in construction fields. The utilization of waste treated crumb rubber and steel fiber can mitigate the problematic issues of Normal Concrete (NC) which is brittle, low tensile, and low damping performance. The purpose of this research is to numerical modeling of Crumb Rubber Concrete (CRC) using ABAQUS and to investigate the damping ratio and study the response of CRC column subjected to an earthquake. Three-dimensional finite element analysis of concrete lumped mass column of 35 MPa and having base 275mm x 80 mm, column 40mm x 500mm and lumped mass 120mm x 190mm is developed using ABAQUS and subjected to numbers of earthquakes loadings. The tests specimen was characterized, concrete mix (10%, of rubber particles content), the results of finite element analysis is validated using experimental data. Overall, this research demonstrated the potential use of treated crumb rubber as sustainable concrete that can enhance the damping performance of the concrete structure, this could be a major benefit for structure in seismic areas where energy dissipation is needed.

Keywords: crumb rubber, concrete, earthquake, finite element modeling

PAPER ID: 165

MODAL UPDATING FOR A SIMPLE STRUCTURE AGAINST IMPACT LOADING

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ABSTRACT

Impact loadings (e.g. blast or missile attack) can cause severe damages to structures. There is a growing trend in studying the experimental and analytical behaviors of structures against impact loadings. Such experimental works are very expensive. Analytical approaches can be economical but these are complicated. Also, there is a need of model updating in understanding the relatively real behavior of structures under impact loadings. In current work, model updating for studying the precise response of a simple structure against impact loading will be presented. For this purpose, a prototype structure of single storey and single bay is prepared. Impact load is applied and recorded at the bottom of one of the four columns and the response will be recorded at the top of the two columns for relative study. Finite element modelling of prototype structure is done in commercially available software SAP2000. Numerical response is then compared with that of experimental one. A set of modifiers is updated based on available literature in order to reduce the difference between numerical and experimental responses. Detail discussions on set of modifiers and their effect before and after model updating is made. Accordingly, recommendations are given for future directions.

Keywords: Impact loading, modelling, modifiers, prototype structure, model updating.

PAPER ID: 180

DYNAMICS OF HIGH RISE BUILDINGS IN PAKISTAN AND ITS SUSTAINABLE APPROACH

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ABSTRACT

Buildings are the main destination for county's power supply and high rise building seems to be utmost achievement. On the contrast, the dynamics of high rise building in Pakistan in quite pessimistic. The exponential rate of increase in population, land unavailability, demands for high rise buildings. However, majority of development is restricted to low rise building, as a result, sufficient land that could be used for agriculture purpose, which is the main concern of Pakistan, is wasted. Hence the efforts for developing high rise buildings in Pakistan is largely on demand. This kind of problem need to be dynamically investigated. Therefore, analysist develop Causal loop diagrams to address the different correlated terms of the problem. This paper studies the need of high rise building in Pakistan and most importantly, reveals the different aspects behind insufficient high rise building in Pakistan. The dynamics of problem has been discussed through Causal loop diagrams. It is shown that, developing high rise buildings, ultimately ends at sustainable development.

Keywords: High rise Building, Sustainable approach, Causal loop Diagram..

PAPER ID: 211

COMPREHENSIVE ANALYSIS OF COMPOUND BRIDGE PIER UNDER CLEAR WATER CONDITIONS: AN EXPERIMENTAL INVESTIGATION OF SCOURING COUNTERMEASURES

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ABSTRACT

Apart from the natural calamities, bridge pier scouring has proved to be the foremost reason for the failure of over 600 bridges so far around the world. Scouring has ascertained to be an inevitable process around hydraulic structures. Many countermeasures were designed and implemented to cope with this critical phenomenon so far, from advancements in shapes to the flow altering countermeasures. However, there lies a huge void in investigating compound piers (piers with non-uniform cross section) that can be seen lying amidst major rives in South Asian region. This study aimed at experimental testing of the circular compound bridge piers and their comparative analysis with circular piers. A series of experiments were performed keeping constant discharge and flow depth following clear water conditions. This study showed valuable results as the compound pier significantly reduced the scouring depth at upstream side of the pier up to a maximum of 52.4 % as compared to a circular pier. Also, the results helped in devising the suitable position for the placement of the footing of compound pier to minimize the vortex.

Keywords: compound pier, experimental work, flow altering countermeasure, local scouring.

PAPER ID: 212

IMPACT OF LARGE WOOD DEBRIS (LWD) ACCUMULATION ON SCOUR CHARACTERISTIC AT BRIDGE PIER

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ABSTRACT

During extreme floods, accumulation of Large wood debris (LWD) at upstream of bridge piers effects the stability of piers. They cause additional forces by deviation and reducing area of flow, which influence hydraulic structures and exacerbate scour. During 2010 floods in Pakistan, more than 278 bridges were collapsed only in KPK Province. Most of them were collapsed due to LWD accumulation. The present study presents results from flume experiments performed at Hydraulics Engineering Laboratory of Civil Engineering, University of Engineering and Technology, Taxila. The circular pier was used in a channel and the debris were allowed to float at the water surface and hit the bridge pier at various heights. On the scour generation mechanism due to various stuck position of debris with respect to depth of water flow H and pier diameter D was investigated. A false bed of 6 m long, 0.96 m wide and 0.17 m depth was provided in laboratory channel to stimulate the scour zone. All the tests were performed under clear water condition. The scour generated at upstream was compared with local scour hole that occurred without debris flow . Based upon the observation and analysis of the experimental data and used setup, the result showed that the debris stuck at the height of 0.75 D generated more scour as compared to that of scour hole generated due to isolated pier as well as flowing debris at the top surface. Further decrease in accumulation height reduces the scour hole and act as pier collar.

Keywords: Bridge Pier, Large wood debris (LWD), height variation, scour mechanism

PAPER ID: 214

IMPACT RESISTANCE INVESTIGATION OF FIBRE REINFORCED CONCRETE HAVING GFRP REBARS IN LAST TWO DECADES

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ABSTRACT

The aim of this paper is to review the impact strength of different concrete composites reinforced with fibres and GFRP rebars. These composites were investigated using different testing methods. The mechanism of impact testing, using state of the art equipment to simplified apparatus done by various researchers on prototypes and on real scale, is presented. A brief overview of the parameters used in these methods is also discussed. The properties of various fibres and performance of GFRP rebars in enhancin g the dynamic properties are highlighted and conclusions drawn are compiled to have a better understanding of the effectiveness of these modifications against impact loading. The outputs of these methods in terms of predicting the actual behavior of fibre reinforced concrete for real life application based on their properties are reported. The mechanism of prototype testing in regard to the implementation of testing results for actual structural members is discussed by identifying the analytical constraints in impact testing.

Keywords: Fibre reinforced concrete, GFRP rebars, impact resistance, prototype testing.

PAPER ID: 217

BEHAVIOR OF THIN SHEAR CONCRETE WALLS DURING EARTHQUAKES IN LAST DECADE

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ABSTRACT

Many researchers have reported numerous thin shear concrete walls failures. The aim of this study is to present the performance of thin shear concrete walls during past earthquakes of last decade. There are four aspects with the help of which behavior is being evaluated; (i) flaw identification in thin shear concrete walls, (ii) governing mechanical property in dominant flaw, (iii) alternate approach to improve governing properties, and (iv) additives in concrete. Various researchers explored different non-conventional materials to change the post cracking behavior of concrete. The output of using non-conventional materials to enhance mechanical properties of concrete are reported. There is a need to explore behavior of thin shear walls with non-conventional materials.

Keywords: Earthquake, flaws, non-conventional materials, thin shear concrete wall.

PAPER ID: 218

DEVELOPMENT OF EMPIRICAL RELATION FOR MOMENT CAPACITY OF A CONCRETE PROTOTYPE BRIDGE DECK SLAB REINFORCED WITH GFRP REBARS AND JUTE FIBRES

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ABSTRACT

Novel and innovative ideas are introduced in construction industry because the requirements from structure increase day by day. Enhancing strength characteristics of concrete has been a practice for long. Bridge deck slabs are exposed to heavy moving loads so cracking presents huge issue as they increase water percolation and enhances the probability of corrosion of steel reinforcing bars and the moment capacity of section reduces. This paper reveals a study to develop the equation to predict moment capacity of concrete slab reinforced with GFRP rebars and jute fibres. An experimental and analytical investigation is carried out on a prototype concrete deck Slab with a width 225mm, length 450mm and 75mm thick. Existing methods for the calculation of bending moment do not incorporate Fibres and GFRP rebars so an empirical relationship is developed based on rational concepts. The proposed equation for bending moment has two parts, the first one is the moment capacity of GFRP reinforced section and other one is moment resulting from fibre in the section. The developed model matches well with the experimental results.

Keywords: Bending moment capacity, Concrete deck slabs, GFRP, Jute

PAPER ID: 228

RESPONSE OF ARMATURE TYPE INFILL WALL PANELS IN INTERMEDIATE MOMENT RESISTING FRAMES SUBJECTED TO EARTHQUAKES

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ABSTRACT

The objective of this research is to study the planar behaviour of simple intermediate moment resisting frames (IMRFs) infilled with brick masonry when subjected to earthquakes. The various types of infill walls in IMRFs show a distinct response to lateral loads. In the 2005 Kashmir earthquake, about half of the structures that were damaged beyond repair were load-bearing buildings. But, the buildings that used armature type walls in construction were seen to be less affected by the earthquake. This study is carried out by simulating the various cases on SAP2000, a finite element analysis package. The forcing function taken is in the shape of response spectrum, the material properties and the mechanical behaviour have been taken from recent experimental studies in Pakistan. This study concludes that the performance of IMRFs is improved to a great extent if armature type infill wall panels are used in place of conventional infill walls.

Keywords: Armature cross-walls, Earthquake, IMRF, Infill walls, Response Spectrum, SAP2000

PAPER ID: 231

BEHAVIOR OF INTERLOCKING BLOCK STRUCTURES UNDER DYNAMIC LOADING: A REVIEW

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ABSTRACT

Earthquake imposes serious harm to non-designed structures in countryside regions of the world. Many affordable yet safe housing strategies for individuals of such regions are being proposed by many researchers. In this regard, interlocking block structure is one of the potential solutions presented by these researchers. The aim of this paper is to review the behaviour of interlocking block prototype structures under dynamic loading based on previous researches. Behaviour of these prototype interlocking structures were investigated by various researchers using low to large scale shake table in the laboratory. Their mechanism of dynamic loading, from real life earthquake phenomena to simplified apparatus in the form of shake table done on prototypes and on real scale, is presented. A brief overview of the parameters evaluated in these studies is also discussed. The viability of different interlocking patterns in increasing the dynamic properties are featured and conclusions drawn are gathered to have a superior understanding of the adequacy of these interlocking patterns against dynamic loading. The output of these methodologies based on empirical relations to predict the actual behaviour of interlocking block structures for real life application are reported. Few limitations to bridge the gap between prototype testing and real-life scenarios are identified and their analytical solutions is recommended.

Keywords: Interlocking block structures, Shake table, Prototype testing, Dynamic loading

PAPER ID: 232

SEISMIC ANALYSIS OF A HIGH-RISE BUILDING: A CASE STUDY

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ABSTRACT

Pakistan is located in a region of high seismicity. The 2005 Kashmir Earthquake near the city of Muzaffarabad, with an intensity 7.6 on Richter Scale had a Death Toll 86,000–87,351 and Economy Loss of 6 Billion US Dollars. Earthquakes don't kill people, Buildings do. The aim of this research is to investigate the response of a high rise building during seismic excitations by using software ETABS. The building selected for this research work is a reinforced concrete building having three shear walls, located in Hyderabad. The research methodology includes the non-linear static analysis also known as pushover analysis. The zone of Hyderabad city is 2A having peak ground acceleration of 0.08g to 0.16g. The required data was extracted from Building code of Pakistan and various displacement and drift values for different floors were observed. The results show that basement carries zero drift and its value increases as one moves from the bottom to the top floors, it concludes that upper floors will move and vibrate for long time intervals as compared to the bottom floors. The building was analyzed for different loads i.e. Dead, Live, Wind and Earthquake Loads where the maximum values of shear force and bending moment diagrams were due to the Dead and Live Loads. However, this research work concludes that the proposed building is safe under seismic excitations because of the shear walls provided.

Keywords: Earthquake, ETAB,; Pushover Analysis, Seismic Zone, Peak Ground Acceleration.

PAPER ID: 248

DAMAGE DETECTION IN RC STRUCTURES FOR RANDOM INPUT SIGNALS USING JERK-ENERGY CURVATURE DIAGRAM

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ABSTRACT

The present paper proposes, an algorithm for damage detection and its localization for reinforced concrete (RC) structure with ambient vibrations. MATLAB based algorithm was developed for damage detection and localization based on both global and local damage indexes. Damage was localized based on the jerk-energy criterion. A finite element model (FEM) of RC beam was considered to provide evaluation of the proposed algorithm with random vibrations. In second stage, the dynamic responses of a RC four story shear frame subjected to random vibrations at base of the structure were used by simulating continuous ambient vibrations. Finite Element Model of RC beam and shear frame were used to extract the nodal accelerations while considering different damage configurations. Damages in the structure were artificially introduced by local reduction in modulus of elasticity. Results of single and multiple damage cases based on both global and local damage indexes showed that the algorithm can correctly detect and localize the damage in RC structure.

Keywords: Concrete structures, Structural Health Monitoring, Ambient Vibrations

WATER & WASTEWATER ENGINEERING AND TECHNOLOGY


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PAPER ID: 05

MAGNETIC NANOPARTICLES (MNPS) FOR CHROMIUM REMOVAL FROM INDUSTRIAL WASTEWATER

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ABSTRACT

Rapid industrialization is causing an emissive increase in discharge of heavy metals by their effluent streams. Water pollution by heavy metals occurs globally and has gained much attention due to their toxic and carcinogenic effects. This study addresses removal of chromium Cr (VI) using highly efficient, low cost and environment friendly Magnetic Nano-Particles (MNPs). MNPs were prepared by co-precipitation procedure in the presence of air using ferric and ferrous chloride salts. X-Ray Diffraction (XRD) and Scanning Electron Microscope (SEM) analysis was performed to characterize MNPs. Adsorbent Dose, pH, contact time with the pollutant and initial concentration was varied to determine maximum removal efficiency at optimized conditions. 96% of the Cr (VI) was removed using 0.3 g/L of MNPs at pH of 4 and equilibrium was achieved within short span of 10 minutes. Maximum adsorption capacity of 124 mg/g was obtained using Langmuir adsorption isotherm. Regeneration studies showed that MNPs retained their Cr(VI) removal capacity. Excellent adsorption capacity along with synthesis of MNPs from locally available material, easy separation, environment friendly composition makes MNPs a feasible solution to remove heavy metals like Cr (VI) from industrial wastewater.

Keywords: Magnetic nanoparticles, Adsorption, Isotherm, Chromium

PAPER ID: 16

PREPARATION OF SUSTAINABLE ADSORBENT TO TREAT ORGANIC POLLUTION IN WATER

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ABSTRACT

Are your thoughts knocking on your mind that Earth is standing on the corner of destruction and soon it will fall down? That's mean your thoughts are challenging human ingenuity. No doubt world is facing various significant concerns associated with Environment. However, water is revealed as a major concern of this contemporary epoch. All concerns need equal attention, but water is a primary need as life is not possible without water. Enormous techniques have brought in front to bring water pollution at acceptable levels but some of them show cons in terms of unsustainability while others in terms of high cost and there are very few available techniques to overcome organic pollution. Keeping all these circumstances into consideration; this paper presents sustainable and cost-effective adsorbent; will be known by world as SUNSPACE to reduce organic pollution in water. With the help of UV spectrophotometer; efficiency of SUNSPACE is observed by comparing before and after water samples using SUNSPACE. This adsorbent is associated with remarkable environmental and economic advantages; these advantages will make the adsorbent a very noticeable technique in the time to come.

Keywords: Adsorbent, Algae, Organic Pollution, Sustainability

PAPER ID: 28

DESIGN AND FABRICATION OF GRAVITATION FILTER UNIT

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ABSTRACT

The lack of safe water creates a tremendous burden of diarrheal diseases and other life threatening illnesses for people in developing world. In this project, a unique design is utilized to filter water for local communities. Further, it works on the principle of renewable energy and gravitational force, and it consists of widely available and economical materials. The materials for filtration are; Sand, Charcoal, Granite and, Gravel, and Ultra Violate lamps are used for disinfection. Initially, filtration of water is done using gravitation, and then, disinfection is achieved in order to kill pathogens. To make the project more sustainable, renewable energy source is used for disinfection. To check the quality of water, the parameters taken into account are; pH before 8.22 and after 8.25, TDS before 275 mg/l and after 278 mg/l, S.S before 30.94 mg/l and after 32.94 mg/l, Alkalinity before 118.8 mg/l and after 65.8 mg/l, Turbidity before 339.8 NTU and after 199.8 NTU, Hardness before 80.76 mg/l and after 42.52 mg/l, Taste and Odor, E.C before 225 µS/cm and after 228 (µS/cm) and, for Disinfection total coliform before 100 cfu and after 0 cfu . The results propose that the project is proved to be cost effective for local households in sub urban and rural areas. Moreover, its simple structure and procedure makes it more viable. Gravitation filter unit filters 50 liters of water in one running and can be effectively used for a family of 10 members. The research has potential of efficient production of safe water for local people and can save precious lives being lost because of water-borne diseases.

Keywords: Gravitation Filter, Renewable Energy, Economical Filter Design, Local Community

PAPER ID: 56

CARBON NANOTUBE MEMBRANES FOR WATER DESALINATION AND PURIFICATION

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ABSTRACT

The alarming rise in global warming has shown dreadful effect on our ecosystem, among which the most consequential is the salinization of fresh water reservoirs. To meet the demand of freshwater, it has made it urgent to develop an appropriate technology to desalinate and purify water. Traditional desalination methods are implemented in large-scale which need a lot of energy and their capacity to remove salt are limited. Carbon nanotubes are very lightweight hollow tube of 0.8 nanometers wide in diameter, nanotubes are incredibly strong, and they can withstand much higher pressure to desalinate sea water. Researchers have also found that it has tremendous potential for markedly improving the water permeability. Carbon nanotube membrane possesses many advantages, including self-cleaning property and requires less amount of energy to remove the salt ions and provides frictionless transport of water. This review article outlines the basic work done over past decades based on computational and experimental work, providing a detailed description about the current knowledge of utilizing carbon nanotubes in desalination. This article also highlights the current hindrances and future challenges relating to this technology. It is expected to make desalination more affordable, which would be a huge boon to poorer drought stricken countries.

Keywords: Desalination, Fresh Water, Nanotube, Purification

PAPER ID: 134

IMPACT OF INDUSTRIAL EFFLUENT ON GROUNDWATER QUALITY OF KOTRI INDUSTRIAL AREA

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ABSTRACT

Water is considered fundamental to development due to its contribution to economic growth and human welfare. Yet, most human activities such as agricultural, domestic and industrial pollute water resources. Industries use water in different processes and if not well managed, they pollute the water bodies. The aim of the study is to assess the impact of industrial effluent on shallow groundwater quality of Kotri (Sindh, Pakistan) Industrial Area. The sampling was conducted in the vicinity of the Colgate Palmolive Industry and Surrya Textile mill. Qualitative data were analyzed by using the physical, chemical and biological tests. The results show that the types and abundance of pollutants discharged by the industries were higher and to some points exceeding the World Health Organization (WHO) and USA EPA guidelines. The laboratory tests were conducted in which the membrane filtration test for micro bacterial contamination was found as 13cfu to 27cfu whereas the allowable limit 0 cfu according to WHO. Furthermore, the results of physical and chemical tests show that industrial pollutants found to be unsuitable for drinking purposes.

Keywords: Industries, Groundwater, Heavy metals

PAPER ID: 145

REMOTE MONITORING OF WATER QUALITY THROUGH IOT PROTOCOLS

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ABSTRACT

Drinking water is the most valuable resource for all human beings so the quality of water should be monitored in real-time. However, in Pakistan, Especially in remote areas. Real-time monitoring of water quality is a difficult job due to the lack of laboratories, awareness and taking a long time in order to collect manual samples and preservation. So, here is a need for real-time monitoring of water quality in order to clean and safe supply of water to consumers. This proposed system ensures water authorities and gives the live reading of water parameters for 24 hours/day. This system consists of various sensors that monitor pH, Turbidity, Temperature, Dissolved oxygen and Total dissolved solids of water and transfers the data towards the microprocessor which analyzes and transmits the data over the server through the Wi-Fi connection. But when there is unavailability of the Wi-Fi GSM module is used through which data is sent towards the user in the form of SMS and Email. If the value of contamination increases from guideline values then the buzzer beeps, and email, SMS sent towards the user about the condition along with the condition treatment is also suggested by the system.

Keywords: Internet of Things, Water Pollution, Water Quality, Remote Monitoring System, Sensors Based, Raspberry Pi.

PAPER ID: 155

METHANE GENERATION POTENTIAL FROM WASTEWATER USING ANAEROBIC ROTATING BIOLOGICAL CONTRACTOR (RBC)

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ABSTRACT

The history of wastewater treatment entirely tied to the history of water itself. As industrialization and urbanization have rapidly grown and water has become more contaminated due to discharge of untreated water containing high amount of organic load. In this study, we have designed and fabricated an anaerobic rotating biological contractor, which can treat synthetic wastewater with the help of bio-film. This reactor was built on small scale to detect the efficiency of this treatment system, this anaerobic rotating biological contractor is made up of two glass tanks, 28 acrylic glass discs, rotating shaft and DC motor. This project designed to treat approximately 30 liters of wastewater during one cycle process, as it is batch. Two holes provided on the top corner of the tank from which one utilized for input of wastewater into the main tank and other hole utilized for gas collection purpose. In this process anaerobic digestion takes place which involve four basic processes like hydrolysis, acidogenesis, gametogenesis and methanogens and then bio-gas is produced which is compound mixture of (CO2+CH4) from which methane is utilized for energy recovery purpose. And the treated water is drained out from the drain valve provided at the bottom of the tank in to the secondary clarifier in which wastewater is retained for certain period of time to allow the formation of flocs. Electrical panel installed to control the motor and the gas generated can be collected in an acrylic glass collection jar.

Keywords: Synthetic Wastewater, Batch, Rotating Biological Contractor, Hydrolysis, Acidogenesis, Gametogenesis and Methanogens.

PAPER ID: 175

DEVELOPMENT OF NYLON 6 NANOFIBER MEMBRANE FOR REMOVAL OF E. COLI BACTERIA FROM DRINKING WATER

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ABSTRACT

Due to increasing population, the activity of human which involved to contaminates the water also increased such as agriculture, industry, landfills, localized pollution and discharge of effluent into waterways. That's why water is contaminated with suspended particles, coliforms, toxic metals, and pesticides, which are very harmful to human health. According to the WHO organization report, about 50% people of Pakistan suffer from different diseases by using contaminated water and among 122 nations regarding water quality, Pakistan ranked on number 80. Herein, we fabricated the Nylon 6 nanofiber for efficient removal of bacteria from water. The bacterial efficiency of the Nylon 6 membrane and Ultra-fine UV filter were analyzed, resulting Bacteria removal efficiency of Nylon 6 nanofiber membrane and Ultra-fine UV filter were 99% and 82% respectively. The Nylon 6 nanofibers were characterized by SEM, FTIR, and XRD. Three different kinds of the membrane were fabricated in terms of different thickness 30, 40 and 60 micrometers. Membrane having 30 micrometer thickness is recommended due to better flow rate, economical and meet the prescribed limit of bacteria Set by WHO.

Keywords: Nanofibers, Nylon 6, Water Filter, E. Coli Bacteria, Membrane

PAPER ID: 177

WATER QUALITY ANALYSIS OF PRIVATE FILTER PLANTS OF LATIFABAD HYDERABAD

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ABSTRACT

This research was conducted to evaluate the water quality of private filter plants located at Latifabad Hyderabad. Total 10 filtration plants were selected based on their functionality at different locations of Latifabad, Hyderabad. The objective of this study was to assess the quality of drinking water provided by private filter plants to the citizens of Hyderabad. Total 10 samples were collected from different filter plants and analyzed for pH, Electrical Conductivity (EC), Total dissolved solids (TDS), Chloride, Calcium, and Magnesium. It has been observed that all samples collected from different filter plants are meeting WHO Limits except a marine premium drinking water filter plant, who do not meet TDS and chloride WHO limit. Therefore, water from a marine premium drinking water filter plant is unsafe for human consumption. Moreover, we recommended to expand this study by including private filter plants of a whole Hyderabad city and besides physicochemical parameters, they must be analyzed for biological parameters such as E. coli and B. coli.

Keywords: Water quality analysis, Private Filter Plants, Latifabad, Hyderabad

PAPER ID: 192

DEVELOPMENT OF IOT BASED DUAL CHAMBER MICROBIAL FUEL CELL FOR WASTEWATER TREATMENT AND POWER GENERATION

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ABSTRACT

The need for electricity and clean water in Pakistan proceeds to increase day by day which triggers the energy crisis and water scarcity in the country. The utilization of oil as an energy source still overwhelms, although oil saves in Pakistan are progressively being drained. Subsequently, there is a need to develop innovative renewable energy sources such as Microbial Fuel Cell (MFC). MFC is a bio-electrochemical reactor that is used to change over the common substrate acquaint in wastewater with electrical essentialness and treat wastewater under anaerobic conditions by utilizing microorganisms as a catalyst. The objective of this study was to develop an IoT (Internet of things) based dual-chamber Microbial Fuel Cell for power generation and COD removal from domestic wastewater. The reactor was developed, incorporating sensors (Temperature, pH, and Voltage) and modules connected with Arduino microcontroller and interfaces cell to PC and android devices. Additionally, the Data Acquisition model (DAQ) utilizing an android platform was utilized for checking and recording results. The productivity of developed double chamber MFC was seen by assessing the removal of chemical oxygen demand and power generation from wastewater. The outcomes of this research showed that COD removal was up to 90 percent and maximum power generation was 2.1 V.

Keywords: Android; Data Acquisition Model; Bioelectrochemical Reactor; Fuel Cell

PAPER ID: 199

RECYCLING OF ABLUTION WATER

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ABSTRACT

Water is one of the most essential and key resource required for sustaining life on earth. However, abrupt, unbalanced and unmanaged water usage has led to water resource depletion. Pakistan is one of the most water stressed country, facing acute water shortage and water experts has predicted that Pakistan will reach absolute water scarcity by 2025. In addition to this, the country water availability has decreased to 1017 m3 form 1500 m3, Close to water scarcity threshold of 1000 m3. Therefore, requires immediate measures to save country water resources from completely stressing out. Being a Muslim state, where majority of population is Muslim One such alternative could be the recycling and reuse of greywater generated from mosques during ablution. Ergo, this paper proposes a water recycling system for mosque. For the study a mosque located in Hyderabad, Pakistan was selected as a case study. The water samples were taken before and after ablution process and the water quality was determined through various physiochemical and biological tests and the results were compared with WHO standards and NEQS. The research concludes that, the used ablution water is not much polluted and could be easily recycled and reused for general cleaning, flushing and landscaping purpose, after sand filtration. Thus much burden from national water budget will be reduced.

Keywords: Wudhu water, Ablution water, Grey water, Water recycling

PAPER ID: 223

PILOT SCALE ASSESSMENT OF LOCALLY DESIGNED TRICKLING FILTER SYSTEMS FOR PERI-URBAN AGRICULTURE

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ABSTRACT

The cost effective trickling filter systems were designed, developed and operated in a constant recirculation manner for wastewater treatment using simple maize cob (TF1) and date palm fibre (TF2) biofilm support medias with hydraulic loading of 0.045 m3/m2.min and hydraulic flow rate of 7.2 L/min (Q=1.8 m3/ h) for temperature range of 15-42°C during 15 operational weeks. A significant removal of mean concentrations of pollution indicators such as biological oxygen demand (BOD) (88% TFI & 79% TF2), chemical oxygen demand (COD) (87%TF1 & 79% TF2), total dissolved solids (TDS) (48%TF1 & 42%TF2), total suspended solids (TSS) (91.6%TF1 & 85.5%TF2), electrical conductivity (EC) (16%TF1 & 15%TF2), total nitrogen (TN) (32%TF1 & 23%TF2), total phosphorus (TP) (38.4%TF1 & 32.1%TF2), and sulphates (28.2%TF1 & 24.3%TF2) was found during operational period of 15 weeks. Whereas a substantial increase in dissolved oxygen (DO) level (63%TF1 & 57%TF2) was observed after wastewater treatment by TF systems. The average removal of total count, fecal coliform and E-Coli from combined effluent of TF1 and TF2 were observed 76.3% (49-96%), 61% (33-91%) and 62% (31-85%) respectively. Thus, the obtained treatment efficiency suggest that pilot-scale TF system has a potential to be applied in full/field scale wastewater treatment for peri-urban small communities in order to enhance quality of treated effluent for safe reuse in peri-urban agriculture.

Keywords: date palm fibber, peri-urban agriculture, Trickling filter, maize cob, wastewater treatment,

PAPER ID: 224

ASSESSMENT, DESIGN AND DEVELOPMENT OF WASTEWATER TREATMENT SYSTEM FOR PERI-URBAN AGRICULTURE

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ABSTRACT

The present research was conducted to assess the feasibility of biological treatment for one typical wastewater (WW) stream in Multan, Pakistan with subsequent inclusive design of wastewater treatment (WWT) system. The pH (5.8-6.2), temperature (24-30 °C), biochemical oxygen demand (BOD5:128-265 mg/L), ultimate BOD (BODu: 227-438 mg/L), BOD/ Total Kjeldahl Nitrogen (BOD5/TKN:5.9-11.2), BODU/BOD5 (1.6-2.0), carbonaceous BODu /nitrogenous BODu (CBODU/NBODU:1.6-2.8) of WW was found feasible to support the biological treatment of WW. The inclusion of NBOD was also indicated the need of nitrification-denitrification. The linear regression analysis of Volatile suspended solids with total suspended solids was found the high content of organic solids that also qualify the biological treatment of WW. The BOD/COD<0.8 was indicated the requirement of pre-treatment or biomass acclimation. The major process units of designed and developed WWT system were included the Primary Clarifier, Cascade aeration system, Trickling Filter systems, Adsorption Filter and Chlorination Contact Tank. During validity of design procedures, considerable removal of TSS (91%), TDS (46%), BOD5 (88%), COD (87%) was observed for 15 weeks operational period of secondary WWT system. The developed WWT system was found appropriate for design and development of sustainable WWT systems especially in developing countries being less energy consuming, having on slope integration and easy to operate.

Keywords: Biological Treatment, Design, Diurnal variation, Secondary Treatment, WWT system

PAPER ID: 234

GRAVITY AERATION (CASCADE AERATION) SYSTEM WITH INTEGRATED SETTLER FOR PRE-TREATMENT OF WASTEWATER

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ABSTRACT

Water resources of Pakistan are commonly exposed to untreated wastewater disposal that causes the dissolved oxygen (DO) depletion, high sediment deposits and other water quality issues. DO is the indicator of river water quality health. Wastewater (WW) aeration is the key process used to enhance DO level. But, WW aeration is recognize the most energy consuming process in wastewater treatment. After comparative studies of different aerators in this paper, it was concluded that cascade aerator may be the best option for DO enhancement being simple, low energy demanding, easy to handle and less maintenance cost. In this research, DO enhancement was investigated on different cascade steps at constant and variable flow rates. Additionally, the cascade aeration system was also investigated for removal of suspended solids (SS) at different retention time, BOD and COD. DO was found to increase from 0.40 mg/L to 2.26 mg/L, 3.06 mg/L, 3.82 mg/L, 4.53 mg/L, 5.24 mg/L, 5.90 mg/L, and 6.51 mg/L from steps 2-8 respectively. But overall aeration efficiency (E20) of the system is increased up to 0.77 due to DO enhancement. E20 was found to increase at same step with increase in flow rate (E20 at 1.983 L/sec) > (E20 at 1.624 L/sec). SS were measured on 30, 60 and 90 minutes detention time. But maximum removal was 50.69% on 90 minutes detention time. BOD and COD removal efficiency after the aeration was 28 % and 27 % respectively. The present research reveals that cascade aeration system can also be used for post aeration of treated effluent before disposal.

Keywords: Aerators, Aeration efficiency, Dissolved oxygen, Stepped Cascade, settler, Wastewater treatment

PAPER ID: 235

GREYWATER CHARACTERIZATION AND TREATMENT USING CHEMICAL COAGULATION

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ABSTRACT

The main problem in treating grey water is the large variation in quality observed over short timescales. Different treatment schemes have been used such as physical, chemical and biological processes to treat this effluent. However they have some problems like adjusting shock loading of organic matters and chemicals. Therefore, in the present study chemical coagulation process was tested to treat grey water. Coagulants such as alum and ferric chloride were used in the present work to treat both real and synthetic grey water. The findings showed that at a dose of 30 mg/L of ferric chloride, 90% of the solution's turbidity and 80% of the TDS could consistently be removed. These findings were well matched with biological active filter system that reported 85% of COD removal from grey water. In addition, the effects of pH and alkalinity on the removal performance were also investigated. Overall, the present study showed that both traditional and proposed novel chemical process could treat grey water to the required level which can further be re-used for agricultural activities.

Keywords: Grey water, Coagulants, Aluminium Sulphate, Ferric Chloride, Coagulation, characterization, Removal performance

PAPER ID: 237

PHOTO DEGRADATION OF DICLOFENAC FROM WATER USING PHOTO CATALYST

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ABSTRACT

The diclofenac is the NSAID compound. It is emerging pollutant in the environment. The main source of diclofenac in the environment is pharmaceutical wastewater and domestic wastewater. It cannot be removed by conventional treatment methods, so it requires a special treatment method to remove from water bodies. Advance oxidation process is latest water treatment method which utilize free radical reaction to directly degrade organic pollutants using catalyst. In this study, the Mn/Ni based catalyst was synthesized by chemical reduction method in which the ratio of Manganese and Nickel was 3:1. The Characterization of photo catalyst such as particle size and SEM was carried out to examine shape and size of catalyst. The zeta particle sizer showed that the average particle size was 524 nm and SEM results indicated that the particles were circular in shape. The batch experiment was carried out in which various parameters such as effect of photo catalyst dose and concentration of diclofenac were optimized. During this experiment the optimized parameters observed were optimized photo catalyst dose 25 mg and concentration of diclofenac 20 ppm. The maximum degradation of 90% were achieved during this study. After degradation the residual diclofenac concentration was determined using UV-Visible spectrophotometer (UV-1800 SHIMADZU CORPORATION Kyoto Japan).

Keywords: Diclofenac, photo catalyst, Advance oxidation process, Bimetallic

PAPER ID: 240

MICROBIAL FUEL CELL WITH CARBON COMPOSITE COATED FLEXIBLE ELECTRODE

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ABSTRACT

Microbial fuel cell (MFC) has the ability to become a renewable energy resource by microbial transformation of wastes and organic pollutants in wastewater using bioremediation approaches. In Pakistan, the concept of using MFC for wastewater treatment and Bio-electricity generation is remain limited due to various limitations. Electrode materials are important in the design selection and operating costs of MFCs. To improve the feasibility of MFCs this study presents an easy way to synthesize effective electrode material in the form of multi-walled carbon nanotube (MWCNT) and activated charcoal (AC). This study also presents an easy and efficient electrode material recipe to prepare activated carbon produced from locally available material. The high power density and conductivity with good biocompatibility and superior electrochemical activity was achieved by preparing different carbon composite with mixture of AC with MWCNT on a flexible substrate. The maximum voltage of 580 mV with maximum current density of 74mA/m2 and maximum power density of 108.53W/m3 was achieved and yielded 80% COD removal.

Keyword: Activated carbon, Bio-electricity, Carbon composite electrode, Microbial fuel cell, Multiwall carbon nanotube

PAPER ID: 241

DEVELOPMENT OF MICROBIAL DESALINATION CELL WITH MODIFIED GRAPHITE PASTE ELECTRODE FOR THE GENERATION OF ELECTRICITY AND SALT REMOVAL

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ABSTRACT

MDC are innovative bio electrochemical devices from which the metabolic activity of the bacteria converts biomass into electricity and desalinate saline water. Electricity production through MDC may become a vital source of bioenergy in the upcoming era because MDCs deals with the possibility of salt removal from the saline water, pull out electric current from a renewable biomass and complex organic waste. Sewage water was tested as a food substrate for bacteria in aerobic anode chamber which is connected through external resistance to cathode aerobic chamber filled with distilled water, whereas middle chamber was desalination chamber filled with synthetic saline water separated by ion-exchange membranes i.e. anion & cation membrane. The modified graphite paste electrode was used to obtain the highest power output (810mv) from the MDC. The MDC was run in three cycles in each cycle desalination rate is 79%,78.5% and 80% and increase the COD removal by 68%,65%,70% and the columbic efficiency by 131%. The desalination in MDC improved wastewater characteristics by increasing conductivity by 2.5 times and maintained the anolyte PH, so the resistance was reduced and stabilized the microbial activity. The Biofilm formation was observed on the surface of anode electrode shows that Geobacter is the most predominant with the abundance and meanwhile, electrogenesis related outer-surface octaheme c-type cytochrome is highly expressed in the anode. After 7 days we were observed uniform brown spots on the surface of the electrode at the anode chamber by using stereomicroscope.

Keywords: Biofilm, Bio-energy, Desalination, Microbial desalination cell, Stereomicroscope wastewater.

PAPER ID: 243

REMOVAL OF PESTICIDES FROM WATER THROUGH ELECTROCOAGULATION UNIT USING STAINLESS STEEL AND IRON ELECTRODES

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ABSTRACT

The purpose of the present study to investigate the removal efficiency of two pesticides: Imidacloprid and Chlorpyrifos from aqueous solution through electrocoagulation treatment unit. Electrocoagulation acts to be one of the best operative methods. The removal efficiency was investigated at variable conditions of operating parameters. The best removal efficiency obtained for Imidacloprid and Chlorpyrifos was 94% and 90% respectively, with initial pH 6.5, the initial pesticide concentration of 30 mg/ L, and current density of 5A after 60 minutes by using combined iron and stainless steel electrodes. Batch flow system was used for operation of reactor. The study concludes that the electrocoagulation treatment process using combined iron and stainless steel electrodes is the efficient and simple method for the removal of Imidacloprid and Chlorpyrifos from aqueous environment.

Keywords: Electrocoagulation; Iron; Stainless Steel; Imidacloprid; Chlorpyrifos

PAPER ID: 246

FABRICATING AND EVALUATING THE ANTIBACTERIAL SUSCEPTIBILITY OF NANO FIBERS SHEETS INCORPORATED WITH CEFTRIAXONE

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ABSTRACT

In this study, evaluating the antimicrobial susceptibility of nanofibers sheets, the ceftriaxone 3rd generation of cephalosporin was used to incorporate with polyvinyl alcohol (PVA) with different percentages (0%, 5%, 10%, 15%, and 20%) of polymer weight for the production of nanofibers sheets. For the evaluating the antimicrobial susceptibility, microbes were used Escherichia coli (E.coli) which were represent gram-negative bacteria and Staphylococcus aureus (S.aureus) which were represent gram-positive bacteria. After the production of nanofibers sheets the characterization of sheets were done which includes Fourier transform infrared spectroscopy (FTIR), X-ray diffraction (XRD) and scanning electron microscopy (SEM). The Kirby–Bauer test (disc diffusion test) was used to evaluate the antimicrobial susceptibility of nanofibers sheets. The result shows the comparably good on microbes the inhibition zone ranges 20-25mm against E.coli and S.aureus.

Keyword: Fabricating, Nanofibers, Ceftriaxone

PAPER ID: 256

SUSTAINABLE DYEING OF POLYURETHANE NANOFIBERS WITH ULTRASONIC ENERGY

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ABSTRACT

For the first time, we studied the sustainable aspects in dyeing process of electrospun polymeric nanofibers in terms of conserving thermal energy and reducing the wastewater pollution. The nanofibrous mats were prepared using polyurethane (PU) polymer followed by dyeing with disperse dyes by batchwise method as well as ultrasonic (US) assisted method. Potential of savings in thermal energy (1000 *kcal*), dwell time (40 min) and quantity of disperse dyes (1.5% on the mass of nanofibers) were realized during the US assisted dyeing method in comparison to the batchwise dyeing method. Further, TDS and COD contents of dyeing effluents demonstrated considerable ecological merits of the US dyeing method in terms of 30% reduction in TDS and 46% reduction in COD contents. Excellent *K/S* (reached up to 10) of dyed PU nanofibrous mats were achieved by US assisted dyeing method.

Keywords: electrospun polymeric nanofibers, color strength, polyurethane, disperse dyes, batchwise dyeing, ultrasonic energy

PAPER ID: 259

PERFORMANCE EVALUATION OF CERAMIC CLAY PITCHER FOR ARSENIC REMOVAL FROM GROUNDWATER

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ABSTRACT

This study concentrates on the preparation of ceramic clay pitchers that can be used for the removal of arsenic from groundwater. Three types of pitchers were prepared with varying ratios of clay and river sand-coated with iron sulfide (FeS) and iron chloride hexahydrate (FeCL3.6H2O). The ratios of clay and river sand coated with iron were taken as 75:25, 60:40 and 40:60 respectively. The performance evaluation of three types of pitchers was carried in a batch process. The arsenic adsorption/removal rate was analyzed using arsenic kit (Merck Germany). The results indicated that the pitcher made of river sand coated with iron sulfide and iron chloride hexahydrate along with ceramic clay with the ratio of 60:40 have acceptable arsenic removal efficiency. The prepared pitcher was considered suitable for the arsenic removal purpose. The prepared pitchers can easily be prepared in the local market and can frequently be used for arsenic removal purpose.

Keywords: Arsenic Removal, Iron Coated Sand, Pitcher

PAPER ID: 260

ARSENIC REMOVAL FROM DRINKING WATER BY MODIFIED CHITOSAN BEADS (MCB) EXTRACTED FROM SHRIMP WASTE

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ABSTRACT

Arsenic contaminated water is a big challenge for Pakistan specially in Sindh. Presence of arsenic in water can cause severe diseases like cancer, tumor and heart failure. This batch adsorption study focuses on the arsenic exclusion from drinking water using a low-cost adsorbent prepared from shrimp waste by different processes such as: preparation and demineralization of benefitted shells and demineralization of chitin to modified chitosan beads. Characterization of adsorbent also takes place at different stages to examine its structure. Modified Chitosan Beads (MCB) was used as an effective and efficient adsorbent for the expulsion of arsenic from ground water. From all batch experiments, the removal percentage of arsenic is up to 98%. This study indicated that MCB is widely available cheap and efficient adsorbent material for the removal of arsenic from water.

Keywords: Batch study, Arsenic removal, Modified chitosan beads, MCB, Drinking water

PAPER ID: 264

REMOVAL EFFICIENCY OF HEAVY METALS THROUGH MODIFIED JUTE FIBER ADSORBENT

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ABSTRACT

The benefits of expanding lifecycle of an adsorbent can reduce the cost and environmental impacts in waste adsorbent disposal and adsorbent fabrication, which gives value to the waste. In this study, the extending lifetime of jute fiber-based bio sorbents for sequentially remedying heavy metal ions was demonstrated by a simple and practical chemical conversion. The potential of a lignocellulosic fiber, jute, was assessed for adsorption of heavy metal ions like Cu (II) and Ni (II) from their aqueous solutions. The fiber was also used as an adsorbent after chemically modifying it, by oxidizing with hydrogen peroxide. The modified jute fibers gave higher metal ion adsorption. Sorption of metal ions was studied as a function of time, temperature, pH and concentration of metal ions in solution. The metal ions sorption was best fitted in the Langmuir adsorption isotherm model. At the optimized conditions, almost complete sorption of Cu (II) and Ni (II) ions was observed for oxidized jute fiber. The pH effect was investigated between 6-9. The optimized dosage of the adsorbent was 2g and the optimized contact time was 60 minutes. The removal efficiency of metals through modified jute fiber at optimum condition was 88.6% and 97.4% respectively. The most meaningful contribution of this study was to provide a new approach of an adsorbent regeneration and waste disposal for developing a sustainable water treatment technology.

Keywords: Jute fibers, Heavy metals, Adsorption, Langmuir, Sustainable technology

PAPER ID: 266

REMOVAL OF NAPHTHALENE AND ANTHRACENE FROM SURFACE WATER OF HYDERABAD USING GRAPHENE OXIDE

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ABSTRACT

In Pakistan, surface water (canals, rivers lakes, ponds, canals and rivers) is mostly used for the domestic, industrial and irrigation purposes. Poly aromatic hydrocarbons (PAHs) is a family organic compounds having benzene rings in their structure, these are carcinogenic in nature which can affect human health as well as aquatic species. In this study, naphthalene(C10H8) and anthracene(C14H10) which are two members of poly aromatic hydrocarbons family (PAHs), have been assessed and removed from the surface water of Hyderabad using Graphene oxide as the adsorbent, graphene oxide was prepared manually from graphite through Hammer`s method in the water laboratory at Institute of Environmental Engineering and Management (IEEM). Prepared adsorbent is characterized by SEM (scanning electron microscopy) and FTIR (Fourier-Transform Infrared) spectrometer techniques. UV-spectrophotometer is used to analyze the samples. Different Parameters for removing of naphthalene (C10H8) and anthracene (C14H10) from surface water are analyzed, such as; pH, adsorbent dosage, contact time, and concentration of the contaminants. Results of this study showed that highest removal efficiency of Graphene oxide (GO) for naphthalene was observed as 99.94% at 300mg, pH between 2-3, time 90 mins, and 20ppm concentration, and to remove anthracene from surface water the maximum efficiency was noted as 99.97% at pH 5, dosage 300mg, contact time 75 mins in 10ppm concentration. Adsorption isotherm data is analyzed by Langmuir and Freundlich isotherm models.

Keywords: Adsorption, Graphene Oxide, Naphthalene, Anthracene, Poly Aromatic Hydrocarbons (PAHs)

PAPER ID: 267

SELENIUM REMOVAL FROM WATER USING BIMETALLIC NANO ADSORBENT

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ABSTRACT

Selenium in wastewater is of particular concern due to increasing concentration, high mobility in water and toxicity to organisms. Selenium ions are toxic at concentration above 40µg/L. This study was carried out to determine the removal efficiency of selenium using iron and manganese based bimetallic nano-adsorbent. In this study bimetallic nano-adsorbent was synthesized by using chemical reduction method, nano particles were characterized by using Energy Dispersive X-ray Spectroscopy (EDX), Scanning Electron Microscopy (SEM), BET, Zeta particle size and then it applied to remove selenium ions in aqueous system. The selenium removal efficiency was optimized by varying the parameters such as contact time, Se concentration, dosage of adsorbent and pH of solution. The pH effect was investigated between 6-9. Results confirmed that alkaline (8.5) pH enhanced the selenium adsorption capacity towards nano-particles. The optimized dosage of adsorbent was 25mg and the optimized contact time was 60 minutes. The reusability of nanoparticles was also studied. Both Langmuir and Freundlich adsorption isotherm models were also calculated. In this study results show that overall adsorption capacity of bimetallic nano-adsorbent towards the removal percentage of selenium is 95% under optimized conditions.

Keywords: Selenium, Iron, Manganese, Bimetallic, Adsorption

PAPER ID: 269

ASSESSMENT OF SUGAR MILLS EFFLUENTS ON LBOD SYSTEM THROUGH GIS AND HEC RUS MODELING

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ABSTRACT

The environmental pollution caused by sugar industries is a very serious problem, but unfortunately it has not been considered accurate perspective so far. It is not only an ecological concern but also a great threat to the ground and surface water, drinking supplies besides the irrigation and drainage system. The LBOD drainage system was introduce to manage the groundwater level and improve the collection and disposal of drainage water from an area of 1.275 million acres on the Left Bank of the river Indus in Sindh. These contaminants causing serious threat to LBOD system and placed serious environmental problems. The main sources of water contamination in the system of LBOD include; municipal solid waste, discharge from the agricultures of fertilizers and pesticides and disposal of toxic effluents from sugar mills. The challenge lies in developing mechanisms and tools, that will assist us to mitigate, prevent or possibly reverse deteriorating river water quality. Water quality models are the most useful tools in describing rivers, water bodies' ecological conditions. One of the well-known water quality models is the Hydrologic Engineering Centre River Analysis System (HEC-RAS) was used to develop a hydrodynamic water quality model for the LBOD to assess and understand the processes affecting the channel. The model results showed water quality output was evaluated for the algae, DO, CBOD, NH4, NO2, NO3, Org N, Org P, and Ortho PO4. The concentration of algae increase from 16thto 17thJanuary and in some dates up to 19th January to words downstream RDs. Ammonium (NH4) Nitrite (NO2) are decrease to increase Nitrate (NO3) from upstream to downstream side in a RD of 157 boundary. Ortho phosphate become increase as the organic phosphate becomes decrease. Between these conversations the Carbonaceous BOD (CBOD) will increase creating an oxygen demand that may depress DO below acceptable concentrations

Keywords: Effluents, LBOD System, GIS, Rus Modeling


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PAPER ID: 47

EVALUATION OF LIMITATIONS OF RATIONAL METHOD FOR RUNOFF CALCULATION FOR URBAN AREAS OF ISLAMABAD

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ABSTRACT

Rational Method is generally used for estimation of peak discharges. Different authors mentioned different catchment area limitations for use of rational method, for different locations due to variation in precipitation rate and variation of ground characteristics. Mostly, the researchers stated that the results from this method could be acceptable upto area limitations of 200 acres. However, there is need to evaluate the applicability of rational method with respect to catchment area for Islamabad region to check the application and catchment limitations for the design of storm drainage system in the future. Digital Elevation Modeling (DEM) along with Global Mapper, Sam-Sam water harvesting have been used to estimate runoff by rational method. Different points of interest developed with drainage areas of 663.8 acres, 805.4 acres, 1056.9 acres and 1529.0 acres respectively. Corresponding value of discharge from rational method was estimated for all points of interest. Then the results were compared with Soil Conservation Service (SCS) Curve Number method applied to same catchments. The results obtained from comparison showed that Rational Method approach could be applicable for larger areas with respect to characteristics of the ground and type of the area i.e. for developed areas. Readers will be able to evaluate the applicability of Rational Method approach after going through this research work.

Keywords: Catchment, Digital Elevation Modeling, Global Mapper, Sam-Sam water harvesting, Curve Number.

PAPER ID: 74

EVALUATION OF WATER LOSSES IN UNLINED CANAL: A CASE STUDY OF MALIK BRANCH CANAL, BAHAWALNAGER, PAKISTAN

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ABSTRACT

Water is an essential component of nature for the survival of life on planet earth. It is the most valued reserve of nature. The two main sources of water are surface water and ground water. Surface water has its uses as domestic and for irrigation supply. Now-a-days, with an increase in demand of water, due to the gradual increase in population, it is becoming a scared source from an abundant resource. This study undergoes to estimates the water losses in unlined canal with a purpose of providing an estimation of water losses. Seepage losses & evaporation losses are determined also investigated the rate of water losses. There is a dire need to identify and prioritize the cause of losses in unlined canals so that rehabilitation and maintenance can be done accordingly. The Inflow and Outflow method was adopted to estimate the water losses on four sections of the selected canal. Average total water loss rate is calculated for four sections which is 1.74 x 103 cusecs/ft, whereas contribution of evaporation losses (during September to December) in total water losses is 1.22%. The amount of evaporation increases with the increase in temperature. It is observed from this research that there is 13.29% difference in water discharge between upstream and downstream of canal which badly affects the proper availability of water to irrigation lands at the tail, hence causes water scarcity.

Keywords: Unlined Canal, Water losses, Seepage losses, Evaporation Losses, Inflow outflow method,

PAPER ID: 96

EVALUATION OF IRRIGATION EFFICIENCIES BY USING MODELLING APPROACHES

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ABSTRACT

Agriculture is one of the most important sector in all over the world. The major component of agriculture based on irrigation system, the irrigation system at farm level can be improve by efficiencies to achieve optimum crop production and water conservation. The aim of this study is to use modelling approaches to determine irrigation efficiencies effectively at farm level by using SIRMOD Model. The field data of Rabi season (2018-19) of wheat crop for simulation of irrigation efficiencies collected from field of a local farmer, the irrigation techniques used in the field are conventional, furrow, and Raised-bed. By using modelling approaches the application efficiency, irrigation efficiency, distribution uniformity and requirement efficiency were calculated. The result concluded that the application efficiency and irrigation efficiency for furrow irrigation is 66.70% and 74.11% whereas distribution uniformity and requirement efficiency is 93.23% and 99.69%. These efficiencies when compared with flood show higher potential of efficient and effective irrigation system promoting conservation of water balanced with yield. The result shows that in comparison with conventional irrigation techniques the furrow irrigation show best output results.

Keyword: SIRMOD, distribution uniformity, requirement efficiency, irrigation efficiency.

PAPER ID: 114

CURRENT STATE OF DARAWAT DAM IRRIGATION NETWORK AND MEASURES FOR ITS REHABILITATION

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ABSTRACT

The emerging water scarcity in Pakistan caught attention of authorities as it demands construction of new dams and storage reservoirs for water saving. In order to address the said issue, a new dam named as Darawat Dam was constructed in 2013 in the vicinity of District Jamshoro few kilometers off Indus highway for water storage and Irrigation purposes. Unfortunately, the dam is unable to provide its services for Irrigation to related lands up to the desired extent. This research is therefore aimed to study the irrigation network and to bring out the reasons for its inactivity. The data was collected with the help of concerned authorities and the recommendations like implementation of Drip Irrigation System, provision of wind/solar turbines to uplift the subsurface water to meet agricultural water requirements, prohibition of human use of canal for washing and waste disposal, providing awareness and trainings to local farmers, optimized water allocation and crop pattern and improvement in embankment crest were proposed to enhance the Irrigation capacity of Darawat Dam.

Keywords: Water Scarcity, Darawat Dam, Irrigation, Drip Irrigation System, Rehabilitation, Irrigation Network.

PAPER ID: 135

QUALITATIVE AND QUANTITATIVE DEMARCATION; AND IMPACT OF GROUNDWATER ON FARMING COMMUNITY

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ABSTRACT

Water being the vital source of life makes it the leading consumed entity around the world and Pakistan is no exception. Moreover, the ever-increasing consumer base in Pakistan, both in the domestic and commercial terms, put this already scant resource more susceptible to variation in both quality and quantity. In Pakistan, the primary source of water remains the Indus river complimented by groundwater. Though, long bouts of droughts have rendered people more dependent upon groundwater whose continuous pumping deteriorates the aquifer characteristics rendering the soil above infertile.

In our study, we assess the groundwater strata by utilizing the electrical resistivity survey technique through analyzing eleven nodal points under the head of command area of Tando Allahyar-II distributory. The main purpose of the study was to demarcate the aquifer characteristics both qualitatively and quantitatively. The Electrical Resistivity Survey with standard Schlumberger electrode configuration was adopted with maximum exploration depth of 150 m. The data was recorded using ABEM Terrameter SAS 4000. Analysis of data was achieved through 1X1D software and the demarcation has been done through ArcGIS. Through the results, it can be inferred that the fresh water is present from ground level to 50m below the earth surface followed by marginal fresh water at 50m to 75m and marginal saline water is located at 75m to 170m.

Keywords: Electrical Resistivity Survey, Groundwater, Interpex IX1D, Terrameter SAS 4000.

PAPER ID: 197

IDENTIFICATION OF GROUNDWATER QUANTUM AND QUALITY AND ITS DEMARCATION: A CASE STUDY OF SERI DISTRIBUTARY COMMAND AREA

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ABSTRACT

The work done under this study is a part of a research work which is to be completed under the project "Sustainable fresh groundwater management for irrigated Agriculture in lower Indus basin (LIB) using PMWIN Model" Funded by HEC under NRPU program. The project study focuses on sustainable ground water management and provide lively hood to the people of irrigated agricultural rural areas of Sindh. For this study three districts of Lower Indus Basin (LIB) will be selected. In this study different activities (field experimentation and computer analysis) is to be carried out. Under this work, the ground water quality and aquifer potential has been assessed. Through Geo-electrical resistivity survey, the underground resistance of the study area at different selected points was determined using Tetrameter SAS 4000 available at USPACW, MUET, Jamshoro. In order to analysis of aquifer thickness and quality the Software IX1D was used. Despite sufficient rainfall, large part of Pakistan suffers from water scarcity. Groundwater is generated in weathered layers and semi-weathered layers / crushed layers of hard rock areas with a thickness of 5 to 20 m[1]. Groundwater is used as a supplement for drinking, irrigation and industrial. Due to shortage of canal water, there is need to utilize groundwater as a supplement to surface water and to meet our needs of food and fiber requirement. This thesis aims to identify the groundwater quantum and quality under the boundary of Seri distributary, which is off-taking from Rohri canal at Almani X-regulator at RD of 1038m. The distributary passing through union Tando Fazal council of district Hyderabad, Sindh, Pakistan. The groundwater quantum and quality was determined through electrical resistivity survey (ERS). The equipment, Tetrameter SAS 4000 available at USPACW, MUET, Jamshoro was used for this survey up to shallow depth of 150 meters at each node point of the grid. The collected data was further analyzed by the IX1D software. The results show that fresh water with 18.5% of the total water quality at the Tanzo fazal in the seri distribution area up to 50 m in depth was discovered, and about 54% of marginal fresh water was discovered. The trend of groundwater quality is inclined from 51% to 100 m depth from 72% freshness, about 16% marginal fresh, 8% marginal saline and 4% saline. Survey depth of groundwater quality from 101m to 150m was fresh. This study suggests that agricultural productivity of crops in this area can be improved by improving the capacity of farmers and proper utilization of the agricultural expansion section for inoculation and use of surface water.

Keywords: Electrical resistivity survey, GIS, Ground Water, IX1D software, Terrameter

PAPER ID: 198

IDENTIFICATION OF GROUNDWATER QUANTUM AND QUALITY AND ITS DEMARCATION: A CASE STUDY OF MUHAMMAD KHAN DISTRIBUTARY COMMAND AREA

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ABSTRACT

The work done under this study is a part of a research work which is to be completed under the project "Sustainable fresh groundwater management for irrigated Agriculture in lower Indus basin (LIB) using PMWIN Model" Funded by HEC under NRPU program. Through Geo-electrical resistivity survey, the underground resistance of the study area at different selected points was determined using Terrameter SAS 4000 available at USPACW, MUET, Jamshoro. In order to analysis of aquifer thickness and quality the Software IX1D was used. This Study aims to identify the groundwater quantum and quality under the boundary of Muhammad Khan distributary command area which is off-taking from Rohri canal at Almani X-regulator. The distributary passing through union Tando Fazal council of district Hyderabad, Sindh, Pakistan. The groundwater quantum and quality were determined through electrical resistivity survey (ERS). The results shows that the water quality in Muhammad Khan distributary command area, up to depth of 50 m Fresh water was found 29% and marginal fresh about 53%; whereas the trend of groundwater quality is inclined from 51 to 75 m depth found fresh of 78% and marginal fresh of about 12% with marginal saline of 6% and saline of 4%. The quality of groundwater of the district from 76m downward to the investigation depth of 100 m found fresh. From the study, it is suggested that agricultural productivity of crops of this area can be enhanced through capacity building of farmers and proper utilization of agricultural extension department for the conjunctive use of surface and groundwater.

Keywords: Electrical resistivity survey, GIS, Ground Water, IX1D software, Terrameter SAS 4000.

PAPER ID: 202

ASSESSING THE EFFECTIVENESS OF POLYMERS AS A SEALANT MATERIAL TO CONTROL THE SEEPAGE LOSSES IN EARTHEN CHANNELS

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ABSTRACT

Earthen irrigation canals result in the loss of substantial amount of total supplied irrigation water due to seepage losses. The reduction of these losses can save a significant amount of water. In this study, the capability of some polymers in reducing the seepage losses in the earthen canal is evaluated. The objectives of this research: firstly, to evaluate the effectiveness of some polymers in reducing seepage; secondly, to quantify the interaction of polymers and suspended sediments (TSS). Three types of polymers (Linear Anionic Polyacrylamide (LA-PAM), Carboxymethyl Cellulose (CMC), and Modified Cellulose Gum (MCG)) were used. Each type is tested with three polymer loadings: (0mg/l (control), 50mg/l, and 75mg/l) under three different sediment contents (250ppm, 450ppm, 900ppm). Experimentation was performed in a soil column using the constant-head method. Polymers were added into the soil column, and suspended sediments were continuously added and mixed with an electronic mixer. The outflow rates were measured for each of the tests. Darcy's equation was used to calculate saturated hydraulic conductivities (Ksat). Results showed, the LA-PAM reduced Ksat 60 to 80%, but the reduction was less in CMC (20-40%) and MCG (8-30%). The results, when the quantity TSS increased by twice, also showed Ksat reduced 1.5 to 2 times.

Keywords: Constant head method, Hydraulic conductivity, Polymers, Seepage.

PAPER ID: 204

DETERMINATION OF GROUNDWATER QUALITY THROUGH VERTICAL ELECTRICAL SOUNDING AND ITS DEMARCATION USING ARCGIS-A CASE STUDY OF TANDO ALLAHYAR–II DISTRIBUTARY COMMAND AREA

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ABSTRACT

Water requirement is not met in agricultural sector because canal capacity is less than irrigation demand. Groundwater plays a vital role in these circumstances. Fertility of soil is adversely affected because of groundwater is utilized without analysis. The aim of this research is to determine groundwater quantity and quantum by ERS (Electrical Resistivity Survey) at Tando Allahyar distributary- II command area. The terrameter (ABEM Terrameter SAS 4000) was used to gather data by using electrode arrangement with half current electrodes (AB/2) having spacing from 2 meters to 150 meters and potential electrodes (MN) varies between 0.5 meter to 20 meters. VES was held at 18 nodes; with 2 km x 2 km area for shallow groundwater survey till the 150 meters depth. Stats were assessed in terms of resistivity and respective depth of numerous underlying layers using "Interpex IX1D" software. The apparent resistivity varies from 0.11 Ω.meter to 293.99 Ω.meters with depths of 1.36 m and 150 m respectively.

Keywords: Groundwater quality, Vertical Electrical Sounding (VES), Tando Allahyar, Resistivity

PAPER ID: 207

EXPERIMENTAL INVESTIGATION FOR DISCHARGE COEFFICIENT OF AN EMBANKMENT WEIR USING SMOOTH AND VEGETATED EMBANKMENTS

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ABSTRACT

Weirs, commonly used as flow control structures in water resources engineering, are also used for discharge measurement. In this study, experiments were conducted at Hydraulic Engineering laboratory of Civil Engineering Department UET Taxila by using smooth and vegetated embankment weirs. In order to determine the variation of discharge coefficients on a broad crested embankment weir, smooth and vegetated conditions were used for different flow intensities ranging from 8-50 liter/second. A broad crested embankment weir having crest length 90 cm, width 96 cm, height 30 cm and side slopes of 1V:2H, was installed in the laboratory channel. The increase in resistance yields the decrease in discharge coefficient. In this study, to achieve different types of vegetation, a grass type vegetation having grass height of 40 mm and rigid vegetation such as stem type with height 8 cm and diameter 2 cm were used on the embankment weir. The results of vegetated weir were compared with that of the smooth embankment weir. Based upon the calculations and observations that carried by experimental setup, we recorded that the vegetated embankment weir creates higher resistance and higher turbulence behavior for the flow as compared to that obtained from smooth embankment weir.

Keywords: Discharge coefficient, Embankment weir, Flow Efficiency, Vegetation.

PAPER ID: 233

IDENTIFICATION OF GROUNDWATER QUANTUM AND QUALITY AND ITS DEMARCATION: A CASE STUDY OF MUHAMMAD KHAN DISTRIBUTARY COMMAND AREA

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ABSTRACT

The work done under this study is a part of a research work which is to be completed under the project "Sustainable fresh groundwater management for irrigated Agriculture in lower Indus basin (LIB) using PMWIN Model" Funded by HEC under NRPU program. Through Geo-electrical resistivity survey, the underground resistance of the study area at different selected points was determined using Terrameter SAS 4000 available at USPACW, MUET, Jamshoro. In order to analysis of aquifer thickness and quality the Software IX1D was used. This Study aims to identify the groundwater quantum and quality under the boundary of Muhammad Khan distributary command area which is off-taking from Rohri canal at Almani X-regulator. The distributary passing through union Tando Fazal council of district Hyderabad, Sindh, Pakistan. The groundwater quantum and quality were determined through electrical resistivity survey (ERS). The results shows that the water quality in Muhammad Khan distributary command area, up to depth of 50 m Fresh water was found 29% and marginal fresh about 53%; whereas the trend of groundwater quality is inclined from 51 to 75 m depth found fresh of 78% and marginal fresh of about 12% with marginal saline of 6% and saline of 4%.The quality of groundwater of the district from 76m downward to the investigation depth of 100 m found fresh. From the study, it is suggested that agricultural productivity of crops of this area can be enhanced through capacity building of farmers and proper utilization of agricultural extension department for the conjunctive use of surface and groundwater.

Keywords: Electrical resistivity survey, GIS, Ground Water, IX1D software, Terrameter SAS 4000.

PAPER ID: 242

DETERMINATION OF AQUIFER CHARACTERISTICS IN THE COMMAND OF MUHAMMAD KHAN DISTRIBUTARY USING AQTESOLV

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ABSTRACT

The Muhammad Khan distributary is located in the region of Lower Indus Basin (LIB) towards the southern part of the Sindh province of Pakistan in district Tando Muhammad Khan. This distributary branches from the Rohri canal at RD-1038 to the right side on Almani X-regulator. Since the management of groundwater resources in any area knowledge of hydraulic characteristics of the aquifer system is essential, hence, the objective of this study is to determine aquifer parameters in the command of Muhammad khan distributary. In this regard, piezometers are installed at the head and tail of the distributary for the conduct of pumping tests to derive the fundamental/basic parameters for the groundwater model AQTESOLV. In this paper, the experimental and analytic work has been presented: drawdown versus time data has been collected from the field during pumping tests, and field data has been analyzed using the AQTESOLV computer model to determine S and T parameters choosing two methods viz. Theis method and the Cooper-Jacob method. The average values of Transmissivity and Storativity at Head reach using the AQTESOLV computer model were obtained as 2.730167m2/min and 0.005556, respectively. Similarly, the average values of Transmissivity and Storativity at Tail reach using the AQTESOLV computer model were obtained as 4.5998m2/min and 0.004429, respectively. Comparison of the transmissivity and storativity values, obtained through the analysis at the head and tail of the Muhammad Khan distributary indicates that transmissivity at the tail reach is more than that at the head reach, whereas the Storativity at the head reach is higher than that at the tail.

Keywords: Muhammad khan distributary, Lower Indus Basin (LIB), Aquifer characteristics, AQTESOLV

PAPER ID: 258

GROUNDWATER DEMARCATION OF SERI DISTRIBUTARY COMMAND AREA

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ABSTRACT
This study is a part of a research work, completed under the project "Sustainable fresh groundwater management for irrigated Agriculture in lower Indus basin (LIB) using PMWIN Model" funded by HEC under NRPU program. The project research emphases on managing the sustainability of groundwater and provides livelihoods to the irrigated agricultural community in the lower part of Sindh. Under this research work 03 districts; Tando Alhyar, Tando Muhammad Khan and Hyderabad have been chosen. Paper aims to identify the groundwater quantum and quality under the boundary of Seri distributary command area, which is off-taking from right side of Rohri canal at Almani X-regulator (RD-1038). The GPS coordinates at its head regulator are 25° 14' 41.97" N and 68° 29' 50.01" E. It lies in administrative boundary of district Hyderabad, Sindh, Pakistan. In this study, different activities (field experimentation and computer analysis) have been carried out. Under this study, the groundwater (GW) quality and aquifer potential has been assessed. Groundwater is generated in weathered layers and semi-weathered layers / crushed layers of hard rock areas with a thickness of 5 to 20 m [1]. Groundwater is used as a supplement for drinking, irrigation and industrial sectors. Due to the lack of surface water, groundwater is the second most common option to supplement canal water to meet the water needs of various water-consuming sectors. The groundwater quantum and quality was determined through electrical resistivity survey (ERS). Through Geo-electrical resistivity survey, the underground resistance of the study area at different selected points was determined using Terrameter SAS 4000.The Vertical Electric Soundings (VES) were done at each node point of (2km x 2km each cell dimension) grid, up to shallow depth of 150 meters below ground surface The collected data was further analyzed using IX1D software to quality wise quantum of groundwater in different geological layers. Finally, the demarcation map of the results was prepared for each layer using ArcGIS. In layers WT to 25m, 50-75m, 75-100m, and 100-150m from WT, the maximum amount was found in freshwater. In the second layer (25-50m), the maximum amount of GW was marginal fresh. On the other hand, saline waterwas found in the lowest amount in all layers (ie average <7%). The study recommended that the tubewells be installed at a shallower depth to avoid salt water upconing problem, because the fresh aquifers overlie highly saline aquifer. It is also suggested that the artificial recharging must be done by constructing open wells in the suitable depressed places to make water balance

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GROUNDWATER FLUCTUATION AND ITS EXCESSIVE USAGE FOR IRRIGATION IN THE COMMAND AREA OF MUHAMMAD KHAN DISTRIBUTARY

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ABSTRACT

Since the surface water at the tail reach of Rohri canal is decreasing day by day, the formers have installed tube wells to irrigate their lands for food and fiber for survival. Due to the excess use of ground water the water level of the aquifer is disturbed .This research focuses on investigation of groundwater fluctuation in the command area of Muhammad Khan distributary on the tail reach of Rohri canal (RD 1038).This research was done under the umbrella of HEC funded project "Sustainable fresh management for irrigated Agriculture of Lower Indus Basin).The ground water fluctuation data was collected from installed piezometers and hand pumps at head, middle and tail reaches of the selected command area. The water level indicator was used to collect the water Table fluctuation data in Rabi and Kharif season (2018-2019). Total four readings were carried, at the start & end of Rabi as well as at the start & end of Kharif season. From the results it is shown that, the average water table depth throughout the research area in 01 September 2018, 20June 2019, 23 September 2019 and 25 November 2019 were assessed as 20.91, 21.05, 20.52 and 20.77ft. Further calculation revealed that from 01 September 2018 to 20June 2019, 23 WT is lowered 0.14 ft and from 20June 2019 to 23 September 2019 the WT is raised 0.53 and from 23 September 2019 to 25 November 2019again lowered 0.25ft. However annual (from Sep 2018 to Sep 2019) water table raised 0.39 ft. Regarding water quality in terms of EC of collected water samples from piezometers and hand pumps varies from 544 to 1504 pp, which is ranging from fresh to marginal quality of water. It is further suggested that for the sustainability of groundwater in terms of WT and water quality the artificial recharge is essential, that can be done through open wells in depressed areas within research areas for rainwater harvesting to recharge the aquifer.

Keywords: Groundwater Fluctuation, Groundwater Quality, Artificial Recharge, Muhammad Khan Distributary, Rohri Canal

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INNOVATION TO ENHANCE EFFICIENT AND SUSTAINABLE USE OF IRRIGATED LAND

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ABSTRACT

This study conducted to assess the level of sustainability achieved by effective enough to smart utilization of irrigated land though be through river or underground water resources. The essence of the study surrounds the phenomenon of change adoptability results into consistent growth. Change adoption carries all such practices involved to enhance the productivity of irrigation resource accompanied with varying cropping mixes; by modifying or elimination conventional footprints. Countries like Pakistan, having above 50% of its labor force involved with Agriculture only; cannot afford to own this huge chunk as ill directed, as will result in huge revenue drains from economy and the factor of sustainability cannot be achieved. The economic growth is endorsed only, when the stability is proved perpetual. Hence, the factors of sustainable growth should have to complete the system or process lifecycle, that guarantees the smooth supply of required inputs and later their recycling as raw to assure optimum utilization of all allied elements on optimum grounds. The tendency of farmers and landlords to accept and adopt modern methods of optimum utilization of an irrigated land which is measured through enhanced and long-term yield with enhanced capability of cultivating multiple secondary plants to add value to self-sufficient farmer particularly and the sustainable economy, as whole. Through qualitative inquiry including experimentation, interviews and awareness creating sessions, the study established that majority of the farmers have accepted the change adoption as prosperity factor and had shifted their cropping techniques to modern intercropping practices to utilize an irrigated land and as a pre-emptive measure against potential food security threat.

Keywords: Irrigated Land, Sustainability, Intercropping, Perpetual Stability, System Lifecycle


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