



INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT IN CIVIL ENGINEERING

23rd - 25th November 2017



CONFERENCE

ABSTRACT BOOK

Organized by
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Mehran University of Engineering and Technology, Jamshoro

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Preface

Mehran University of Engineering and Technology (MUET) is an ISO-9001 certified institute that has been active in various disciplines of engineering, constituting 31 departments, institutes and directorates offering undergraduate and postgraduate programs 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 and industrial collaboration with various establishments around the globe.

In order to provide a platform to all the collaborators and policy makers from academic organizations, public and private institutes for discussing their technical and general issues, Mehran UET organizes international and national conferences, workshops and seminars regularly. In this framework, Department of Civil Engineering is hosting an “International Conference on Sustainable Development in Civil Engineering” (ICSDC 2017), November 23-25, 2017.

The Department of Civil Engineering is one of the oldest and largest departments 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.

ICSDC 2017 aims to provide discussion on the present-day research on sustainable development in various disciplines of civil engineering namely, Structural Engineering, Geotechnical Engineering, Transportation Engineering, Irrigation and Drainage Engineering, Construction Management, Environmental Engineering, etc. The convention encourages collaborators from academia arena as well as industry professionals to present their original research of top-notch quality. The forum assembles keynote speakers, authors and participants from educational and industrial sectors to present and debate on various challenges faced by the stakeholders in the domain of Sustainable Civil Engineering.

ICSDC 2017 has been triumphant in attracting National and International participants and speakers from public and private organizations.

Acknowledgment

The organizing committee of ICSDC 2017 acknowledges the collaboration and support of Higher Education Commission (HEC), Pakistan Engineering Council (PEC), Omni Power (Pvt.) Ltd., Osmani & Company (Pvt.) Ltd., Niaz Khan Brothers Engineers and Contractors (NKB), M/S. Technology Links (Pvt.) Ltd. Karachi and Ideal Autonetics (Pvt.) Ltd. to make the event successful.

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

High gratitude for the rigorous efforts of conference organizing committees.

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Keynote Speakers



**Prof. Dr. Marat
Ubaydulla Akhmet**

Prof. Marat is a Professor of Mathematics at Middle East Technical University, Ankara, Turkey. He is known for his research on the chaos and bifurcation theory in differential equations and hybrid systems with applications in physics, neural networks, biology, medicine and economics. He has been awarded a Science Prize of TUBITAK (Turkey, 2015), for best achievements in scientific research. He is also author of four books on covering range of topics. Prof. Marat has introduced and developed the theory of differential equations with piece wise constant argument of generalized type and many aspects of discontinuous dynamical systems.

Chattering, Grazing and Singularity in Impact Mechanisms

Abstract: Two of the most difficult and interesting phenomena of nonlinear dynamics of impact mechanisms are Chattering and Grazing. In last several years we have performed research on these problems. The results of our studies published in our papers will be presented on this platform. The method of regular perturbation is utilized for analysis of grazing collision of solids. Chattering, which is considered as infinitely many impacts in finite time, is considered as a singular problem for the first time. Sufficient conditions for chattering have been formulated for the first time in literature. The Pyragas control is applied to stabilize chattering. We will demonstrate the results by simulation modelling of colliding bodies, Van der Pol and Duffing oscillators with impacts.



**Prof. Dr. Othman Bin
Che Puan**

Prof. Dr. Othman is a faculty member of Civil Engineering Universiti Teknologi Malaysia (UTM). He started his teaching career from Kuala Lumpur Technical School. Dr. Othman has expertise in Highway & Traffic Engineering. He did his doctor of Philosophy from University of Wales, Cardiff, United Kingdom. He has held various high profile posts including Deputy Dean (Engineering) and Head of Postgraduate Studies at UTM. His fields of interest include Transportation Engineering & Planning and Traffic Engineering & Safety. He has produced more than 100 technical papers and supervised more than 30 post graduate students.

Driver's Car Following Headway On Single Carriageway Roads

Abstract: One of many aspects that are considered to influence road crashes and road traffic handling capacity is the driver's "Car Following Behavior." This study examines the distance separation between impeded vehicles on single carriageway roads. Data defining headway and speed for more than 8000 vehicles were collected using video cameras to record traffic movement at four sites in Malaysia. The distance headways and associated vehicle speeds were separated into vehicle following category by vehicle type and then into speed classes for vehicle following vehicle: car following car, car following heavy goods vehicle (HGV), HGV following HGV and HGV following car categories. In most cases the lognormal distribution was found to be an appropriate representation of the variation in distance headways for vehicles within a particular speed class. Linear regression models were developed to represent the relationships between distance headway and speed and the predicted variation in population mean distance headway with vehicle speed. In general, Malaysian drivers tend to follow another vehicle closely and platoons appeared to develop rapidly.



Prof. Dr. Ahmed Taufik

Dr. Ahmed is a Full Professor at E-JUST, and Chairperson of Environmental Engineering Department. He has received several national and international awards. Moreover, he has published 79 papers in peer reviewed international ISI journals with h-index Google Scholar of 21. Dr. Ahmed has a significant contribution for creating novel and innovative technologies for wastewater treatment including industrial, domestic and drainage. Which have been disseminated not only in Egypt but also in Africa to mitigate the severe water pollution problems. He has supervised 38 PhDs and MSc- students since 2001.

Sustainable Technologies for Safe Conversion of Wastes (Liquid & Solids) into Renewable Resources for Further Use

Abstract: Building of a sustainable society will require reduction of dependency on fossil fuels and lowering of the amount of pollution that is generated. Wastewater treatment and valorization of solid waste is an area in which these two goals can be addressed simultaneously. As a result, there has been a paradigm shift recently, from disposing of waste to using it. Utilization of wastewater and solid waste is an attractive approach for biofuels production. However, the major problems in biofuels production from wastes (wastewater) are the low rates and yields. Developing more efficient processing schemes, optimizing the environmental conditions, improving the reactors' efficiency and developing more efficient bioreactors would overcome such problems. The holistic approach of energy from wastewater (liquid & solids) via wet/dry anaerobic digestion process will make the major bio-waste-producing sectors less dependent on natural energy resources and strongly reduce the impact of wastewater discharges and solid waste dumping into the environment avoiding health risks. This will help to generate employment, social well-being and economic benefits for developing countries.



**Prof. Dr. Fayyaz Ali
Memon**

Dr. Fayyaz Ali Memon is associate professor in Water Engineering at University of Exeter, UK. He has worked at Imperial College London for about 10 years on Sustainable Urban Water Management Systems. In this domain of, he heads a research group with focus on developing countries. He has, to his credit, over 130 publications in peer reviewed journals and refereed international conferences, along with 11 book chapters and 9 co-edited books. He is an associate editor for the British Journal of Environment and Climate Change, member of CIWEM, Chartered Environmentalist, fellow of the UK Higher Education Academy and also a member of the Institution of Civil Engineers.

Modelling Water Energy Food Nexus

Abstract: The presentation describes the development of two domestic and city scale models that capture interactions and implications of water, energy and food consumption and strategies to enhance resilience. The models were tested using consumption behaviors extracted from a survey of over 400 households. These models were integrated and then investigated for established four global scenarios. The results will be discussed within the context of resilience and risk due to seasonal variability.

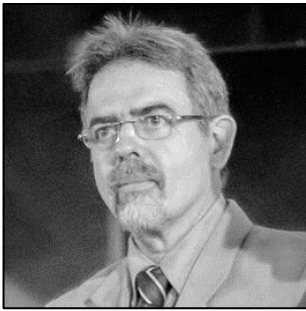


Dr. Naveed Anwar

Dr. Naveed Anwar holds an experience of over 30 years in structural modeling, analysis and design of buildings, bridges and other structures. He is proficient in the development of software for structural engineering applications, including earthquake resistant design, structural detailing etc. Dr. Anwar is teaching academic courses to Masters and PhD students in Tall Buildings, Bridge Design and Advanced Concrete Design at Asian Institute of Technology (AIT). He is the Executive Director of AIT Solutions (AITS), formerly AIT Consulting, established by the Asian Institute of Technology.

Trends and Advancements for Structural Performance – Lessons learnt from the Performance-based Design (PBD) of 100 Tall Buildings

Abstract: The explicit consideration of performance in recently developed performance-based design (PBD) philosophy has brought a major paradigm shift in the field of structural design and evaluation. It provides a systematic and flexible methodology for assessing the structural performance of a building, system or any component, as opposed to the cookbook type design methods prescribed in building codes. This methodology explicitly evaluates the response of the buildings under the potential seismic hazard while considering different probable site-specific seismic demand levels (Service Level Earthquake (SLE) and Maximum Considered Earthquake (MCE)). For this purpose, various state-of-the-art nonlinear analysis procedures and latest computer modeling tools are used to accurately determine the seismic demands of whole structure and its individual components. This study discusses latest seismic design philosophies and provides an account of recent developments and trends in the modeling, analysis and performance evaluation of high-rise buildings. Based on practical experience obtained from a detailed PBD of 100 buildings, this study also shares some important insights into the nonlinear and dynamic behavior of buildings and provide useful recommendations for their effective design and enhanced structural performance against wind and earthquake loads.



Dr. Douglas Barreto

Douglas Barreto is a senior lecturer in the Department of Civil Engineering, University of Sao Carlos, Brazil. He has wide experience in civil engineering construction especially in “Building Systems”, “Sustainable Built Environment” with a focus on rational use of water in buildings and alternative energy. He has conducted numerous studies on pathology solutions in building systems in addition to technical work of restoration of historic sites. He has authored several national and international articles on building systems and is also a member of Regional Council of Engineers.

Urbanization and Environmental Degradation

Abstract: By 2025, more than 85% of total world population will live in cities, i.e. urban areas. This is an important matter to consider now and in the near future, since these cities can be considered as part of built environment. These cities are built from natural resources and consist of buildings, roads, streets, amenities and so on. From this point of view, all incomes used to make cities come from nature. So this huge amount of urban population would utilize natural raw materials for their settlement in urban area. Since the natural resources are limited, and their depletion can cause irreversible consequences on local and as well as global environment. According to ancient philosophy the nature is composed of the four fundamental elements, i.e. "earth", "air", "fire" and "water". This rapid urban growth in terms of civil construction would consume some of these fundamental elements. The construction materials like bricks, sand, cement, iron and so on are derived from "Earth", and are utilized for construction of buildings and ultimately whole cities. The construction activities release pollutants into the air which adversely affects the atmosphere. “Fire” is a source of energy. Since every construction activity require energy, the consumption of energy affects the environment negatively. "Water" is a fundamental need for life, and in the civil construction, it is used during execution, and even afterwards by the end users- So we should take more conscious efforts in building projects and other construction processes. For each kind of these elements, there is a huge list of examples to demonstrate the effect on environment depletion caused by civil construction.

Prof. Dr. Sarosh Hashmat Lodi

(Vice Chancellor, NED University Karachi, Pakistan)

Resilience Assessment of Built-Environment in Pakistan Considering Earthquake as a Natural Disorder

Abstract: The built environment always has fear of damaging during any natural disorder more specifically during when the earth shakes (earthquake) or heavy amount of water strikes (Flooding or Tsunami). The most important element at risk during any natural disorder is, without any doubt, human life. By determining the vulnerability of the housing units, where humans reside, the susceptibility of the human life can be determined. Factors such as design, height, number of storeys and materials used in the wall and in the roof; collectively define the vulnerability of the building. Immediate response after any high magnitude disorder is effective only if, one has a better idea about the intensity of the potential damage due this in the environment. The purpose of this study is to provide rapid estimates of damages due to earthquake. This research has tried to correlate the existing buildings of Pakistan as per Population and Housing Census 1998, with the building typology mentioned in EMS-98 to estimate the vulnerability levels of building types at defined intensity levels of earthquake in EMS-98. In addition to, for any kind of earthquake loss estimation analysis all the relevant information was required in spatial format. Hence all the information regarding buildings characteristics in term of their type, spatial location and vulnerability are collected in spatial grid of 1x1 km size across the Pakistan. Then the developed data was tested using earthquake loss estimation software (ELER) first, and then correlated with seismic zonation maps of Pakistan for pre-loss estimation of buildings stock of Pakistan against minimum and maximum possible intensities in each zone. The GIS-based database of risk elements is used not only for earthquake pre/post estimation but can also be used for interdisciplinary purposes, especially to provide immediate response against any natural disaster.

Prof. Dr. Abdul Sattar Shakir

(Dean, Faculty of Civil Engineering, UET Lahore, Pakistan)

Sustainable Development in Civil Engineering Projects

Abstract: Sustainable Development is the challenge of meeting human needs for natural resources, industrial products, energy, food, transportation, shelter, and effective waste management while conserving and protecting environmental quality and the natural resource base essential for future development. The civil engineers play a vital role in Sustainable Development of any country. When a client approaches a civil engineer to design a new project, this immediately incorporates a multi-discipline process that may involve all stake holders, community interest groups, regulatory enforcement agencies and the business community. All the groups have an interest that the project is completed in a way not to put their interests at risk. It is the civil engineer's responsibility to ethically combine all the disciplines' interests and produce a balanced design that meets the client's requirements without compromising the minimum expectations of various interest groups. The civil engineers play an essential role to meet, address and achieve sustainability goals of engineering projects. They work to improve the well-being of the society as a whole with focus on minimum use of natural resources while paying attention to the environment and sustainability of resources. The sustainability of engineering projects is faced with both challenges and opportunities. The key challenges include but not limited to the impacts of declining resources, rapid population growth and environmental pollution. To signify the role of civil engineers in this context is important in which they can provide solutions that optimize positive social impacts of civil engineering projects and minimize negative environmental impacts. This paper discusses various issues related to the civil engineering projects keeping in view the sustainability considerations for present and future requirements. The paper emphasizes different aspects which can minimize negative social and environmental impacts in civil engineering projects. The necessary sustainability actions required for both individual level as well as organizational level are also presented. The principles that are related to sustainable developments linked to civil engineering projects particularly in Pakistani conditions are also discussed. The importance of sustainability in civil engineering project requires incorporating the concepts of sustainable development in the curriculum so that the graduating civil engineers can understand the significance of this important aspect. A case study of a civil engineering project is also discussed to emphasize the significance of such tools and strategies that can optimize the sustainability aspects. The importance of pre, during, and post project evaluations and implementation of proper SOPs are also highlighted along with best practices in the construction industry related to sustainable development of civil engineering projects.

Prof. Dr. Abdullah Saand

(Dean, QEC, QUEST Nawabshah, Pakistan)

An Investigation on Use of Local Material (Soorh/Kaolin) As Cement Replacement Material

Abstract: Cement is being utilized as construction material in the construction industry worldwide. Meanwhile, production of cement accompanied by the emission of hazardous gases such as CO₂, SO₃ and NO_x into the atmosphere which is source of the greenhouse effect and acid rain. In addition to serious environmental effects, a lot of energy is required (approximately 1700–1800 MJ/tonne clinker) in the production of cement. The reduction of CO₂ emissions in the cement industry is currently one of the most important tasks. Replacement of cement clinker by using Supplementary Cementing Material (SCM) such as Metakaolin to reduce CO₂ and other gases is an effective way. The aim of this research is to investigate and introduce a local natural material, i.e. Soorh available in Thatta district, Sindh, Pakistan as a new cement replacement material. To ascertain the optimum temperature and heating duration for development of the local Metakaolin, the natural material Soorh was calcined at temperatures of 650, 700, 750 & 800°C for 2, 3 and 6 hours duration and at temperatures of 900 and 1000°C for 1 and 2 hours duration respectively. Based on the results of strength activity index (SAI) and X-Ray diffractometer analysis, the treated Soorh at 800°C with heating duration of 2 hours is found most appropriate as natural pozzolanic material to be used in concrete. The chemical composition, SAI and loss on ignition of the treated Soorh at 800°C with heating duration of 2 hour meet the requirement of a pozzolanic material/metakaolin to be used in concrete as per ASTM C 618 standard. To investigate the effect of the locally developed Metakaolin on workability, drying shrinkage, mechanical and durability related properties of concrete produced by replacement of cement with the local developed metakaolin (Soorh at 800°C-2hr) at dosages of 5 to 25% by weight of cement were employed. The 15% replacement of cement with calcined Soorh, resulted into maximum compressive strength i.e. 31.65 MPa (15.43% increase) and ultrasonic pulse velocity i.e. 4.51 km/s (24.59% increase) as compared to control concrete, respectively. At 15% substitution of cement with the developed local Metakaolin, the durability properties i.e. the maximum reduction in water penetration depth was found as 40%, corrosion potential 5.7% and carbonation depth 31% less than that of ordinary concrete, respectively. The change in length of specimens cast with 15% substitution of cement with locally developed metakaolin (800°C-2hr) subjected to alkali silica reaction and sulphate attack, lie within the permissible limit, i.e. 0.1% of maximum length change for mortar as described by ASTM C-618 for pozzolanic material. On the basis of the investigated parameters; workability, drying shrinkage, mechanical and durability properties of concrete, 15 % replacement of cement with locally developed Metakaolin (calcined Soorh at 800° C for 2 hours) is found to be optimum.

Prof. Dr. Ing. Saqib Ehsan

(HOD, Civil Engineering Department, NFC-IEFR Faisalabad, Pakistan)

Evaluation of Flood Protection Measures Downstream of Mangla Dam for Long-term Flood Safety Management

Abstract: The assessment of flooding risks downstream of a dam has always been a major part of dam safety studies. Extreme flooding can occur downstream of a dam either due to dam failure or without failure. Unfortunately in the past, the dam managers/authorities did not consider properly the safety of downstream population while planning and designing the dams. The main focus was the fulfilment of purposes like hydropower generation, water storage for irrigation and water supply etc. Due to advancement in research in recent decades, the dam safety has been strongly associated with the possible risks to population living downstream of the dam in case of severe flooding with or without dam failure. For new dams prior to construction, thorough flood risk assessment is carried out at the proposed dam site and the outcomes are incorporated in the dam design and in the planning of suitable flood protection measures downstream of dam in order to make the dam more safe for the people living downstream. In case of existing dams, the estimation of flood risks can help in enhancing the existing flood protection measures with respect to the long-term safety of downstream population. In this research, about 330 km long reach of Jhelum River downstream of Mangla dam up to Trimmu barrage has been considered as case study. The project reach was modeled for unsteady flow conditions by using MIKE 11 (1D). Different flooding scenarios with and without dam failure have been analyzed. Based on the simulated results, the adequacy of existing flood protection measures has been evaluated. Further, the population at risk (PAR) has also been estimated along the whole project reach for different scenarios by using the available census data. This study is intended to give useful guidelines for the strengthening of flood safety measures (both structural and non-structural) downstream of Mangla dam and other existing/planned dams in Pakistan as well as in other parts of the world.

Prof. Dr. Amanullah Marri

(NED University Karachi, Pakistan)

The Mechanical Behavior of Cemented Granular Materials at High Pressures

Abstract: The mechanical behavior of cemented granular materials has been an important topic in geotechnical engineering since decades. Historically, most research on cemented granular materials has been performed at relatively low confining pressures. Problems relating to cemented granular materials at high-pressure are still not fully understood. However, understanding of the behavior of cemented granular materials at high-pressure is highly important in deep foundations, particularly for offshore piling, deep mine shafts, high earth dams, and oil-bearing strata. To address the problem, artificially cemented sand specimens with varying degrees of cement contents and initial relative densities were prepared in the laboratory to simulate the natural cementation characteristics. A high-pressure triaxial compression apparatus was utilized to investigate the effect of initial relative density, cement content, and confining pressure on the mechanical behavior of artificially cemented sand. High-pressure tests including isotropic compression, drained and undrained triaxial shearing and microscopic studies of the materials were carried out on the artificially cemented sand specimens in the Nottingham Centre for Geo-Mechanics laboratory at the University of Nottingham. Complexities with artificial specimen preparation and with high-pressure testing were identified and tackled. The experimental results indicate that there is significant effect of cement contents and confining pressures on the mechanical behavior of cemented materials. Particularly, these effects were notified on isotropic compression, peak strength, strength parameters, shear banding, particle crushing, yielding, and stress-dilatancy relationships. For example, reduction in compressibility, reduction in particle crushing and shift in normal compression line by the increase in cement content of the material during isotropic compression were significant. Progressive suppression in the dilation of cemented sand by the gradual increase in confining pressure, increase in the peak strength, developing of curved failure envelope, increase in the yield strength and formation of conjugate shear banding during progressive failure during triaxial compression were worth noticeable. This concludes that the significance of high-pressure and cement content cannot be ignored in the design considerations. However, more research needs to be carried out at further high pressures in order to see the convergence of failure envelopes and the initiation of bond breakage and particle crushing to give a reasonable design framework for foundations.

Dr. Kiran Farhan

(Principal, Al-Jazari Academy Lahore, Pakistan)

Long Term Settlement of Domestic Waste in Landfill: ISPM Method

Abstract: In context of increasing rationalization of the management of domestic and assimilated waste of class II, the control and the prediction of settlement of waste becomes very technical with whole share of the follow-up of the modern Municipal Solid Waste (MSW). Until recently, most widely followed method for the determination of long term settlement for a column of waste is that of Sowers. While ISPM (Incremental Settlement Prediction Model) proposed by the LTHE-Lirigm, which has been calibrated over a dozen of landfill sites in France and abroad is compared here with the Sowers Model. It is noteworthy that this method proves to be much more effective than that of Sowers.

Dr. Muhammad Jamaluddin Thaheem

(HOD, Construction Engineering & Management –NIT, NUST Islamabad, Pakistan)

Are We Ready to Implement Sustainability in Our Building Projects? An Insight into Potentials and Implications

Abstract: Sustainable development has become a key agenda in modern day debate, and it is heard across disciplines, policy- and decision-making forums and institutional realms. Assessing the body of knowledge on sustainable development in various areas of civil engineering, a mixed focus surfaces where infrastructure development seems to occupy major concern in the economic sustainability dimension. Thus, it is evident that sustainability is overemphasized in some areas and ignored in others. The case of building projects is most appealing in the context of sustainability where it is absolutely essential to incorporate all of its dimensions in order to realize a holistic sustainability evaluation of building projects. But an integrated sustainability decision-making framework cannot successfully answer all our questions before analyzing the barriers towards green and sustainable buildings. In developing countries including Pakistan, sustainable development in building and infrastructure projects suffers from many market barriers, despite numerous social, economic and environmental benefits. This talk will consist of exploring the barriers to and drivers for promoting green and sustainable buildings in Pakistan and discussing the possibility of integrating all sustainability dimensions for a detailed building assessment with a holistic view to help in decision-making process. In doing so, the role of modern technology such as BIM and its sustainability-facilitating features will be discussed to trigger a debate towards development of new BIM plugins with holistic sustainability assessment capabilities. The talk would help policy and decision-makers in identifying the barriers of Pakistan construction industry towards green and sustainable building practices and the measures needed to remove those potential barriers along with assessing overall building sustainability.

Dr. Muhammad Jawed Iqbal

(HOD, Transportation Engineering Department –NIT, NUST Islamabad, Pakistan)

CPEC – Opportunities and Challenges

Abstract: Transportation facilities besides providing mobility and accessibility for people and goods also play an important role in economic vitality and global competitiveness of any nation. There is a very strong positive correlation between a country's economic development and the quality of its road network. Efficient transportation systems provide economic and social opportunities and benefits that result in positive multipliers effects such as better accessibility to markets, employment and additional foreign investments, thus acting as vital tool for development. Pakistan is a developing country of South East Asia region having the sixth largest population in the world. Pakistan has bravely sailed past the period of trials and tribulations and paid a very heavy cost of being a frontline state against the global war on terror. Pakistan is strategically located at the junction of south Asia, west Asia and central Asia; a way from resource efficient countries to resource deficient countries. Pakistan provides shortest trade route from Gawadar to Kasghar with eventual possibility of linking it with Central Asian States. To exploit this opportunity China and Pakistan have mutually agreed to establish China-Pakistan Economic Corridor (CPEC). The “CPEC mega project” with an estimated cost of \$46 Billion, will include construction of new motorways/ highways, a rail link between Kasghar and Gawadar, network of oil pipelines, development of special economic zones, dry ports, communication link and different energy projects. Separate short-term (e.g. construction of Gawadar Airport) and long-term (e.g. construction of a rail link Xinjiang to Gawadar) goals which may take 10 to 15 years for completion have been envisaged under CPEC. Projects under CPEC are expected to bring overall economic prosperity in the region and specifically help Pakistan in development of its human and physical capital. The geostrategic importance of CPEC demands that it should be structured and operationalized as a truly networked economic corridor and its various facets merit a closer examination in order to maximize its benefits for Pakistan. From transportation infrastructure perspective, the development of multi-modal communication lines, linking Gwadar to Kasghar are expected to result in enormous growth in commercial travel demand.

Mr. Naseer Memon

(General Manager, CSR, Engro PowerGen Limited)

Water Scarcity in the Perspective of Pakistan

Abstract: The forthcoming threat of clean drinking water scarcity constitutes one of the biggest challenges to Pakistan's survival. This threat is not less dangerous than that of terrorism because it has been taking millions of lives, especially those of children, every year. Water is the most important and basic necessity for human life. Without water life can't exist. Throughout the world, more than a billion people do not have access to safe drinking water because the increasing population of the world has lowered the level of ground water alarmingly, particularly in the densely populated parts of the world like South Asia, China and Indonesia. Potable water is becoming a rare commodity all over the world. In some regions, water is even more costly than milk. In Pakistan, 38.5 million people have no access to clean and safe drinking water and its shortage is proliferating quickly. Pakistan was a water rich country just a few decades ago; however, a recent World Bank Report mentioned that Pakistan is now among the 17 countries that are currently facing water shortage. Because of the lack of clean drinking water, children are especially vulnerable to water-borne diseases such as diarrhea, worm infections, typhoid, and hepatitis -A. Some of these diseases can have long term effects on physical, mental and educational development of children. According to a report of Pakistan Council of Research in Water Resources (PCRWR), the mortality rate children under-five due to ill-water conditions is 101 per 1000 children. Diarrheal infections kill 2 million every year. Unhygienic practices coupled with impure water usage cause a number of diseases. It adds more difficulties due to resultant high costing treatment for water-based illnesses.

Dr. Salah-ud-Din

(HOD, Civil Engineering Department, Balochistan UET Khuzdar, Pakistan)

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 behavior 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 behavior 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 behavior of soil-cement-fibre composite materials. The main objective of this lecture is to enlighten the audience about the behavior 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 under compaction and were cured for 28 days prior to testing. The experimental results indicate that there is significant effect of fibre addition and/or cement contents and confining pressures on the mechanical behavior 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.

Construction Management



Paper Acceptance ID. 14

Influencing Attributes of Earthquake Disaster Risk in Building

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Abstract. Earthquake disaster is a worldwide issue but due to lack of proper management and implementation of necessary codes and standards, Pakistan is becoming one of the most vulnerable countries in the world. Therefore, this study focused towards identification of the most influencing attributes of earthquake disasters in buildings of Pakistan region. Current study identified thirty-nine (39) attributes from an extensive literature review. The most significant attributes of earthquake disaster risk are determined by questionnaire survey. Top most risk attributes of earthquakes are lack of consideration of seismic standard, insufficient emergency response during earthquake disaster, delay in dismantling of structures which are dangerous for life, inadequate monitoring, improper planning and absence of sufficient and proper rescue service. The identified critical attributes of earthquake disaster risk will help researchers and construction practitioners to search out important measures for avoiding these risks in developing countries like Pakistan.

Keywords: Earthquake, Risk Attributes, Buildings.

*Corresponding author

Paper Acceptance ID. 31

Measuring Safety Management System of Oil and Gas Industry in Sindh

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Abstract. Oil and Natural Gas industry is very sensitive due to its vulnerability towards accidents. A small mishap may cause huge disaster in the field. These accidents cause loss of both, the time and valuable assets. Eventually, loss of time and assets causes financial losses that also damage the credibility of the Oil & Gas (O&G) company which is worth more than the loss of money. There are variety of reasons that may cause on-field accidents. These accidents can be categorized as i) explosion, ii) falling out, iii) being struck, iv) being caught, v) electrocution, vi) chemical exposure, vii) electrocution, and viii) rig collapsing. Pakistan, especially the land of its province Sindh is rich in Oil & Gas minerals and lot of international and national companies have started their operations already. This paper focuses the trend of Health & Safety (H&S) in relevant companies / industries operating within the region. The data collected through surveys helps us to analyze the adoption rate of quality standard regarding (H&S) during the production processes within O&G companies. The analytical reviews are carried out using SPSS™ V23.0. Various interesting results are observed after running different algorithms / filters that can guide any stakeholder of the Oil & Gas industry to know more precisely about the culture of H&S in existing oil exploring companies. The findings can also be helpful for new entrants in the O&G industry to evaluate their H&S parameters. In this research, safety management is measured for Sindh. Through literature survey, 34 attributes are selected and a questionnaire was distributed. The authors received 41 responses, which helped in measuring safety management of Oil and Natural Gas Industry of Sindh.

Keywords: Health & Safety Management, Measuring Safety Management System, Oil & Gas Industry.

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Paper Acceptance ID. 32

Significance Level of Project Participants Causing Conflicts in Construction Projects

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Abstract. Construction industry is one of the most growing industries in the world. It is a major industry that has a great impact on economy and infrastructure of any nation. In any project, the basic aim of parties involved in project is to accomplish it successfully. A project is called successful, if it is planned, designed and constructed in a way that it should meet the project goals and client satisfaction. There are numerous factors leading to conflicts in construction industry and one of the major factor is due to parties involved in project. This study aims to investigate the significant level of project parties causing conflicts. A qualitative survey has been made and the data has been analyzed by average index method using SPSS. The study concludes that most of the time client and contractor are the major parties causing conflicts in construction projects followed by consultants. This paper is an addition to the existing literature for project participant's role in conflict management.

Keywords: Conflict, Construction Industry, Project Participants.

*Corresponding author

Paper Acceptance ID. 33

State of the Published Literature on Material Waste in Buildings

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Abstract. Construction industry is flourishing gradually, especially in developing countries, due to infrastructure development projects. Owing to major construction procurement, a lot of waste is generated. Material waste has significant implications for environment and economic aspects of construction projects. Waste measurement is assumed vital for the management of production system, since it is an effective way to assess project performance. In this way, areas of potential change can be found. In an attempt to assess the state of published literature on type and sources of material waste in construction industry, 57 research papers were thoroughly reviewed. Using an equal weightage, the most wasteful materials were identified based on their i) frequency of appearance ii) waste percent and iii) cost impact. Results reveal that major sources of waste are improper handling of materials, procurement problems, change in design, etc. After performing multiple analysis, top ten wasteful materials out of initially identified 25 are found to be wood, mortar, bricks, steel reinforcement, concrete, concrete blocks, tiles, ceiling boards, cement and sand. Further data can be collected from actual projects to check the material wastage in construction industry of Pakistan.

Keywords: Building Industry, Literature Review, Material Waste.

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Paper Acceptance ID. 34

Main Causes of Accidents during Construction and Operation of Dug Wells: A Case Study of Tharparkar Region

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Abstract. Accidents are very common during construction and operation phase of dug wells in Tharparkar region. These wells are very essential for the community of Tharparkar, as this is the most common existing source of water for local people and livestock. The experience of installing tube wells, hand pumps, wind mills, solar pumps have also been introduced but such schemes have not been fully successful. Most of such schemes are not functional due to social, economic, technical and other reasons. This study focuses on the identifications of the main causes of accidents during construction and operation of dug wells in Tharparkar, Sindh. The causes are identified through a detailed literature review. Various unstructured interviews were conducted with relevant experts. The data was collected through a questionnaire survey from skilled laborers, site supervisors, field engineers and project managers. Analysis was carried out with the help of SPSS and Average Index technique. The study identified critical causes of accidents during construction & operation phase. The study concludes that special attention should be given to eliminate identified main causes. The findings of the study will be helpful in reducing accidents during dug well construction and operation in Tharparkar region of Pakistan.

Keywords: Accidents, Dug Well Construction, Tharparkar Region.

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Paper Acceptance ID. 37

Identification of Causes Leading to Heat Stress and Their Negative Effects on Construction Labor in Extreme Hot Weather: A Case Study of Sindh

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Abstract. Global warming is a serious threat worldwide because of its negative effects on industries either indoor or outdoor. Several measures are taken for indoor industries to maintain labor performance but outdoor industries like construction industry still needs attention. Construction labor encounters multiple activities that can cause heat stress. Heat exhaustion and heat stroke directly affects labor health and indirectly affects their performance. Extreme hot weather is a major hazard in construction industry which has an increasing effect. Hence, this paper initially focuses on identification of causes leading to heat stress along with the negative effects on labor health. An extensive literature review has been carried out followed by unstructured interviews and finally the factors are identified with the co-operation of Sindh province construction industry stakeholders and medical field experts. This research paper will help the project stakeholders to design their work plans and activities accordingly in hot weather to achieve higher performance and to provide better health protection to construction labor.

Keywords: Causes of Heat Stress, Construction Labor, Health & Safety, Hot Weather, Sindh.

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Paper Acceptance ID. 41

Barriers to Green Building Construction in Pakistan

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Abstract. Nowadays the concern of entire world is to develop such methodologies which can lead to decrement of economic issues, energy crisis and environmental pollution. Sustainable development is a pathway which advances the quality of current and future generation as it leads to lesser pollution. Conventional methods of construction contribute a lot to atmosphere, lithosphere and hydrosphere pollution. Pakistan, being a developing country follows traditional methods of building construction. These methods are not only producing excessive pollution but are also responsible for waste of resources. Green building construction helps in sustainable development of the society. As green building construction is a new concept in Pakistan and not many projects have been initiated; various barriers are observed in the implementation. This research paper aims to investigate the major problems faced during implementation of green building concept. Initially, senior professionals of Pakistan's construction industry were selected for unstructured interviews. Questionnaire was then generated and data was collected through various means from the relevant stakeholders. Results of this research work will add to the literature; the barriers being faced by the construction industry of Pakistan to the successful implementation of green construction idea.

Keywords: Barriers, Construction Industry, Pakistan, Green Construction.

*Corresponding author

Paper Acceptance ID. 45

**Risk Identification in Joint Venturing Projects of Pakistan's
Construction Industry**

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Abstract. A joint venturing (JV) is a common way of combining resources and expertise of different organizations. It helps business to grow faster, increment in productivity and to generate greater profits without borrowing funds. However, it offers certain severe risk. Recent developments in Pakistan due to CPEC, has brought JV into its modern form. The scope of joint venturing is increasing and if the concerned issues of JV has been identified, it would enhance the involvement of such projects under the umbrella of JV. This research aims to investigate the various risk involved in national with national and national with international organizations. The work was carried out by reviewing the literature and a few national & international guidelines. Unstructured interviews were conducted with the relevant professionals, experts and organization's owner working under JV projects. The data was collected in the form of a questionnaire form relevant professionals. The descriptive analysis was performed through SPSS using average index (A.I) technique. The research investigates the critical factors causing different risks in JV projects. The study is helpful for Govt. of Pakistan, Public and Private Construction firms working under JV to reduce rising risks on projects.

Keywords: Joint Venturing, CI of Pakistan, Risk Identification.

*Corresponding author

Paper Acceptance ID. 51

Causes of Building Failures in Pakistan

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Abstract. The problem mostly seen for many decades in construction industry of Pakistan is failure of structures specially buildings before it design life. Occurrence of failure in buildings at the time of construction or after completion may results in number of fatalities, wastage of colossal amount of money, social disturbance around the project, clashes and claims between stakeholders. Many researches have already been made by many authors about key causes which lead a structure to fail at later stages. This research is pursuing to analyse specially the building failure causes in Pakistan. The causes were worked out form in depth literature, past history and actual visits of various projects in Pakistan. Finally a list of causes with the opinion of relevant experts were included in a questioner survey to collect the data. The collected data was analysed in SPSS using average index technique. This research discussed the critical causes of building failures in Pakistan with their reasons with the opinion of rich experience stakeholders working at various projects in Pakistan. The identification of building failure causes is a key interest research topic for the country, as it would possibly reduce the failures of buildings in future, saving in lives, injuries, money, time and conflicts among stakeholders.

Keywords: Buildings, Construction Industry, Pakistan, Structural Failure.

*Corresponding author

Paper Acceptance ID. 75

Change Orders in Projects at Different Stages of Construction

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Abstract. Construction projects are very complex in nature. Each activity involves multiple varying tasks. Construction industry is major source of economic growth. When change order occurs, performance of projects affected. Change orders often have a serious impact on the quality, time and cost. Eventually it results in disputes, delays, and dissatisfactions among stakeholders and ultimately results in failures of projects. In past several studies have been done to evaluate the causes of change order and its effects. Attempts have been made to quantify these impacts by many researchers, but the aim of this study is to identify the causes of change order in two different phases i.e. preconstruction and construction stage. Views were taken from relevant experts over included factors after in-depth literature review from past researches. A questionnaire was made and floated with different construction players from clients, consultants and contractors side. The data was analyzed by SPSS using average index technique. This study will enable the clients, consultants and contractors to be aware of factors which causes changes in orders and their consequences on project completion. By the identification of possible reasons, the right decisions can be made to mark the project successful.

Keywords: Construction Industry, Change Orders, Construction Players.

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Paper Acceptance ID. 95

Human Resource Management Practices in Construction Industry of Sindh

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Abstract. Human Resource (HR) is one of the key resource which plays vital role in achieving organization goals of any firm and project. It is very imperative to manage human resource. Thus human resource management (HRM) is considered very important area as it aims in assigning the work element to the most suitable person. There are several practices and model adopted by different organization. This paper is aimed to give insight view regarding HRM practices adopted in construction industry. It involved comprehensive literature review in identifying various HRM models and practices adopted in construction industry worldwide. A group of experts from five large construction firms of Karachi involved in HRM process were interviewed using structured questionnaire to assess relevancy of the identified HRM practices and model with construction industry of Pakistan. The findings of this paper revealed that, in Pakistan there are several practices adopted, however no specific model is used. This paper also give clear understanding of HRM Practices implemented by various organizations.

Keywords: Construction Industry, HRM Practices, Sindh.

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Paper Acceptance ID. 96

Green Building Rating Systems Adopted in Asian Countries

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Abstract. The increasing demand of social and infrastructural facilities has resulted in huge amount of construction activities. Together with benefitting the society, this increased construction activities has affected the environment badly. It has also affected on the availability of resources. This has led to thinking and introducing new philosophies to overcome negative impacts caused by construction work. One of the emerging philosophies is a green building. Green building concentrates on expanding the proficiency of natural resources like energy, water, and materials. While decreasing building impacts on human being and the earth amid the building's lifecycle, through better design, execution, development, operation, maintenance, and evacuation. In ensuring the implementation of green building, several assessment and rating tools are developed. This paper presents the comparative review of the features of six popular green building rating systems adopted in Asian Countries. These rating systems are BCA (Building & Construction Authority), Green Mark (Singapore), GREENSHIP (Indonesia), GRIHA (Green Rating for Integrated Habitat Assessment) (India), HK-BEAM (Hong-Kong Building Environmental Assessment Method) (Hong Kong), PGBG (Pakistan Green Building Guideline) (Pakistan) and PBRS (Pearl Building Rating System) (Abu-Dhabi). Purpose of this study is to find the similarities and dissimilarities between PGBG and other five green building rating systems.

Keywords: BCA Green Mark, Green Building, GREENSHIP, GRIHA, HK-BEAM.

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Paper Acceptance ID. 99

Software Application for Reducing Steel Waste in RCC Construction

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Abstract. Construction industry plays an important role in developing the GDP of a country through which the overall economy of the nation is strengthened and government gets new opportunities to enhance development. However at the same time it has to deal with the losses in construction waste it produces during the development of a project. For emergent countries like Pakistan, growing levels of waste creation, due to the quick construction growth of urban centers and infrastructure development cities has become critical issue. A large amount of budget is spent on these construction projects. The construction methods used in R.C.C constructions generate significant quantity of steel waste. This research focuses on the development of software to reduce the wastage of steel bars which results due to manual procedures. The study explore that application of software significantly helps in the reduction of steel waste in R.C.C structures.

Keywords: Construction Waste, R.C.C Structures, Software Development.

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Paper Acceptance ID. 100

Barriers in the Adoption of Sustainable Construction in Pakistan

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Abstract. Global Construction industry consumes 40 percent of the energy, 40 percent of raw materials and 25 percent of the available timber. It is also accountable for generation of 30 to 40 percent of solid waste as well as 35 to 40 percent of carbon dioxide emissions. Sustainable construction meets the anticipated performance as well as functionality by causing minimum destructive impact on environment on the other hand causing enhancement in social and economic aspects. The philosophy of sustainable construction is relatively new in Pakistan. The present study therefore is an endeavor to clear a path for the adoption of sustainable development in Pakistan. This study identifies the common barriers faced by the construction industry at global level through an extensive literature review. Further it explores the relevance of identified barriers with construction industry of Pakistan. It is envisaged that the outcome of this research will pave the way for smooth adoption of sustainable construction in Pakistan.

Keywords: Barriers, Sustainable Construction, Construction Industry of Pakistan.

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Paper Acceptance ID. 101

Identification and Role of Various Stakeholders in Earthquake Disaster Mitigation

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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 buildings. A major earthquake in one of the vulnerable cities can cause huge human and financial loss. As compared to developed countries, earthquake risk is more and rapidly increasing in developing countries. The history of earthquakes in the Indo-Pak region reveals that this region has faced devastating earthquakes time to time. The recent earthquake in Pakistan (October 08, 2005) caused collapse of many structures and unprecedented loss of human lives. Various stakeholders have an important role in earthquake disaster mitigation. This study identifies the level of importance of different stakeholders in earthquake disaster mitigation. Level of importance was obtained through questionnaire survey and statistical analysis by using average index method. The study explores that Engineers, Scientists, City & Regional Planners, Disaster Management Authorities, International Scientific Organizations, Hospitals and Media can play an important role in earthquake disaster mitigation at pre and post-earthquake levels. In the end, the study also highlights the role of important stakeholders in earthquake disaster mitigation.

Keywords: Disaster Mitigation, Earthquake, Stakeholders, Pakistan.

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Paper Acceptance ID. 105

**Women in Construction Industry of Pakistan- Roles Challenges,
Opportunities and Trends**

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Abstract. Construction Industry of Pakistan is lagging behind as lack of skilled workers is becoming a local problem; this gap can be filled in by women- working in partnership with men. This infusion of women, in the construction industry sector is not easy as there are some barriers hindering their entrance such as, gender-based discrimination, the harsh work environment of the construction site, lacking adequate knowledge regarding construction site and shortage of successful women in construction as role model. This Paper Identifies the role of women in construction industry and the prevailing challenges faced by them. This study also highlights the present opportunities that can be availed by women.

Keywords: Challenges, Construction Industry, Women's Role,

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Paper Acceptance ID. 106

Implementation of ISO 9001 Quality Management System in Construction Companies of Pakistan

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Abstract. The success level of construction projects greatly depends on the implementation of quality management system (QMS). Research in this area is carried out to identify the factors influencing implementation of ISO 9001 QMS. There is limited research geared at studying factors inhibiting the ISO 9001 quality management system and ability of practitioners to effectively control their projects. To fill this gap, a research study is carried out to assess the level of implementation of ISO 9001 QMS within construction projects of Pakistan. The data was collected through survey carried out from construction industry professionals. The study identifies that there is poor level of implementation of ISO 9000 QMS in construction companies. The study also highlights the advantages of ISO 9000 implementation in construction sector. The study concludes that effective implementation of ISO QMS in construction companies of Pakistan will help in improving the project outcome. Consequently the customer satisfaction level will enhance which is the ultimate need of owner/client.

Keywords: Construction Project, ISO 9001 Standards, Quality Management System, Project Management.

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Paper Acceptance ID. 110

Causes of Time Overrun in Construction of Dam Projects in Pakistan

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Abstract. Time overrun in construction projects is very serious issue in developed countries like Pakistan. Because of this severe issue many construction projects of Pakistan are not completed on approved time. Main object of this research is to find the main causes of time overrun in construction of dam project and its possible mitigation measures. Quantitative approach was adopted in this research to achieve object and RIW (Relative importance weight) approach was used for collected data. Main causes of time overrun in construction projects were financial issues faced by contractor, inexperienced contractor, weather impacts, late delivery of material, mistakes in design, shortage of skilled labour, incompetent subcontractor and mistakes in time estimation were identified and possible mitigation measures were also identified from experts. This research will help to give awareness to stakeholders to narrow down the factors of time overrun in construction projects of Pakistan.

Keywords: Causes, Dam projects, Mitigation Measures, Pakistan, Time Overrun.

*Corresponding author

Paper Acceptance ID. 115

**Facilities Mapping Using BIM and Augmented Reality: Findings of a
Case Study**

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Abstract. Infrastructure is crucial to our societies as they provide habitations, workplaces and services indispensable to our daily life. As vital parts of facility management, operations and maintenance (O&M) ensure a facility to continuously function as intended, which take up the longest time in a facility's life cycle and demand great expense. Therefore, computers and information technology have been actively adopted to automate traditional maintenance methods and processes, making O&M faster, more reliable and cheaper in many ways. Augmented reality (AR) offers a new approach towards human-computer interaction through directly displaying information related to real objects that people currently perceive. People's sensory perceptions are enhanced with information of interest using VR enabled portable devices. AR has been proved to be able to further improve O&M task performance. This research presents user evaluations of AR applications in the context of facility maintenance. It looks into invisible target designation tasks assisted by developed AR tools in both indoor and outdoor scenarios. A 2D barcode based positioning system was made and synchronized with the digital data so that it can be juxtaposed in real-time.

Keywords: Augmented Reality, BIM, Construction Facilities, Management.

*Corresponding author

Paper Acceptance ID. 116

Field Skill Assessment of Civil Engineering Graduate: A Case of Pakistan

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Abstract. The success of construction industry is largely dependent upon both the technical and managerial skills of the civil engineering graduates. This study identifies and ranks the key skills that fresh graduates of today should acquire to succeed in the multipart construction industry of Pakistan. The study also evaluates the satisfaction level of the employers regarding the currently employed civil engineers and the skillset they have acquired during their studies. A total of 29 skills were identified after a thorough literature review on which a survey was designed. The survey encompassed of the employers hiring fresh graduates currently in the market. The data collected after questionnaire survey is analyzed and concluded presenting ranks and difference of perception between the graduates and industry demands.

Keywords: Civil Engineering Education, Key Skills, Skill Assessment.

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Paper Acceptance ID. 118

**Identification of Key Performance Indicators for Building Performance
in Construction Industry of Pakistan**

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Abstract. The requirement for measuring construction project performance has led to evolution and execution of various key performance indicators (KPIs). The aim of this research paper is to present and discuss the results of a pilot study and interviews to identify KPIs for the construction industry of Pakistan. Initially, KPIs are identified affecting Building Performance (BP) in the developing country like Pakistan. The process of the complete stage was mapped based on the literature review. The mapping process was then verified through a pilot study. 16 KPIs were identified and later, collaboration was done with experts in the form of interviews. 5 most important KPIs were selected. Identified KPIs offer a significant help to know the reasons for deficient performance of completed building project depends. Outcome will explain the relation of these KPIs on the performance of building construction project and provide a base for further development.

Keywords: Building performance, Construction industry, Key performance indicators, Performance management.

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Paper Acceptance ID. 121

Barriers in Hospital Waste Management: A Case Study of Civil Hospital Hyderabad

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Abstract. Hospital waste management (HWM) has become one of critical concerns in developing countries. Hospital waste (HW) is a hazardous type of waste that requires special handling and disposal techniques as it is considered as a major public health hazard. During recent years, population has rapidly increased in Hyderabad and so the bedding capacity, resulting in improper hospital waste handling. Various obstacles in hospital waste management lead to inadequate collection and disposal of waste which possess serious health risk towards environmental degradation in most cities of emerging countries. There are several barriers which creates a number of problems in waste management plan's execution in any hospital. To oversee these problems, the aim of this research paper is to highlight internal and external barriers in hospital waste management at civil hospital Hyderabad. The methodology consist of literature view, brain storming sessions and interviews/survey conducted with waste management experts and hospital workforce. Through this study, the barriers in hospital waste management at Civil Hospital would be identified.

Keywords: Barriers, Hospital waste, Hazardous Waste, Hospital Waste Management, Pakistan.

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Paper Acceptance ID. 124

State of Awareness with LDA Building Regulations in Lahore and Strategies to Ensure Better Compliance

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Abstract. Building regulations are meant to ensure safe, healthy and conducive environment for the inhabitants. In this context planning authorities are responsible for ensuring effective compliance of these regulations. The general perception is that people do not comply fully with building regulations due to lack of awareness. This research investigates this issue in Lahore City in residential areas under the jurisdiction of Lahore Development Authority (LDA), the principle planning agency responsible for implementing building regulations. Based on interviews with LDA officials and selected residents of approved housing schemes, the study explores the state of awareness of building regulations and identify factors that contribute to non-compliance. The study also finds lesser incidence of violations of building regulations in co-operative housing schemes as compared to public and other types of private housing schemes, mainly due to the fact that co-operative housing schemes have their own management playing the role of a watchdog to ensure compliance. The paper also suggests ways to improve awareness as well as strategies for ensuring better compliance with building regulations

Keywords: Building Regulations, Housing Schemes, Lahore Development Authority, State of Awareness.

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Paper Acceptance ID. 125

Sustainable Concrete Structures for Future in Changing World

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Abstract. The increase in migration of people and terrorism are the results of number increasing natural disasters, economic and social problems in the world. There is a need of sustainable structures for new needs in this changing world for sustainable future. In this perspective due to its properties, manmade material, concrete gradually becomes the most used building material. It is suitable for sustainable construction with high potential to reduce environmental impact reduction. Concrete proved to be a disaster resilient material due to some specific properties such as durability, water tightness, compressive strength etc. The advanced technologies e.g. UHPC, timber-concrete composites, subtle concrete frame, textile reinforced concrete etc. represent high potential for further development of environment sustainably. These technologies save materials up to 70% as compared to ordinary concrete which consequently reduces embodied CO₂ emissions. These structures could be more resilient in current situations and social conditions.

Keywords: Concrete, Embodied, Subtle, Sustainable Structure.

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Paper Acceptance ID. 126

**Assessment of ICT Use Awareness and Bottlenecks in Adoption in the
Construction Organizations of Pakistan**

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Abstract. Projects in the construction industry are more challenging in comparison to other industries. Every project is different in nature and generates unique information. Information handling is key to manage challenges. Information and communication technology (ICT) can be used to empower construction organizations to make quick decisions based on accurate information. Information can be visualized, studied, optimized, and quantified with greater accuracy. However, the construction industry in Pakistan has been relatively slow to adapt ICT. Design and construction organizations can achieve integration of various construction activities by redesigning organizational functions and processes using ICT. Before that an assessment of ICT use and its effectiveness is required. This paper will provide an assessment of the effects of the use of Information and Communication Technology systems in the Construction Industry of Pakistan. A survey of different construction organizations has been conducted. The results of the study provide an insight into awareness of ICT benefits in the construction organizations of Pakistan furthermore; bottlenecks in its Adoption are explored.

Keywords: Adaptability, Information Handling, ICT.

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Paper Acceptance ID. 142

Value for Money Drivers in Infrastructure Public Private Partnerships: A Life Cycle Approach

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Abstract. Public Private Partnerships (PPPs) are embraced by the different governments around the world to uplift their basic infrastructures. As a matter of fact, PPPs are legal frameworks that are developed to accommodate private business opportunities in public infrastructures. Such frameworks are based upon a promise that, private provision of a public infrastructure can deliver extended value for money (VFM) to the taxpayers, especially the users of the infrastructure. Nevertheless, the anticipation of the extended value rests upon a range of various factors that belong to different domains, such as public partners, existing regulations, national economic situations, etc., and the different project stages as well. Therefore, the VFM drivers are spread across the project lifecycle, and needed to be focused throughout project life. This paper discusses such spread of VFM drivers that are needed to take care of, in order to attain the anticipated value from any infrastructure PPP project. This Paper identifies a list of VFM drivers, and illustrates their probable span in a PPP project lifecycle. The results of a pilot study over the importance of such VFM drivers are then discussed within the lifecycle of PPP project. The findings of this paper will help industry and academia in understanding the life cycle approach of the VFM in infrastructures PPPs.

Keywords: Infrastructure, Public Private Partnerships, Value for Money.

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Paper Acceptance ID. 180

Automation with Building Information Module in Civil Engineering

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Abstract. Recently the building industry has become more interested in scheming and making environmentally friendly buildings (e.g. supportable buildings) that can provide both high performance and financial savings. More Building information modules with several techniques is being applied in construction industry but their impacts are not up to the mark. Artificial Intelligence provides more tools for addressing complicated problems in automation for construction work. In today's technology, people are getting narrower to the automation industry to implement very fast systems for maximum output. Using Principle Component Analysis and Gaussian Mixture Regression Techniques with Automation in Construction, lot of problems in this industry would be solved. Solution of challenges are presented in this research. The advent of computer science, electronics and automation proved themselves as milestone in construction industry. Face of civil industry is changed with applications of computer science. With steel, spraying fireproofing material robot, that was developed in Japan around eighties witnessed advent of robotics at that time. For construction site and building service application, major efforts are suggested that would bring revolution in the construction industry to use automation in first priority while developing infrastructure.

Keywords: Artificial Intelligence, Building Information Model, Civil Engineering, Computer Science, Construction and Development.

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Paper Acceptance ID. 184

Implementation of Lean Construction in Construction Industry of Pakistan: An Exploratory Study

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Abstract. Construction industry's role in the economic growth of a country is indispensable. Over the years, several techniques have been adopted to enhance its performance. Lean construction has emerged as an important technique in this perspective providing value for money and customer satisfaction. This research examines the current challenges of construction industry and proposes a road map for implementing lean construction in Pakistan to address them. Using questionnaire survey and interviews, the major reasons, hurdles and possible solution for the adoption of lean construction are identified. Results reveal that wastage, and time and cost overrun are the driving factors for the implementation of lean construction. Human reluctance and lack of knowledge are the major hurdles undermining its implementation. Mitigation approach include increasing awareness of lean culture through training and seminars at multiple levels.

Keywords: Lean Construction, Implementation, Challenges, Hurdles, Construction.

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Paper Acceptance ID. 185

Managing Stakeholders in PPP Road Infrastructure Projects; A Strategic Approach

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Abstract. Infrastructure projects are the back bone of any modern, successful and competitive economy. In a competitive global environment, public private partnership (PPP) has emerged as an alternate way of infrastructure delivery liberating government's financial pressure. Whilst provision of infrastructure through PPP has been more or less successful in terms of effectiveness, a major hurdle undermining its success is stakeholder opposition which results from inadequate stakeholder identification and management. This research identifies and classifies the major stakeholder groups involved in PPP projects and possible strategies for their engagement. Using questionnaire survey and interview, major stakeholder groups are identified. A total of 32 identified stakeholder are classified into public sector (government, state/ federal/ regional development authorities, legal authorities), private sector (contractor, subcontractor, architect/designer), general public (general public, community representatives, customer) and third party (NGOs, press/ media, environmentalists). Finally, engagement strategies regarding lifecycle perspective are presented.

Keywords: Stakeholders, Identification, Classification, Engagement Strategies, Public Private Partnership.

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Paper Acceptance ID. 197

Empirical Evaluation of Cost Control Functions in Construction Companies of Pakistan

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Abstract. One of the key parameter in defining a project success is cost. From business perspective, cost control is an important system for any construction company that assists to limit the project expenses within the budget. Hence, the company is also able to realize its targeted profit. However, due to the absence of well-established functions of cost control system, companies can face overruns. Cost engineering and control, as an integrated system, is still a maturing concept in construction industry of Pakistan. Typically, construction companies do not have separately established cost departments. Instead, whatever formal or informal system exists is dependent upon mere experience of the staff. This study aims to assess the strength of practice of the cost control functions construction companies in Pakistan. Extensive literature review was performed to identify the common practices related to cost engineering and control systems. Keeping these practices in mind a questionnaire form was made and a survey from contracting firms was conducted about their cost control practices. Sixty three responses were received. Results of this study shows that companies in Pakistan need to improve their cost deviation mechanism, reporting procedures, financial yardsticks, cost control during close out phase and cost variation procedures.

Keywords: Construction Industry, Cost Control System, Limitations, Pakistan, Practices.

*Corresponding author

Paper Acceptance ID. 198

**Problems Caused Due to Low Bid Award System: A Case Study of
Public Sector Construction Projects in Pakistan**

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Abstract. The bid procurement is an essential and considerable component of construction project management. Bid procurement problems are widely connected with participants of construction industry. The core objective of undertaking this research study was to identify the problems faced by public sector projects due to lowest bid award system. In order to achieve the objective of the study both qualitative and quantitative research methods were applied. Problems caused by lowest bid award system were identified by literature review and questionnaire survey. It was found that poor performance, selection of inexpert and non-qualified contractors, schedule and cost overruns, delays, risk exposure to client were the major problems faced by public sector projects due to low bid award system. In context of identified problems, this study suggests some measures for improvement in award of public sector projects.

Keywords: Bid Procurement, Construction, Low Bid Award, Public Sector.

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Paper Acceptance ID. 200

Relationship between Demographical Factors and Construction Safety Management

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Abstract. The construction industry plays an important role in the economic and social development of the world. The construction company deals with the construction projects executed by the number of workers, thus the safety of these workers should be investigated and provided properly. In the developed and developing countries, the safety in the construction industries is considered a major issue. In Pakistan many construction companies are working on different projects, but the safety and health facilities provided to the workers by the organizations are not meeting to the standards. In this research an attempt is made by using the safety climate questionnaire and demographic factors having several statements with the Likert scale. Survey was conducted on more than thirty-six construction projects in different cities of Pakistan. The main objective of this study was obtained by keeping in view the relationship of demographic factors with the safety climate, including construction company type, project types, nature of employee, age and educational level of the workers.

Keywords: Demographic Factors, Mean Safety Climate Score, Operation and Maintenance, Safety, Safety Climate.

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Energy & Environmental Engineering

Paper Acceptance ID. 10

Adaptability of Zero Energy Buildings in Pakistan

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Abstract. The world is focusing on a drive towards generation of energy through renewable sources and to promote this idea; concept of sustainability plays key role in understanding how to use resources conservatively. This helps in reducing environmental impacts and ensures balance between production and utilization. Sustainability is utmost desire of today's construction industry. Environmentally it's crucial to be sustainable. One way to be sustainable is to apply the concept of Zero Energy Buildings (ZEBs). Here, the mentioned title of the research studied in detail concerning the views of people from Sindh, Pakistan. Adaptability of such a concept with a developing country perspective is studied. Literature review was quite limited for Pakistan's construction industry. So, several unstructured interviews were conducted from experts of respective fields. The design aspects of ZEBs are also reviewed in the industry of Pakistan. Further, implementation level of such design in the industry of Pakistan is also assessed.

Keywords: Adoption, Design, Pakistan, Zero Energy Building.

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Paper Acceptance ID. 18

**Urban Metabolism Approach Incorporating Renewable Energy
Resources in the City of Gwadar: The Context of CPEC**

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Abstract. Pakistan being rich in solar irradiations is reported as one of the most appropriate regions to manage its energy requirements. Utilization of fossil fuel as an energy resource has the major contribution in the electrical system of Pakistan, with an energy deficit of 4000-6000 MW so far and this figure will accelerate in the coming decades due to substantial increase in demographic statistics and international investment focusing China Pakistan Economic Corridor (CPEC) surrounding regions. The eye catching Gwadar port in the Balochistan province will consequently may face inevitable growth, with high projected energy demands and urbanization. Urban metabolism approach can be incorporated as independent power producer (IPP) using renewable energy resources in the city of Gwadar, in the pursuit of satisfying predicted domestic and industrial energy demands. IPPs can also be equipped with energy storage systems to reduce the intermittent nature of renewable energies. This approach will not only incentivize the foreign investment but it will also influence environmental sustainability in the region.

Keywords: CPEC, Sustainable Cities, Sustainable Energy Systems, Urban Metabolism.

*Corresponding author

Paper Acceptance ID. 19

Performance of Anaerobic Sequencing Batch Reactor for Biohydrogen Production from Polyethylene Terephthalate Industry Wastewater

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Abstract. Biohydrogen production from polyethylene terephthalate (PET) industry wastewater via anaerobic sequencing batch reactor (ASBR) was extensively assessed. The sole contaminant in this effluent is mono-ethylene glycol (MEG), which is highly toxic to aquatic organisms. ASBR (15 L) was operated at different organic loading rates (OLRs) of 1.00, 1.67, 2.67 and 4.00 g COD/L/d and pH of 5.50. The hydrogen yield (HY) was increased from 134.32 to 189.08 mL/g MEG initial at increasing OLR from 1.0 to 4.0g COD/L/d. The biodegradability of substrate was substantially decreased from 99 to 70% at increasing OLR from 1.0 to 4.0g COD/L/d. Moreover, two batch-mode experiments were conducted using the acclimatized sludge collected from the reactor to investigate the effect of nitrogen supplementation (C/N ratio), as well as salinity (as NaCl) on biohydrogen production. Different C/N ratios were tested at a constant MEG concentration of 3g COD/L, and HY was dropped from 125.56 to 12.04 at increasing C/N from 28 to 112. Simultaneously, NaCl concentrations of 5.0, 7.0 and 10g/L were used, so that HY was slightly improved by 4.91% at 5g NaCl/L; however, it was deteriorated from 98.04 to 76.83 mL/g MEG initial at increasing salinity from 5 to 10g NaCl/L.

Keywords: Biodegradability, C/N Ratio, Hydrogen Yield, Mono-Ethylene Glycol, Organic Loading Rate.

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Paper Acceptance ID. 20

Bio-Solar Hybrid Energy System Village Model Karani

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Abstract. The rural areas of Sindh are facing adverse energy shortage due to ineffective utilization of alternative energy sources (i.e. biomass, solar and wind). This study has focused Karani village, one of the rural area of Sindh situated near Larkana. A bio-solar hybrid energy system model is proposed in this study. The model is developed using statistical and analytical approaches. The Karani village is consisted of 210 houses. It is observed that average electrical and gas energy consumption per house is 9 kWh and 1.1 m³ respectively per day. Considering current consumption of electrical and gas energy of single house per day, total consumption of whole village was calculated as 1815 kWh and 274 m³ respectively. It is also noticed that unit cost of proposed model is less than the current tariff charges imposed by traditional energy system. Based on the study results, it has been observed that implementation of bio-solar systems is promising to overcome energy crisis in rural areas of Sindh.

Keywords: Bio-Solar Module, Resources Management, Renewable Energy, Sustainability.

*Corresponding author

Paper Acceptance ID. 30

Household Perceptions About Drinking Water Facility in Developing Countries-A Case Study of Ghousia Colony Lahore Pakistan

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Abstract. A human's intrinsic access to pure water cannot be denied, but in developing countries, water and sanitation are taken for granted. The subsequent rise in population and urban development, enforces the policy makers and city planners to take influential implemental steps in regard to management of drinking water and public perception. The consumer may contribute to improvements in water management by their own participation. Keeping in mind the points of paramount importance mentioned above, the study demonstrates socio-economic factors and public perception about the drinking water facility of the Ghousia colony, Lahore Pakistan. A structured questionnaire survey was conducted with a randomly selected sample of 100 households within the study area. Location map was prepared with the aid of ArcGIS and SPSS for data analysis. Descriptive statistics-percentage analysis method was used to proceed the research. Results revealed that public satisfaction regarding access to drinking water and its quality is questionable in the research area due to the lack of enforcement of water quality standards. It revealed actual public view point regarding drinking water and also developed socio-economic statistics, which may be adopted by the policy makers for the betterment of that area.

Keywords: City Planners, Drinking Water, Public Perception, Questionnaire Survey.

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Paper Acceptance ID. 38

**Design of Pilot Scale Equipment for Arsenic Removal Using
Nanomaterial**

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Abstract. Arsenic is a recognized threat to human health all over the world. Chronic exposure to arsenic could lead to skin lesions and skin cancer. WHO recommends the accepted level of arsenic to be 10µg/l. Arsenic has been seen all around as the most destructive inorganic contaminant of drinking water. Nano-filtration, among other techniques has been gaining more attraction recently. However, no automatic equipment has been designed and tested using nanofiber for purification of Arsenic from water. In this study, an attempt has been made to design an equipment for convenient purification of Arsenic from water. The equipment consists of a compartment in which contaminated water is guided automatically by control panel. Chitosan/Fe³⁺ nanofibers were fabricated using electrospinning process to be used in the machine. These can be placed inside filters attached on the ends of the shafts. The water is guided through pipes using automatic valves. The results were optimized for time, dosage and RPM. The research found that the equipment purifies best when water is treated for 45 minutes (83.1% removal rate). The optimal dosage was found to be 200mg of nanofibre and 200 RPM gives the best removal percentage of 83.3%.

Keywords: Adsorption, Arsenic, Chitosan, Electrospinning.

*Corresponding author

Paper Acceptance ID. 43

**Analysis of Pesticide Residues in Selected Vegetables, Surface Water
and Groundwater in the Vicinity of Tehsil Mehrabpur District
Naushahro Feroze**

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Abstract. This work is done with the purpose of determining residual concentration of organophosphorus pesticide (Chlorpyrifos) in vegetables (Okra, potato), surface water and groundwater. Five samples of each vegetable, groundwater and surface water were collected randomly from eight union councils (UCs) of tehsil Mehrabpur district Naushahro Feroze. Pesticide residues were extracted and cleaned up using standard analytical methods USEPA 3510C and USEPA 3620C, respectively. In continuation to this, samples were analyzed through Gas Chromatography-Flame Ionization detector (GC-FID). Results showed that the residual concentration of selected pesticide was not more than maximum residual limit (MRL) in groundwater samples. Maximum value 16 μ g/L was found in UC5 while minimum was 3 μ g/L in UC2. Whereas, in surface water higher residual concentrations were observed having maximum and minimum values 91.2 μ g/L and 25 μ g/L, respectively. However, in vegetable samples 15% of okra and 20% of potato samples contained residual concentration within MRL values and rest were found with higher concentrations. The presence of such hazardous pesticides in vegetables is a serious threat to humans relying on them for food. Therefore, it is very much necessary to regulate the use of hazardous pesticides in recommended areas by conducting ongoing monitoring.

Keywords: Chlorpyrifos, Gas Chromatography, Vegetable, Water.

*Corresponding author

Paper Acceptance ID. 54

**A Sustainable Development Approach by Recycling Ablution Water - A
Case Study of Hyderabad Mosque**

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Abstract. Water is one of the most important resource and prime element responsible for sustaining the life on earth. However, its unbalanced and unmanaged use makes it scares. Due to natural phenomenon worldwide, the water quantity is decreasing. Pakistan is a country facing the issue seriously where per capita availability has decreased from 5260 m³ to 1050 m³ in few couple of years. To cope with the current and future water scarcity in Pakistan, we need to look for alternative water sources and work towards achieving high level of sustainability. One such alternative is the reuse of greywater generated from mosques during ablution. This research proposes a water recycling system for a mosque. For this purpose a mosque located in Hyderabad is selected. Quality of the used water after ablution is determined by laboratory tests. The sample were compared with WHO standards before and after ablution. The research concludes that, after sand filtration the used ablution water can be used for general cleaning, flushing and landscaping purpose etc. This would reduce much burden from national water budget.

Keywords: Ablution Water, Grey Water, Water Recycling, Wastages of Water.

*Corresponding author

Paper Acceptance ID. 55

**Production and Application of FeCl₃-Activated Carbon from
Agriculture Residue (Cotton Stalks) For the Synthetic Grey Water
Treatment in Combination with Sand Bed Filter**

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Abstract. Production of activated carbon (AC) from agricultural residue had gain more interest all over the world in recent years because of low-cost and easy availability. At the same time, grey water management is a fast arising issue, particularly in developing countries like Pakistan, who are facing improper waste water management as a maximum source for environmental pollution. Present study focuses on the application and efficiency of FeCl₃ based activated carbon, extracted from a low cost locally available annual agriculture waste (cotton stalk) through two stage pyrolysis process and a slow sand bed filter to treat synthetic grey water. The characteristics of activated carbon were analyzed through scanning electron microscopy (SEM) photos, X-ray diffracto meter (XRD), Fourier transform infrared spectra (FTIR) method, iodine number and methylene blue adsorption. Indus River were examined by sieve analysis. While the synthetic grey water samples were also physio chemically characterized before and after treatment, using parameters TDS, BOD, COD, TSS, Turbidity, pH, Oil and grease, and E.C.

Keywords: Activated Carbon, Agriculture Residue, Cotton Stalk, Synthetic Grey Water, Two Stage Pyrolysis.

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Paper Acceptance ID. 56

Preparation and Application of Rice Straw Based Activated Carbon for Synthetic Grey Water Treatment

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Abstract. One of the agriculture wastes of rice crop is rice straw which is best bio-sorbent in its natural state, having minor level of lignin while rich in silica. Rice straw is an agriculture waste produced from rice crop annually. This waste is almost four times higher as compare to rice husk, and its bulk quantity also goes as waste. It is cost effective and environment-friendly solutions by transforming negative-valued to valuable materials. The objective of this study is to investigate the efficiency of agriculture waste (Rice Straw) as filter with and without modification for the treatment of domestic synthetic wastewater. The purpose of this study was to identify the effectiveness of activated carbon and rice straw for the reduction of chemical oxygen demand (COD), biological oxygen demand (BOD), total dissolved solid (TDS), suspended solid (SS), turbidity, pH, Electric conductivity (EC) and oil and grease.

Keywords: Activated Carbon, Agriculture Waste, MgCl₂, Rice Straw, Synthetic Waste Water.

*Corresponding author

Paper Acceptance ID. 60

Comparative Study of Solar Inactivation of Total Coliforms through Ordinary Plastic Bottles and Fabricated Disinfection Setup

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Abstract. The water is disinfected through different techniques commonly used at domestic level. Methods may be chlorination, ozonation and ultraviolet disinfection etc. These methods require extensive amount of chemicals/energy sources including the trained manpower. Solar disinfection of drinking water found as best among all other disinfection technique. A series of experiments were conducted in order to characterize the bacterial inactivation process contained in fabricated disinfection setup. It consists of a stainless steel tub and glass covering, and transparent plastic bottles. In this study the role of solar radiation in bacterial inactivation process are compared in transparent plastic bottles and stainless steel tub to determine the performance of both by simulating conditions of solar radiation, turbidity, temperature, and exposure time. Results shown that disinfection of water in stainless steel tub and plastic transparent plastic bottles successfully inactivated total coliforms reduction about 80% and 70% respectively. Bacterial inactivation of solar radiation were observed even in highly turbid water (250 NTU). The results shows that the use of solar radiation to disinfect drinking water in transparent plastic bottles and stainless steel tub, both are found as best approaches for cost effective, promising and appropriate household water treatment technology for rural communities.

Keywords: Bacterial Inactivation, Solar Radiation, Total Coliforms, Water Treatment.

*Corresponding author

Paper Acceptance ID. 72

Fabrication of Co-Electrospinning Zein/Nylon Nanofibers for Anionic Dye Removal

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Abstract. Present study assess the applicability of zein/nylon, as a nanoadsorbent membrane for the selective anionic dye removal i.e., Acid blue 117, using batch adsorption method. Adsorption of anionic dye on zein/nylon was investigated under different parameter such as time, pH, concentration and adsorbent dosage. The composite membrane was synthesized through co-electrospinning process and characterized by SEM (Scanning electron microscopy) and FTIR (Fourier transform infrared spectroscopy) without any pre or post electrospinning treatment. Results showed that zein/nylon possess high adsorption efficiency for the removal of AB117 in just 10 min of contact and at normal working pH. Adsorption capability of zein/nylon was found to be 88mg/g of nanofiber. The adsorption kinetics for AB117 on zein/nylon fitted well to the pseudo-second order kinetic model.

Keywords: Anionic Dye Removal, Adsorption, Co-Electrospinning, Composite Membrane.

*Corresponding author

Paper Acceptance ID. 78

Three-Dimensional Fluorescence Analysis of Ground and Treated Surface Water of Hyderabad, Pakistan

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Abstract. Fluorescence spectrum technique has advantages of high sensitivity, high selectivity and quick-and-easy detection. The excitation-emission matrix (EEM) can provide abundant information. Fluorescence spectrum is unique for each water sample as the function of the type and concentration of dissolved organic matter (DOM) and is named as "fluorescence fingerprint". In the present paper, the excitation-emission matrix (EEM) was used to study the quality variability of ground and treated surface water supplied for drinking and other domestic purposes to different zones of Hyderabad city, Pakistan. The first typical peak was observed within the Excitation/Emission wave length range 235-250nm/400-425nm (associated with Fulvic acids) and second in the region of 220-230nm/295-340 nm (Aromatic proteins). The groundwater samples were observed to have higher fluorescence intensity than that of treated surface water which indicates a significant presence of fluorophores and can be traced to obtain pollution type and source information.

Keywords: Aqueous Fluorescence Fingerprint, Contamination, Water Monitoring.

*Corresponding author

Paper Acceptance ID. 85

Designing Off-Grid & On-Grid Electricity Generation with Renewable Energy Technologies for IEEM MUET Jamshoro by Using HOMER Software

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Abstract. The limited amount of fossil fuel, increasing demand of energy and global environmental issues of electricity generation is the main consideration for exploitation of renewable energy resources (RE). Improvements in photovoltaic technologies and wind turbine generators have given different opportunities for utilizing these renewable resources for electricity generation. The purpose of this paper is to audit the energy demand, optimization, economic viability of system and evaluation of designs for both off-grid and on-grid connected power systems for a range of applications and in order to know accurate and exact cost of solar and wind energy system with the help of Homer (Hybrid Optimization Model for Electric Renewable) software. The software developed by National Renewable Energy Laboratory (NREL), USA. It used for the economically, clean power and optimum utilization of renewable energy sources for Institute of Environmental Engineering & Management MUET Jamshoro.

Keywords: HOMER, Hybrid System, Renewable Resources, Optimization.

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Paper Acceptance ID. 90

Preliminary Evaluation of Smart and Sustainable Water Distribution Systems in the Gambia

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Abstract. An estimated one-third of hand pumps in rural sub-Saharan Africa are non-functioning at any one time because of lack of upkeep. Citizens are left without access to clean drinking water and this has multiple knock-on developmental impacts. An innovative ‘e-Tap’ based water pre-payment technology and management system, in operation in The Gambia since April 2016, cycles revenue back into operation and maintenance and collects accurate and real-time data on consumption and tap failures. Preliminary research has begun on evaluating this innovation. Technical tests were conducted to examine the efficiency of the e-Tap under varying conditions. Water use trends were then analysed using the cloud-collected data transmitted from operational e-Taps. Further, a baseline survey to investigate social parameters was undertaken on 20 user households. This exploratory research shows the e-Taps to work efficiently in the lab and The Gambia with negligible failures, and to reduce distances users must travel for clean water and time they spend collecting.

Keywords: e-Tap, Innovation; Rural Water Supply; Smart Technology, The Gambia.

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Paper Acceptance ID. 91

Optimal Design Approach of Solar Powered Rural Water Distribution Systems in Developing Countries

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Abstract. In many rural parts of the developing world reliable access to clean water and electrical power is constrained. In this study, methods of integrating estimations of power outputs from solar photovoltaic arrays into gravity-fed water distribution network modelling are investigated. The effects of powering a rural water distribution system that is replenished with groundwater pumps that use solar power, and the effect of this on other network design decisions, are investigated. A rural community of an estimated 2,800 people with 28 standpipes from a borehole was chosen to develop the optimizations. The water storage tank and pipework were the focus on the water distribution system. EPANET and generic algorithms were used to run network optimization simulations of water tank location, elevation and volume; pipe diameter and configuration; and optimal system design in terms of cost. Different scenarios were included producing supply, demand and required water storage curves, which could have practical application for rural water distribution system design. Indicative costs for theoretical water distribution networks for rural communities in THE Gambia were generated.

Keywords: EPANET, Network Optimization, Photovoltaic, Rural Water Supply, The Gambia.

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Paper Acceptance ID. 97

Potential of Bio-Ethanol from Waste Bread

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Abstract. Pakistan's energy infrastructure, policy and demand plan are in construction phase; recently Pakistan has been suffering from huge energy crisis. No any well-thought-out policy have been introduced commercially to overcome the ever-growing energy crises. This research is based on, to figure out how much bio ethanol can be produced from the waste bread used in market. Research is based on lab work, each bread had at least two products one sweet (milky) and other simple (plane). Two samples (sweet and simple) were selected and passed through five steps namely pre-treatment, liquefaction, saccharification, fermentation and distillation. Two enzymes alpha amylase and glucoamylase were used to break down the starch. And for fermentation dry instant yeast or *Saccharomyces cerevisiae* was used. It was concluded from results that waste bread has significant potential for the production of bio-ethanol as a source of green energy.

Keywords: Bio-Ethanol, Fermentation, Green Solution, Waste Bread.

*Corresponding author

Paper Acceptance ID. 102

Context Specific Upscaling of a Hybridized-Submerged Aerated Filter (HySAF) Wastewater Treatment System in Developing Countries

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Abstract. As part of Project Saraswati, an EU-Indo collaboration developed to tackle real water issues faced by modern India, the HySAF bioreactor was trialled as a candidate EU-proven technology for the treatment of wastewater. This technology was chosen for its advantage in areas of limited land availability due to its increased throughput potential. The HySAF, which is based on Integrated Fixed-Film Activated Sludge (IFAS) technology, demonstrated promising results during trials treating actual municipal wastewater in Rishikesh, India. Average removal efficiencies of key parameters detrimental to water quality were reported to be between 88-92%, although the removal of phosphorus was observed to be inadequate at only 50%. Further work will now investigate potential design and operation enhancements that may reduce the high energy demand associated with this technology, improve treatment performance of all key parameters and improve resilience to environmental change such as toxic or quantitative shock loading that may otherwise lead to system failure. These objectives will be achieved through a combination of kinetic modelling, computational optimization, and rigorous testing of alternative design and operational values at bench-scale. Enhanced features are then to be translated at pilot-scale in India as a means of further validation.

Keywords: BPR, Energy-efficiency IFAS, Optimization, Shock Loading.

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Paper Acceptance ID. 113

Environmental Management of Open Dug Wells Using GIS and Remote Sensing Technique in Taluka Mithi Tharparkar

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Abstract. A precise assessment of groundwater is essential for the best possible usage and management of these valuable natural resources. Spatial varieties in groundwater quality in the Taluka Mithi Tharparkar, have been studied utilizing geographical information system (GIS) and remote sensing (RS) procedure. The land utilizes maps, geological and soil maps utilized for connection between the geographical formation, land use and soil classes to understand the source of contamination that can bring down the groundwater quality. For this research, the global positioning system (GPS), utilized as a part of the field to distinguish the borehole location in a three-dimensional coordinate (Latitude, longitude, and altitude). The dug wells water samples were collected from 6 villages of taluka Mithi, 25 dug wells samples analyzed for physicochemical parameters like pH, electrical conductivity, Fluoride, Total dissolved solid, utilizing standard methods in the laboratory and compared with the standards. The open hand dug wells quality maps of the whole study area have been prepared to utilize spatial interpolation technique for all the above-analyzed parameters. Then the maps used to envision, analyzed, and comprehend the relationship among the measured points. Mapping was coded for consumable zones, non-consumable zones in the study area, regarding water quality suitability for drinking water and suitability for irrigation purposes. All in all, satellite remote sensing (RS) in conjunction with geographical information system (GIS) offers incredible potential for water resources improvement and management.

Keywords: Dug Wells, Water Quality, GIS, Spatial Interpolation, Satellite Image.

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Paper Acceptance ID. 117

Reduction in Climatic Changes through Vegetation: An Empirical Study of Hyderabad Pakistan

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Abstract. Global warming is increasing rapidly due to various causes, major being the presence of vast amount of carbon dioxide (CO₂) in atmosphere. As we burn fuel and cut down our forests, carbon dioxide further takes over in atmosphere. On the other side, vegetation in urban areas of Pakistan is much lesser than the required amount, thus supporting the climatic changes. Nature is life, sorting out this issue by the use of nature is a wise decision. Natural approaches like vegetation can contribute to decrease the level of CO₂ in atmosphere. This research work aims to provide guidelines to reduce the effect of current climatic changes and keeping the atmospheric temperature controlled for Hyderabad city. The author conducted a survey and multi unstructured interviews with environmental experts of Hyderabad city. The research proposed solutions of increasing climatic changes issues by provision of urban vegetation. The study promotes the need of vegetation in urban area of Pakistan. This research is helpful for policy makers to utilize their efforts on this most untouched issue of the country.

Keywords: City Atmospheric Temperature, CO₂ Causes and Effects, Hyderabad City, Pakistan, Urban Vegetation.

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Paper Acceptance ID. 134

Analysis of Groundwater Quality for Drinking Purpose in Hyderabad Sindh

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Abstract. Safe drinking water is a basic need for good health. The study was carried out for groundwater quality sampling in Hyderabad urban areas. In this connection, three different regions were selected and total numbers of 20 water samples were collected. Different physico-chemical parameters were measured in the laboratory. The pH, EC, TDS were measured through YSI instrument. Total hardness (CaCO_3), Total alkalinity, Chloride and Fluoride were measured by color change test strips. However, the Arsenic was determined by using Arsenic Kit. The results revealed that pH varies from 7.02 to 8.03, EC 662 to 17674 $\mu\text{S}/\text{cm}$, TDS 487.5 to 10160 mg/L, total hardness 245 to 425 ppm, total alkalinity 190 to 240 ppm and Arsenic 0.1 to 0.01 mg/L. It concludes that out of 20 samples only 9 samples are suitable and can be used for drinking purpose having TDS value within permissible limit (less than 1000 mg/L) and EC less than 1700 $\mu\text{S}/\text{cm}$. This analysis also revealed that about 55% of groundwater samples confirm not to be used due to crossing the maximum permissible limits prescribed by WHO and National Standards for Drinking Water Quality (NSDWQ) standards. Therefore, the groundwater of Hyderabad city may not be considered completely safe for dinking purpose. Keeping in view the limited number of samples and rapid urbanization in Hyderabad, it is suggested that samples from other areas should be tested for water quality analysis before use for drinking purpose.

Keywords: Groundwater, Hyderabad Sindh, Physico-Chemical, Water Quality Parameters.

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Paper Acceptance ID. 147

Health & Environmental Issues to Society: A Case Study of Hyderabad Vegetable Markets

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Abstract. The vegetable and fruit, a part of our dining table, through a chain of processes finally reaches at vegetable markets. The lack of awareness in planning & designing and unhygienic conditions of vegetable markets cause various health & environmental issues to society. The study unfolds the current situation of Hyderabad vegetable markets and provides sound solutions for better planning & designing to minimize the rising health issues due to present market condition in the city. To investigate the health & environmental issues, a case study was conducted on different vegetable markets of the city. This research consists of multiple personal interviews from the staff, local public, top management & stakeholders of market. The research concludes that current situation of market is very ill and lacking several basic facilities. Disposal of waste, highly polluted effluent and a huge bundle of rotted vegetable and fruit discharge in open atmosphere poses numerous health & environmental issues in the city. The research recommends that a properly planned & designed vegetable and fruit market can reduce various risks of human diseases and also the environmental pollution by providing hygienic goods to the society & safe disposal of its wastage.

Keywords: Health & Environment, Hyderabad, Public Issues, Vegetable Market.

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Paper Acceptance ID. 150

Representation of Septic Tanks in Storm Water Management Model (SWMM)

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Abstract. Worldwide, there are many households that are not connected to centralized sewer systems. This is due to population growth and urbanization which have resulted in overwhelming the capacity of existing sewerage systems. Other factors are people's preferences, non-availability of resources to construct sewer systems to all residential areas. Especially in rural areas which are sparsely populated, and problems related to poor connection to centralized sewer systems particularly relevant in developing economies such as Sirte city of Libya. Septic tank systems are used commonly for treating domestic wastewater and an essential part of decentralized wastewater management systems. Many studies have considered septic tanks in terms of their design, performance and their impact on the environment. However, there is no study that has modelled septic tanks to test their performance for the removal of biochemical oxygen demand (BOD) and total suspended solids (TSS). This paper presents the approach to model septic tanks using the Stormwater Management Model (SWMM). Moreover, in this paper the performance and efficiency of septic tanks to reduce pollutants in the wastewater will be tested by comparing the removal of pollutants by septic tanks with one and two compartments.

Keywords: Centralized and Decentralized Sewerage System, Performance, Septic Tanks, Sirte, SWMM.

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Paper Acceptance ID. 154

Deployment of Greywater Reuse Systems in Residential Buildings

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Abstract. The adoption of water conservation measures in urban areas is a fundamental practice to guarantee the sustainable development of society. Among the various conservation measures, the implementation of greywater reuse systems in residential buildings for non-potable uses is a particularly interesting practice because of the already applied technology in conventional sewage treatment, recognized as being efficient. However, for the implementation to happen in a harmonic way, a detailed study on the interface of the treatment systems to the building systems is necessary, as well as an efficient interaction with the architecture and the structure of the building, guaranteeing conditions to implantation, operation and maintenance of the reuse systems. This paper presents application characteristics of greywater reuse systems in residential buildings, as well as some of the main aspects involved between building design and reuse systems. The analysis and compatibilization of projects designed to three different projects of a construction company allowed to write a list of recommendations to be observed in the design phase, in order to guarantee adequate conditions to the implementation, operation and maintenance of reuse systems.

Keywords: Building Systems, Greywater, Reuse, Sustainable Buildings.

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Paper Acceptance ID. 159

Removal of Ammonia Nitrogen from Greywater through Biological Treatment

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Abstract. The demand for water is increasing with the urbanization, industrialization and population growth. Innovative ideas and technologies are urgently needed to meet the requirement of water. Among the alternatives of water resources, greywater treatment and recycling is receiving vital attention for decentralized areas. Rotating Biological Contactor (RBC) is biological treatment process which removes dissolved as well as suspended organic matters. The RBC system comprises of rotational discs which allow the greywater to interact with a biological film to remove biodegradable constituents in greywater before discharge to the environment. The main purpose of this study was to analyze efficiency of RBC in treating synthetic greywater and effect of rotational speed on the removal of Ammonia Nitrogen. Ammonia exists in two forms in the water, i.e. unionized ammonia and ionized ammonia. Together, these two forms of ammonia are called total ammonia nitrogen.

Keywords: Grey water, Recycling, Waste Water, RBC.

*Corresponding author

Paper Acceptance ID. 161

A Case Study for Analyzing the Ambient Air Quality of Karachi Industrial & Residential Area

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Abstract. Atmosphere is collection of complex and dynamic gases which supports life on the planet earth. Sulfur Dioxide (SO₂) is colorless gas with a strong suffocating odor which primarily occurs due to combustion of coal, fuel oil, and diesel fuel. Burning of Diesel and Heavy Furnace Oil (HFO) are also main sources of Sulfur Dioxide. Many factories still use diesel or HFO as a fuel in Industrial processes. When sulfur containing fuel is combusted, it produces sulfur dioxide at high temperature. The Sulfur Dioxide goes directly into the atmosphere and remains suspended for days allowing for wide distribution of air pollutant. This study has focused on two main parameters i.e, Sulfur Dioxide (SO₂) and Carbon Monoxide (CO). These parameters were monitored at two stations simultaneously which were 15 kilometers apart , and data was collected for six months and performed in an Industrial Area of Korangi and residential area of North Nazimabad, Karachi. The results of ambient air quality show that the level of Sulfur dioxide observed within the range from 10 µg/m³ to 30 µg/m³ at North Nazimabad and 45 µg/m³ to 63 µg/m³ at Industrial area Korangi. The Results of CO show that Korangi industrial area range is 0.7 mg/m³ to 3.0 mg/m³ and North Nazimabad 0.3 mg/m³ to 1.0 mg/m³ contributed Carbon Monoxide in the atmosphere of the Karachi.

Keywords: Ambient Air, Air Pollutants, Carbon Monoxide, Sulfur Dioxide.

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Paper Acceptance ID. 162

Analysis of Groundwater Contamination Using Electrical Resistivity & GIS Techniques in a Typical Mine Area of Tharparkar

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Abstract. Present study is conducted to assess the groundwater availability in Thario-Halepoto, Tharparkar, according to various groundwater zones. Survey of Thario-Halepoto was done to prepare various thematic maps viz. electrical resistivity, physical & chemical parameter of water, soil minerals analysis and were transformed to raster class data using feature to raster converter tool in Arc-GIS. Geo-electrical resistivity survey technique was used to assess the potential of water layer. The resistivity meter (PASI Model 16GL-N) was used to collect the vertical electrical sounding (VES) resistivity data at sites. For this purpose, the Schlumberger electrode configuration was followed. The collected data were interpreted in terms of resistivity and the outputs were verified using bore hole data. The bore hole data of lithological and groundwater samples were collected from ground surface at different depths with an interval of 2m. The combination of VES data with borehole data provided useful information on subsurface hydro-geologic conditions. It was observed that geo-electrical resistivity of the layers containing groundwater ranged between 1 to 500 Ω m resistivity and VES criteria of fit groundwater quality for aquifer resistivity values of 45 Ω m was valid for the sites. The results indicate that VES survey has the potential to identify the layer containing water and quality of groundwater depth.

Keywords: Groundwater Zone, GIS, VES (Vertical Electrical Sounding).

*Corresponding author

Paper Acceptance ID. 164

**Performance Assessment of Aquatic Plants in GROW System for
Greywater Treatment in Hot Climate Jamshoro**

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Abstract. The main purpose of this study was the assessment of treatment performance of local Plants species grown in "GROW System", treating onsite greywater. A Pilot scale study was conducted at Teacher's hostel (male), Mehran University of Engineering & Technology, Jamshoro. Four aquatic plant species as Rice (*Oriza/satival*), Water Hyacinth (*Eichhornia crassipes*), River Lily (*Crinum pedunculatum*) and Corsicant mint (*Mentha requienii*) were implanted systematically row wise in GROW system. Hydraulic Retention Time (HRT) was 0.972 d^{-1} and Hydraulic loading rate (HLR) was maintained as 0.130 m.d^{-1} . The study results showed that corsicant mint (*Mentha requienii*) plants, grown in 5th row performed better and removed pollutants were COD, BOD₅, and TSS (average +S.D) $55.5 \pm 15.4\%$ with ranged (21-77.7 %), $42.3 \pm 12.6\%$ ranged (21-62.5 %), $31.0 \pm 13.4\%$ ranged (21-48.4%) respectively during the study period. The overall GROW system Performance (combined effect of four plant species) was also evaluated and found as average removal 93.5 %, 81.7 %, 81.6 % for COD, BOD₅ and TSS respectively from eleven runs. The influent and effluent temperature of greywater was $18-27 \pm 2^\circ\text{C}$ and $20-25 \pm 1^\circ\text{C}$ respectively during the monitoring period.

Keywords: Aquatic Plants, BOD, COD, Greywater, GROW System.

*Corresponding author

Paper Acceptance ID. 170

Effect of pretreatment on Biosorption of Chromium by Macroalgal Biomass

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Abstract. Application of biosorbents for the removal of heavy metals from wastewater has revealed huge potential of algae for biosorption. The dried biomass of native macroalgae was used as biosorbent for removal of chromium from wastewater. Macroalgal biomass without pretreatment was compared with six different pretreatment methods namely 0.1 HCl, 0.2 HCl, CaCl₂, NaOH, Na₂CO₃ and hot water. The objective of pretreatment was to enhance biosorption capacity of algal biomass. Maximum removal efficiency was 57%, 57%, 47%, 31%, 24%, 2% and 2% for untreated, CaCl₂, Na₂CO₃, NaOH, 0.1N HCl, hot water and 0.2N HCl, respectively. From this study it was concluded that CaCl₂ pretreatment and untreated methods were most suitable for the removal of chromium from synthetic wastewater.

Keywords: Chromium, Macroalgae, Pretreatment, Wastewater.

*Corresponding author

Paper Acceptance ID. 171

**Enhancement of Native Algal Biosorption Capacity for Lead by Using
Different Pretreatment Methods**

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Abstract. The use of biosorbents for heavy metal removal has shown enormous potential of algae for biosorption. The dried biomass of macroalgae was used as biosorbent for removal of lead (Pb) from wastewater. The algal biomass was treated with 0.1 HCl, 0.2 HCl, CaCl₂, NaOH, Na₂CO₃ and hot water. The biosorption efficiency was compared with untreated biomass. Maximum biosorption efficiency was 92%, 73%, 55%, 42%, 35%, 21% and 15% for CaCl₂, untreated, NaOH, hot water, 0.1 N HCl, Na₂CO₃ and 0.2N HCl respectively. From our current study it was concluded that CaCl₂ pretreatment was most suitable for the biosorption of lead from wastewater.

Keywords: Biosorption, Lead, Macroalgae, Pretreatment, Wastewater.

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Paper Acceptance ID. 172

Optimization of Copper Sorption from Wastewater by Native Macroalgae

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Abstract. The dried biomass of macroalgae was used for removal of copper from wastewater. The removal efficiency of macroalgal biomass was increased by treating algal biomass with 0.1 HCl, 0.2 HCl, CaCl₂, NaOH, Na₂CO₃ and hot water. The biosorption efficiency was compared with untreated biomass. Maximum removal efficiency was 36%, 26.98%, 18%, 17.62%, 12.84%, 3.1% and 3.02% for hot water, Na₂CO₃, untreated, 0.1 N NaOH, 0.2N HCl, 0.1N HCl, and CaCl₂, respectively. From our current study it was concluded that hot water pretreatment method was most suitable for the removal of copper from wastewater.

Keywords: Copper, Macroalgae, Pretreatment, Wastewater.

*Corresponding author

Paper Acceptance ID. 173

Role of Pretreatment in Increasing Adsorption of Mercury On to Dry Biomass of Native Macroalgae

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Abstract. In the present study, a native macroalgae was used as an inexpensive and efficient biosorbent for mercury removal from wastewater. The algal biomass was pretreated with six different methods namely 0.1 HCl, 0.2 HCl, CaCl₂, NaOH, Na₂CO₃ and hot water for enhancing the removal efficiency of mercury from synthetic wastewater. The biosorption efficiency was compared with untreated biomass. Maximum biosorption was 49%, 39%, 37%, 37%, 31%, 31% and 18% for NaOH, hot water, CaCl₂, Na₂CO₃, 0.1 N HCl, 0.2N HCl and untreated algae respectively. From current study it was concluded that NaOH pre-treatment was most suitable for the removal of mercury from synthetic wastewater.

Keywords: Mercury, Macroalgae, Pretreated, Wastewater.

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Paper Acceptance ID. 174

The Influence of Nutrients Limitations, Light/Dark and CO₂ on Lipid/Carbohydrate Production in *Dunaliellatertiolecta*

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Abstract. *Dunaliellatertiolecta* (*D. tertiolecta*) cells were exposed to stress conditions in order to improve their lipid/carbohydrate contents. The optimum nutrients, salinity, and light/dark conditions which enhances lipid/carbohydrate yield were determined. The Maximum lipid productivity of (146.68 mg/L/d) was observed under a relatively low salinity of (17.5 ‰), 5% CO₂ and dark condition. While under CO₂, salt and light deprived conditions the maximum carbohydrate productivity (202.56 mg/L/d) was achieved. High yields of both lipid and carbohydrate productivity of 162.8 mg/L/d and 165.87 mg/L/d respectively were achieved during salt variation, 5% CO₂ and dark. The carbohydrate productivity was better than that reported in other studies.

Keywords: Carbohydrate, *Dunaliellatertiolecta*, Lipid, Productivity, Stress.

*Corresponding author

Paper Acceptance ID. 175

Utilization of Native, and Pretreated Macroalage Biomass for Biosorption of Nickel

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Abstract. This paper discusses the heavy metal nickel, its sources and human health impacts. Its sources being both natural and man-made, exposure can be varied through every medium including air, water, soil, food including as well as plants and fertilizers. The health impacts may include diseases like dermatitis, eczema and lichenification; severe exposure causing lung and nasal cancer. Acute toxicity of nickel varies with amount and time period of exposure. Primarily lung lesions, decreased lung function, immunotoxicity, cardiac arrest, hemodialysis and hypersensitivity are some results of such exposure. Common symptoms are nausea, vomiting, diarrhea, giddiness, lassitude, headache, and shortness of breath. Overall impacts may include reproductive and developmental toxicity as well. This review summarizes all the health hazards associated with nickel exposure.

Keywords: Macroalgae, Pretreatment, Wastewater.

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Paper Acceptance ID. 176

Pretreatment of Native Alga Biomass for Enhancing Cobalt Biosorption

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Abstract. Native macroalgae was used for biosorption of cobalt from wastewater. Macroalgal biomass without pretreatment was compared with six different pretreatment methods namely 0.1 HCl, 0.2 HCl, CaCl₂, NaOH, Na₂CO₃ and hot water. The objective of pretreatment was to enhance biosorption capacity of algal biomass. Maximum removal efficiency was 53%, 42%, 39%, 31%, 29%, 15% and 13% for Na₂CO₃, CaCl₂, NaOH, untreated, hot water, 0.1 N HCl and 0.2N HCl respectively. From our current study it was concluded that Na₂CO₃ pretreatment was most suitable for the removal of cobalt from synthetic wastewater.

Keywords: Biosorption, Cobalt, Macroalgae, Pretreatment, Wastewater.

*Corresponding author

Paper Acceptance ID. 178

Sources and Impacts of Heavy Metals: A Case Study of Civil Hospital Hyderabad

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Abstract. Heavy metal contamination is the emerging issue nowadays due to human and industrial activities. Humans are being exposed to heavy metals through different pathways such as ingestion, inhalation and skin contact. Humans are unaware about the sources of heavy metals contamination, that's why different diseases become a part of human life. Heavy metals are also known as carcinogens according to United States Environmental Protection agency (USEPA). In this paper, a case study of Civil Hospital Hyderabad has been considered. The aim of this paper is to analyze the sources and impacts of heavy metals that causes chronic diseases in humans. The first section of this paper is focused on the explanation of heavy metals, its sources, pathways and impacts. The second section is focused on the unstructured interviews and questionnaire survey of civil hospital Hyderabad. The third section is focused on the findings of the survey. All of these sections are followed by the conclusion.

Keywords: Heavy Metals, Impacts, Occurrence, Pathways.

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Paper Acceptance ID. 182

Empirical Effect of Different Hydraulic Retention Time on the Removal of BOD & COD through Rotating Biological Contactor

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Abstract. Paired t-test is a special technique called randomized block design provides the method for comparing two population means. This procedure determines the probability distribution of the random variable. In the present study paired t-test is used to compare the population means of the Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). The BOD and COD taken from Rotating Biological Contactor (RBC) at different Hydraulic Retention Time (HRTs) i.e. 2 hours (0.42 l/min), 2.5 hours (0.33 l/min) and 3 hours (0.28 l/min) respectively with 9.78 m² discs surface area. The Box plots and mean values revealed that the removal % of BOD₅ is much better than the removal % of COD at all HRTs. Study revealed that RBC is much affected technique for removal of BOD₅ than COD. Computed values of paired t- test statistic are 6.61, 5.83 and 15.98 and all these three t-value are > the $t_{\alpha/2, n-1} = 2.262$, that's why reject all three null hypothesis H₀.corresponding p-values are less than even 0.01, while level of significance was 0.05, as it is a sufficient evidence to indicate that the removal % at all HRTs is not same.

Keywords: BOD, COD, HRT, RBC, t-Test.

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Paper Acceptance ID. 183

Comparison of Wall Materials Used for the Construction of Efficient Building in Hyderabad Pakistan

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Abstract. Efficient building construction is one of the important concerns nowadays. All around the world, buildings sector utilizes 40% of the total energy consumption. Higher energy consumption causes environmental degradation along with depletion of conventional energy resources and can burden the whole economy. The aim of our research is to compare different materials used for wall construction in Hyderabad Sindh, Pakistan and to investigate a suitable material for efficient building construction. A simulation software `Energy Plus` is used to determine zone air temperature and inside surface face temperature of the building by providing the 3D model of the building and other parameters like weather conditions, topographical values, and material specification. The result shows that zone air temperature of the building constructed by fire red brick is lower as compared to other materials, which means it has less tendency of heat transfer than other materials. So, building constructed by using material is likely to move towards sustainable development.

Keywords: Efficient Buildings, Sustainable Development, Construction Materials.

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Paper Acceptance ID. 187

Sustainable Treatment of Emerging Pollutants in the Context of India

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Abstract. Emerging pollutants have been increasingly studied over the past decade to improve our understanding of their fate, occurrence and toxicological effects on the environment and human health. The aim of this research is to develop a model that calculates the removal of emerging pollutants in India using different treatment unit processes. Different wastewater treatment scenarios based in India were defined considering several variables and factors including: influent water quality, intended use of effluents, available resources, operational envelop and treatment efficiency of technologies. WiSDOM Tool was used to find optimal wastewater trains/packages for treatment keeping in view technical, environmental, social and economic aspects. The tool also evaluates the performance of each optimal solution in terms of removal of current pollutants (such as BOD, COD, TN, TP, FC etc.) using multi-objective genetic algorithms and multi-criteria decision analysis. An Excel spreadsheet model was developed, where the treatment trains (generated/selected by the WiSDOM tool) were passed through to determine the removal efficiency of emerging pollutants. Each emerging pollutant has different physical and chemical properties and therefore, each compound should be monitored separately to generate the optimum removal. Further research is required to bridge the knowledge gap regarding emerging pollutants and their removal during treatment.

Keywords: Emerging pollutants, Pharmaceuticals, Wastewater treatment, Wisdom.

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Paper Acceptance ID. 199

Evaluation of Boron & Other Physicochemical Parameters in Groundwater of Tandojam Town

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Abstract. The aim of this research work is to analyze groundwater for determination of physicochemical parameter and compare those parameter with WHO guideline values. The groundwater samples were fetched from different locations of Tandojam. Locations included Pakistani Chowk, Garibabad Colony, Shahi bazaar, Meer colony and Sindh Agriculture University Colony. Mostly sample were acquired through groundwater pumps. A physicochemical analysis was conducted for collected samples in order to determine its quality and suitability for usage. According to results the TDS value of Pakistani chowk was high and which was around 4000 parts per million (ppm). Which shows the quality of water from Pakistani Chock is not well but TDS of SAU colony was within limit. In Garibabad colony, Shahi Bazar and Pakistan Chock, the condition of water is very displeasing because samples from these areas contain salty test followed by high level of TDS value. Other physicochemical parameters, such as chloride, sulphate, boron and hardness, were also exceeding WHO guideline values. This poor situation of groundwater has already drifted the spread of many water borne diseases, such as diarrhea and cholera. Furthermore, the samples from only two places were found within WHO limits. Those were University Colony and Meer colony where water is considered suitable for drinking and other domestic usage.

Keywords: Boron, Groundwater, Physicochemical.

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Paper Acceptance ID. 201

Value Addition to Fixed Dome Biogas Plant to Anaerobic Digestion

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Abstract. This study was carried out to analyze value addition of digested slurry from an-aerobic digestion fixed dome bio-gas plant. Dung source for plant is buffalo manure which is a major source of bio-gas production and dried digested slurry is used as bio-fertilizer, because of rich nutrient content such as nitrogen, phosphorus, potassium (NPK) which is economically beneficial along with less solid waste generation. The average feeding per day of fresh dung with water is observed 24:24 ratio with total 48kg per day. To identify moisture content (M.C), total solids (T.S), volatile solids (V.S), fixed solids (F.S) experimental work result shows that the average of (M.C), (T.S), (V.S) and (F.S) from fresh dung and digested slurry, were observed as (fresh dung=85.68%, 14.314%, 84.57%, 15.42%), (digested slurry= 93.836%, 6.15%, 66.997%, 33.00%) respectively. The average pH and alkalinity of fresh dung and digested slurry observed as (fresh dung= 7.511, 2402.66mg/l), (digested slurry=7.689, 2810mg/l). The average NPK ratio content fresh dung, digested slurry and after dried observed as (fresh=30.61mg/l, 17.60mg/l, 22.97ppm), (digested=34.74mg/l, 23.36mg/l, 32.68ppm), (dried= 98.82mg/l, 72.76mg/l, 51.97ppm). Output of digested slurry is 16 kg in cloudy weather and in hot weather is 44 kg per day. Value addition of 44 kg digested slurry when dried as of vermi-compost then remains 17 kg that can be sell about 59.50 Rs. per day. This is additional earning after bio-gas production with less environmental damage.

Keywords: Fixed Solids, Moisture Content, Total Solids, Volatile Solids, pH.

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Paper Acceptance ID. 205

Refuse Derived Fuel Production from Hyderabad Municipal Solid Waste

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Abstract. Municipal solid waste management and global warming are the most critical problems that humankind is facing. Both are increasing due to the rapid increase of population, industrialization and urbanization. This study aims to reduce greenhouse gases, waste management and encourage the use of renewable energy sources. In this regards the Refuse Derived Fuel (RDF) production and utilization contributes the positive impacts on global warming and local environment. Due to the lack of information regarding the RDF there is still not a single plant of RDF in Pakistan. Therefore, this study aims to provide information about RDF users, production process, characteristics and driving mechanism. Four main users of RDF were investigated namely cement industry, brick kilns, bangles industry and steel re-rolling mills. Field data was collected to find out the RDF characteristics and compared with RDF users. The results illustrate that the cement industry and brick kilns have positive opinion to use the RDF. Cement industry can use the RDF 35709t/y and 20 brick kilns out of 105 have requirement of 4277.707t/y RDF while the others users which are not ready to use RDF because of some issues which are discussed in study. Bangles industry have capacity of 1019.06t/y and steel re-rolling require 1305.602t/y. The total RDF is generated from the Hyderabad MSW is 220752 tons per year so the RDF will be available in sufficient amount to fulfil the industries in Hyderabad city and also we can supply it to other industries.

Keywords: RDF, MSW, Energy Recovery.

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Paper Acceptance ID. 207

Comparing Effects of Leachate Circulation on Mixed Municipal Solid Waste and Organic Fraction of Municipal Solid Waste

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Abstract. Landfilling is a leading option in waste management series in developing nations. It generates leachate, which has the potential of polluting the watercourses as well as groundwater quality. Leachate is an important pollution factor, resulting from anaerobic digestion in landfills. This research is based on effects of leachate re-circulation on mixed municipal solid waste and organic fraction of municipal solid waste. This study was carried out by using two lab- scale landfill bioreactors containing approximately 100 kg of waste in each, which left for waste degradation up to 16 weeks. Physical characteristics of mixed municipal solid waste are: organic waste 44%, paper waste 7%, wood waste 4%, yard waste 12%, metal 2%, glass 6%, polythene bags 7%, plastic waste 4%, rubber waste 2%, lather waste 1%, textile waste 4% and miscellaneous **waste** 7%. Other 100 kg waste is total organic waste for landfilling. The main difference between mix municipal solid waste and organic solid waste bioreactors options are determined in terms of leachate quality. Leachate quality is measured quantatively in terms of pH, VFA and chemical oxygen demand (COD). It has been observed that leachate generation and recirculation is more effective in anaerobic degradation of organic solid waste than mix municipal solid waste. After 16 weeks of anaerobic degradation, waste stabilization seems to have reached for the organic municipal solid waste bioreactor. Therefore, further studies required to determine the optimum operational conditions for leachate recirculation rates. And the operational costs of recirculation for solid waste stabilization.

Keywords: Chemical Oxygen Demand, Landfill, Leachate, MSW, Re-Circulation

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Paper Acceptance ID. 209

Preparation and Characterization of FeCl₃-Based Activated Carbon Obtained from Cotton Ginning Trash

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Abstract. An economically efficient adsorbent was produced by converting cotton ginning trash (CGT) into activated carbon through two stage pyrolysis process using FeCl₃ as an activating agent. Initially, cotton gin trash was passed through mesh size ranging from 0.185in to 0.0328in and then washed with double distilled water to remove dirt impurities. The washed material was oven dried for 8 hours at about 110°C. Later washed CGT was charred at 550°C for 1 hour. The charcoal obtained in pervious step was soaked in the solution of activating agent FeCl₃ with impregnation ratio of 1:1 and then oven dried at 110°C for 8 hours. In the last step, charcoal was activated at 650°C for 2 hours in an inert atmosphere. The characterization of freshly extracted FeCl₃-Activated Charcoal was examined through several analysis, including Fourier Transform Infrared (FTIR) Spectroscopy to analyze the functional-groups present on surface of activated charcoal, and X-Ray Diffraction (XRD) to observe the modification in crystalline structures. Furthermore, Iodine adsorption and Methylene blue adsorption were carried out to measure the number of micro and medium size pores. In addition, ash content was also obtained.

Keywords: Activated Carbon, Adsorbent, Biomass, Cotton Ginning Trash.

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Paper Acceptance ID. 210

High-Resolution Domestic Water Consumption Data – Scope for Leakage Management and Demand Prediction

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Abstract. Challenges such as water scarcity and ever-increasing demand put an additional strain onto water distribution networks. Better asset management through leakage mitigation and demand forecasting can offset the current and future implications of these challenges. This paper shows how new high-resolution logging (e.g. 1 liter ticks) is able to enhance traditional methods of investigating leakages (e.g. minimum night flows) and instantiate novel methods for demand prediction (through micro-component analysis). Machine learning or other statistical analytical techniques **coupled** with the high-resolution data can be used in an adaptive way for leakage detection and demand forecasting. As a proof of concept, this paper investigates example datasets obtained from a UK based water company. The analyses suggest that it is possible to: extrapolate leakage from night flow time series data; predict water consumption patterns for different types of households and create consumption profiles based upon water user characteristics/behavior.

Keywords: Demand Forecasting, Leakage, Micro-Component Analysis, Water Distribution.

*Corresponding author

Geotechnical Engineering

Paper Acceptance ID. 03

Soil Improvement by Utilizing Natural Fiber Material: Jute Fiber

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Abstract. Engineering structures are very massive in nature. Every structure is built over the soil, which is a complex mixture of various ingredients, hence most of the time the soil is not suitable for the foundation. Previously, various techniques of soil reinforcement have been used for soil improvement such as continuous insertion of strips, grids and fabrics into an earth mass. Nevertheless the methods are effective but involve reasonable material cost. This study has focused on utilization of jute fiber as a soil reinforcement to increase the bearing capacity of soil. This study aims to investigate the behavior of jute fiber reinforced A4 soil. Two different lengths (i.e. 10mm & 20mm) of jute fiber with same diameter are mixed with the A4 soil with four different fiber contents (i.e. 0.25%, 0.50%, 0.75% and 1%). Thus eight samples containing jute fiber in soil and one reference sample without jute fiber is taken for laboratory experiments to determine the bearing capacity of soil using unconfined compressive strength (UCS) test. The increase of unconfined strength in soil using 10mm long fiber with 0.25%, 0.50%, 0.75% and 1% is found to be 1.66%, 7.5%, 16.72% and 24.9% respectively. The 20mm long fiber with same percentages results in 4.42%, 14.8%, 24.7% and 35.26% increase in the UCS respectively. The results of this study concludes that the increment in length of fiber along with increment in mixing percentage results in higher stresses in the A4 soil. The experimental results of this research will guide the engineers about the effective use of Jute Fiber in the soil for its improvement.

Keywords: A4 Soil, Jute, Natural Fiber, Soil Improvement, Unconfined Compressive Strength.

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Paper Acceptance ID. 05

Development of an Empirical Co-Relationship Between Dynamic Cone Penetrometer (DCP) and Maximum Dry Density (γ_{max}) of Different Soils

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Abstract. In this research a portable in-situ device known as Dynamic Cone Penetrometer (DCP) is used to develop a co-relations between DCP and Max: dry density, as well as DCP and Optimum moisture content (OMC) on different soil samples. Different soil samples have been prepared by firstly using pure clayey soil and replacing the proportion of Clay content with sand content. Different soil samples prepared were belonging to different soil groups which are estimated by calculating its plasticity index from liquid limit and plastic limit from fall cone method. From this research it is concluded that DCP results can be utilized to estimate Max: dry density and OMC of different soils with confidence.

Keywords: DCP, Dry Density, OMC.

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Paper Acceptance ID. 06

Date Palm Fiber as Geo Reinforcement Material for Shale

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Abstract. Reinforcement of plastic soils with natural fibers is getting popularity day by day. Date palm is one of the most cultivated tree on the earth with an overall distribution of around 100 million palms in 30 countries. Date palm fiber, mostly produced in Asian nations, for example, Saudi Arabia, Iraq, Iran, Pakistan, Indonesia and so on. In this research Date Palm fiber is added and mixed by 1%, 2%, 4% and 6% by weight of air dry shale to investigate fiber reinforcement effect on water density relationship, shear strength parameters, California Bearing Ratio (CBR) and swelling potential of Shale. From the results it could be concluded that Date Palm fiber can be utilized to enhance the Unconfined Compressive Strength (UCS) of Shale.

Keywords: Date Palm Fiber, Geo reinforcement, Unconfined Compressive Strength (UCS).

*Corresponding author

Paper Acceptance ID. 17

Stabilization of Jamshoro Soil with Lime

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Abstract. The geology of Jamshoro soil (being expansive soil which expands when wet and contracts on drying) poses serious problems of deformation and rutting on superhighway which is running through the vicinity of Jamshoro. This paper describes the influence of mixing lime on geotechnical properties of Jamshoro soil. The soil was collected from Jamshoro and was then mixed to obtain homogeneous characteristics. Different proportions of lime i.e. 1%, 2%, 4%, 6%, 8%, 10%, and 12% by dry weight of soil were mixed with soil. For every lime-soil mixture sample, optimum moisture content were obtained by utilizing the particular optimum moisture content (OMC). The effect of mixing lime on unconfined compressive strength, California bearing ratio, and swelling potential were then observed. The results show that mixing of lime with the soil increased the unconfined compressive strength, improved the CBR value in unsoaked and soaked conditions, and decreased the swelling potential. It is also observed that the lime content of 8% is sufficient to achieve desirable unconfined compressive strength, California bearing ratio (CBR) value, and lowest swelling for a sub grade material.

Keywords: California Bearing Ratio, Jamshoro Soil, Lime Content, Unconfined Compressive Strength.

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Paper Acceptance ID. 25

**Laboratory Electrical Resistivity and Moisture Content Correlation for
Compacted Laterite Soil in Malaysia**

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Abstract. Laterite soil is generally believed to be a good natural material for foundation and building purposes. The occurrence of laterite soil is found in abundance in the tropical regions of the world including Malaysia. The properties of laterite soil are normally determined by borehole sampling method. This method renders actual determination of the soil material, but on the contrast, it is very expensive and requires too much time and effort. Being an alternative method, electrical resistivity technique can be used to deliver a quick assessment of the subsurface soil and thus save expenditure, time and energy. This research paper focuses on the preliminary analysis of compacted laterite soil on laboratory basis by correlating electrical resistivity with moisture content. Correlations obtained from electrical resistivity and moisture content highlight good relationship with higher regression values ranging from 0.6859 to 0.9974. It is found that an increase in moisture content decreases the electrical resistivity of the soil.

Keywords: Compacted Laterite Soil, Correlations, Electrical Resistivity, Moisture Content.

*Corresponding author

Paper Acceptance ID. 26

Comparative Study of Drill Cuttings with Core Samples to Determine the Petrophysical Properties of Reservoir in Lower Indus Basin of Sindh

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Abstract. Hydrocarbon behaviors vary from reservoir to reservoir and heterogeneity in the formation are due to geological changes in the formation. As for economical approach, evaluation of drill cuttings is a proper technique to give the important data for the reservoir. In this research the measurement of petrophysical properties i.e. porosity and permeability from drill cuttings were obtained from the field of Lower Indus basin of Sindh in the sandstone formation where the coring job was carried out. Twenty samples of drill cuttings were collected from the field of Lower Indus Basin of Sindh at different depths between 2100m and 2195m with the interval of 5m. Screening of sample was done with the help of microscope and the size of drill cuttings were kept between 1mm to 5mm. Porosity was measured by taking the ratio of pore volume and bulk volume, whereas permeability was measured with the help of Darcy Log equipment. Then the comparative analysis was done by comparing the core data which was obtained from the same well with the data which was obtained from drill cuttings. The study shows that there is very minor difference between the data of core samples and drill cuttings through comparison i.e. in the values of porosity and permeability.

Keywords: Core Samples, Drill Cuttings, Permeability, Porosity.

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Paper Acceptance ID. 63

The Settlements of Shallow Foundation on Low Plasticity Clay

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Abstract. Liquefaction is a total or partial loss in shear strength and stiffness that is caused by increase in pore pressure due to cyclic shear strain in loose and medium dense silty sands during earthquakes. The 7.4 magnitude Kocaeli earthquake was one of the largest events to strike a highly urban and industrialized region of the world in recent past. Damaging ground shaking intensities covered an area of 2,000 Sq. km. area in the provinces of Izmit and Istanbul in north western Turkey. It was the unique case which surprised many researches that, a low plasticity clay which was previously considered non-liquefiable, was liquefied as a result of that event. In the view of this fact, the study of ML/CL soil which was taken from a site near Hussain Heights, Qasimabad, was carried out. The work was started by conducting the classification of soil which classified the soil as A-6 in AASHTO system and CL in Unified soil classification system. Then in this research, liquefaction potential was identified through liquefaction criterions and physical modeling of shallow foundation on CL low plasticity soil. The liquefaction potential through the classical criterions identified the soil as non-liquefiable while the modern criterions identified as moderately liquefiable but these criteria suggest further study and investigation to evaluate the liquefaction potential. The liquefaction potential through physical models was also performed. Two models 1-g were prepared for shallow foundation on liquefiable ground. The physical models showed that there was insignificant liquefaction-related settlement of footing in dynamic excitation of 180 secs. Based upon this study it could be concluded that liquefaction potential and related settlements in the case of shallow foundation on low plasticity (CL) soil was not so significant that it could affect the stability of structures in earthquakes.

Keywords: Liquefaction, Low Plasticity Clay, Physical Model, Settlements

*Corresponding author

Paper Acceptance ID. 64

Finite Element Modeling on the Behavior of Foundation on Shale

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Abstract. Design and construction on swelling soil has always been a very challenging task due to expansion and contraction of soil with variation in the moisture content. In this research project a typical structure Civil Engineering Department building MUET Jamshoro, which was constructed on the pile foundations to bypass the underlying swelling shale present at its site, was analyzed for vertical deformations. The columns of the structure were designed on shallow foundation. Numerical modeling approach with the help of finite element software Plaxis 2D was applied to analyze the model. Swelling rock model as provided with software PLAXIS was applied as a constituent material model to represent the behavior of the swelling shale. Model parameters were obtained by calibration with laboratory consolidation tests. In total, six numerical analyses were run with gradually increasing loads to represent lighter to heavier structures. It was observed from the results that consolidation settlements were dominant for heavier structure load while swelling (expansive) deformations were substantial for lighter structure loads. This research concludes that structures with heavier loads should be built with deep foundations in this area to avoid consolidation settlements while lighter structures like pavements and boundary walls on the shale could be constructed after the required ground modification.

Keywords: Foundations, Numerical Modeling, Structure, Swelling Shale.

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Paper Acceptance ID. 65

Liquefaction-Induced Settlements of Foundations in Earthquake

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Abstract. This research was focused on the study of the effects of earthquake-induced liquefaction on the shallow foundations of structures and its mitigation by reinforcing the ground with stiff columns. First, the behavior of a soil element was studied in cyclic simple shear tests. The soil-structure interaction boundary value problem consisting of a structure supported on a shallow footing pad which was founded on liquefiable ground reinforced with stiff jet grouted column rows was numerically studied using FLAC 2D finite difference code. The effects of a past Loma Prieta earthquake on the treatment performance were assessed on the shallow foundation. The results showed that the settlements of the shallow foundations of buildings were reduced to the tolerable limits by providing rows of columns adjacent to and beneath the footing.

Keywords: Earthquake, Foundations, Liquefaction, Numerical Modeling.

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Paper Acceptance ID. 66

Physical Modeling of Shallow Foundation on Liquefiable Soil and Its Mitigation with Densification

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Abstract. Soil liquefaction and related ground failures are commonly associated with large earthquakes. In common usage, liquefaction refers to the loss of strength in saturated, cohesionless soils due to the build-up of pore water pressures during dynamic loading. The main objective of this work is to determine the behavior of the shallow foundation on saturated soils when they are subjected to dynamic loading. Liquefaction occurs in case of loose soil deposits below the groundwater table, in which the strength and stiffness of the soil will be reduced. In this work the manually operated shake table produces cyclic loading to the saturated soil on which foundation is constructed. A general purpose vibration test system has been developed to provide a testing platform. This research presents the design of the shaker table for the platform-testing base where a manual device will be placed and excited by the men power. The purpose of the cyclic loading is to observe the behavior of the shallow foundation when subjected to the dynamic loading. In this work there are four physical models, two of them are of the loose soil and other two are of dense soil, and presents comparison between them. There are large vertical deformations (settlement) in the loose condition of the soils because in loose condition contraction occurs and in case of dense sand there are negligible vertical deformations (settlements) because in dense sand dilation (expansion) occurs. This work also gives the remedial measures of the soil liquefaction.

Keywords: Liquefaction, Physical Modeling, Foundations, Settlement

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Paper Acceptance ID. 67

Remediation of Liquefaction-Induced Settlements of Foundations with Jet-Grouted Walls

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Abstract. This research pertains to the study of the remediation of settlements caused by earthquake-induced liquefaction in the structures founded on shallow foundations, with stiff jet-grouted walls around the foundation. The soil-structure interaction problem consisting of a structure supported on a shallow footing pad which was founded on liquefiable ground reinforced with stiff jet-grouted walls, was studied using 1-g physical models. The earthquake vibrations on physical models were simulated physically by small shaking table. The effects of these jet grouted walls on the treatment performance were assessed on the shallow foundation. The results showed that the settlements of the shallow foundations of buildings could be reduced to the tolerable limits by providing jet-grouted walls around the footing.

Keywords: Earthquake, Foundations, Jet-grouted Walls, Liquefaction, Physical Model.

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Paper Acceptance ID. 70

Prediction of Rainfall induced Slope Failure by Model Slope Experiment

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Abstract. Most of slope failures occur due to the rainfall. Therefore in order to better understand the rainfall induced slope failures, series of experiments have been conducted in the laboratory with the physical model. However the factor controlling the initiation of failure is rarely done. During the experiments the pore pressure and moisture were measured with piezometers, and TDRs (Time Domain Reflectometry). The parameters such as soil density, rainfall intensity, and initial moisture conditions were changed. From the detailed and numerous experiments it was observed that the density of slope have relatively higher impact on the initiation of failure and long run out distances. The pore pressure increased gradually before the failure and suddenly increased during failure. The moisture content increased in two step pattern, and can be used for prediction of slope failure.

Keywords: Factors, Failure, Prediction, Rainfall, Slope.

*Corresponding author

Paper Acceptance ID. 71

Numerical Evaluation of Pile Axial Capacity

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Abstract. Single axially loaded pile has been numerically simulated to evaluate axial bearing capacity in layered soil. Geotechnical finite element software PLAXIS 2D is capable to simulate soil-pile interaction, changes in state of stress in pile installation and its effect on skin friction and end bearing. Soil response is simulated by 15-noded triangular element with elastic perfectly plastic Mohr Coulomb constitutive model and pile response is assumed to be linear-elastic. Soil-pile interaction has been simulated using interface element. Load displacement curve of full scale pile load test is used in calibration of numerical model to select appropriate mesh size. Load displacement curve from PLAXIS 2D shows reasonable agreement with pile load test. The calculated axial capacity from numerical modeling is compared with published empirical and theoretical methods.

Keywords: Finite Element Method, Pile Axial capacity, Pile Load Test, Soil-Pile interaction.

*Corresponding author

Paper Acceptance ID. 122

An Attempt to Correlate Laboratory Resistivity against Various Soil Parameters Using Predicted Artificial Neural Networks and Basic Regression Values

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Abstract. Geo-electrical assessment is an appealing method for depicting subsurface properties without soil disturbance and can also be considered as an important phenomena in the prediction of numerous other soil index and engineering properties. It is non-intrusive and relatively quick as oppose to the conventional bore-hole sampling which is expensive and time-consuming. The primary objective of current research was to investigate the relationship of laboratory electrical resistivity with various soil index and engineering properties at a controlled moisture content (30%). For this purpose, 40 samples were collected from different locations in Perak state, Malaysia and brought to the geotech lab where numerous soil characterization tests were conducted. Laboratory scale Wenner probes method was incorporated for the determination of electrical resistivity. The resistivity values were calculated based on constant amount of moisture content and were found to range from 34.9854Ω-m to 1560Ω-m. Atterberg's limit values ranged from 8.88% to 39.65% and direct shear test results ranged from 21.22kPa to 87.25kPa (friction angle) and 5.17° to 42.85° (cohesion) respectively. The obtained correlations were analyzed through least-square regression method which was later compared to the coefficient of R² predicted from ANN system. Improved correlations were developed from ANN models between laboratory electrical resistivity and shear strength parameters of soil.

Keywords: ANN, Laboratory Resistivity, Regression Analysis, Soil.

*Corresponding author

Paper Acceptance ID. 152

Soil Improvement by Biological Treatment Method

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Abstract. The subject of soil stabilization is diverse as are its methods, ranging from being chemical based to mechanical, but these contribute to global carbon emission along with other gaseous emissions. This study focuses on the ecofriendly method of soil stabilization by Microbial Induced Calcite Precipitation (MICP). Previous research shows increment in shear strength and other properties of groups of soil when concentration of bacteria is 1% to 4%. This technique has shown significant increase of shear strength in clay soil, with injection of bacteria (*Sporosarcina Pasteurii*) using urea hydrolysis to influence the natural calcium precipitation process of bacteria. In this study metabolic pathway of bacteria is utilized to induce calcite precipitation throughout the soil mass. To analyze the increase in strength; 1% to 3% concentration of this bacteria is used. The MICP requires bacterial growth at laboratory scale along with nutrients to form bio slurry. The basic parameters like shear strength and maximum dry density (MDD) of the soil matrix were observed before and after treatment. This technique is ecofriendly which does not produce oxides of carbon in the environment.

Keywords: Bio Grout, Clayey Soil, Maximum Dry Density, Microbial Induced Calcite Precipitation (MICP), Shear Strength.

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Paper Acceptance ID. 156

Correlations between Relative Density and Compaction Test Parameters

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Abstract. Soil is naturally occurring uncemented or unaggregated deposit of minerals so it is difficult to maintain its properties while bringing representative sample in laboratory for testing. So the project involves developing a suitable correlation between different parameters (these parameters help us in using various equations) by using single linear regression and multiple linear regression analysis. 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 properties. The tests included 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 multiple linear regression analysis are more reliable than single linear regression. Equations developed by using multiple linear regression analysis are more reliable than single linear regression.

Keywords: Multiple Linear Regression, Relative Density, Sand Equivalent, Single Linear Regression.

*Corresponding author

Paper Acceptance ID. 192

Parametric Optimization of Reinforced Concrete Cantilever Retaining Walls

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Abstract. Selection of the type of reinforced retaining wall is a challenge as poor consideration of type may result in uneconomical solution. Prior research has been performed using different complicated techniques (like Swarm Intelligence Technique, Target reliability method, Harmony search based algorithms and etc.) focusing on the optimization of a particular type of a retaining wall by varying its structural and geotechnical design parameters. This research on the other hand takes into account three types of cantilever retaining walls classified on the basis of stem shape as stepped, tapered and rectangular or uniform. A combined evaluation for an optimized design based on simple parametric comparison has been reported in this paper. Computer based design tools have been developed and cost being compared for selection of the optimum design using variation of different parameters of Retaining Wall design. All typical failure modes including overturning, sliding of the wall; bearing capacity check below the footing; eccentricity check; and shear/moment demands on the stem, heel, toe and key were considered. Tapered stem retaining wall was found to be the most economical among stepped stem retaining wall and uniform stem retaining wall under specified conditions, as it passed all the necessary failure modes and yet provided adequate margin over the other types of retaining walls in terms of material's volume. Although, all three types of walls were exposed to same backfills having same geotechnical properties, and thus all the walls had same height. As retaining walls are long structures thus costs are very high; a small saving in unit length can economize the whole project several folds.

Keywords: Cantilever, Optimization, Reinforced Concrete, Retaining Wall, Stem Shape.

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Highway & Traffic Engineering

Paper Acceptance ID. 16

**Asphalt Mix Design for Base Course Using Fly Ash as a 100%
Replacement of Mineral Filler**

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Abstract. Asphalt mix design for base course using fly ash as a 100% replacement of mineral filler based on Marshal Stability method has been carried out. Sample of Aggregates have been collected from hot bins from Asphalt crushing plant near Jamshoro and Fly ash has been collected from Lakhra coal power plant. The tests were conducted in the Highway Research laboratory of MUET. Many trials (by trial and error method for blending of aggregate) have been computed in order to achieve the desired grading and a number of Marshal moulds (by Marshal stability method) have been prepared at various percentages of bitumen for optimum bitumen content. Findings of this research project suggest that there is need to put emphasis on use fly ash material in pavement construction and avoid the consequence of environmental impacts.

Keywords: Aggregate, Asphalt, Fly Ash, Marshal Stability.

*Corresponding author

Paper Acceptance ID. 59

**Required Friction Vulnerability Analysis of Indus Highway (N-55),
Sindh, Pakistan**

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Abstract. Skid resistance, being an important parameter in road safety, is always under minor attention during design and maintenance of highway. The case is even worst in Pakistan, the road network expansion is on boom; but the quality of the service has always been under question. The situation gets worse under the wet conditions with a number of incidents occurring. The present study is an attempt to highlight the severity of issue on thick traffic portion of N-55 highway (Korti to Sehwan). The study has utilized portable friction tester (British Pendulum Tester) for skid resistance measurement. Moreover, the obtained values were compared with the required SSD based friction coefficients incorporating 85th percentile speed of operating vehicle on sections and minimum safe stopping sight distance (SSD) as per AASHTO specifications. The results confirm the vulnerability of almost all sections regarding the required friction, and provides a constructive way forward regarding the issue.

Keywords: British Pendulum Tester (BPT), Friction, N-55 Highway, Skid Resistance, SSD.

*Corresponding author

Paper Acceptance ID. 80

Analysis and Design of Flexible Pavement Using Empirical-Mechanistic Based Software (KENPAVE)

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Abstract. Premature failures like Rutting and fatigue in the flexible pavements of Pakistan are considered to be the most violent distresses because of their high severity and densities and their huge effect on pavement performance. Instant increases of heavy vehicles and truck axle loads, improper pavement design procedures to meet local environmental conditions and errors occurring during manual design are major factors responsible for premature failures now days in Pakistan. Thus it is needed to minimize these premature failures for economical design. Aim of this research is to reduce these failures by using Empirical-Mechanistic based real software like KENPAVE. This software is used to calculate stresses and strain in flexible and rigid pavement. The object of this research work is to validate and compare KENPAVE design software with existing empirical design approaches and to investigate the effect of variation in thicknesses of wearing course and base course on pavement performance and on design life with respect to fatigue and rutting damage. For this purpose portion of NHA (N-55) is taken as a test section. Different probable x-sections that may be used in Pakistan for wearing course and base course are considered by varying their thickness +25% and -25%. By doing that there are total 10 x-sections to be analyzed. These 10 x-sections are analyzed for allowable number of load repetitions in terms of rutting (Nr) and fatigue (Nf) depending upon max allowable ESAL on N-55 road. Results have highlighted the most failure resisting pavement x-section in terms of allowable number of load repetitions to prevent rutting (Nr) and fatigue (Nf) failure along with the indicated cost.

Keywords: Design Life, Empirical-Mechanistic Design, Failures, Fatigue, KENPAVE.

*Corresponding author

Paper Acceptance ID. 82

Survey and Evaluation Study for Determining Flexible Pavement Failures of a Section of Indus Highway N-5 Hyderabad-Hala

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Abstract. An effective transportation system has a profound effect on the national development of a country. However, in recent years due to axle overloading and improper maintenance of pavements, the roads in Pakistan are subjected to structural cracking and functional distresses. The objective of this paper is to investigate and conduct survey to evaluate the flexible pavement distresses and develop guidelines to reduce the probability of premature pavement failures in the future rehabilitation projects. A section of Indus highway (N-5) from Hyderabad to Hala (Km 167+000 – KM 172+000) was surveyed and factors leading to failures were investigated. Pavement Condition Index (PCI) was used to examine the inadequacy of the road. Further, the investigations carried out in this study included the site survey, analysis of traffic, coring of samples and evaluation of materials used in the asphalt mix design. It was diagnosed that improper selection of materials and the plying of heavy traffic were the likely root causes behind the observed distresses in the pavement. In order to curtail the failures in future projects, it is recommended that road pavements are structurally enhanced to withstand heavy loads and qualified site personnel are recruited for monitoring of road maintenance.

Keywords: Aggregates, Axle Overloading, Pavement Condition Index (PCI), Structural Cracking.

*Corresponding author

Paper Acceptance ID. 84

Design and Evaluation of Semi-Rigid Pavement

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Abstract. Flexible pavements provide good riding quality, easy maintenance and early open to traffic. Nevertheless, these pavements are more susceptible to wear and tear in heavy loading conditions. Rigid pavements in comparison, endures more heavy loading and are durable, however they produce poor riding quality and higher construction costs. To come across combine benefits of both pavements, world is moving towards a new type of pavement. The semi-rigid pavement consists of porous asphalt concrete skeleton containing 25 to 30% air voids which is subsequently impregnated by highly workable cement grout resulting in combination of asphalt concrete and cement concrete. This study comprises of preparation of open-graded asphalt concrete and highly workable cement grout and later fabrication and characterization of semi-rigid pavement. The optimum mix ratio for grout was 1:0.5 at w/c of 0.5 with SP dosage 1% of cement. The results indicate that Marshall Stability of semi-rigid pavement is twice that of flexible pavement and compressive strength about 15 % that of Rigid pavement. Besides, the early open to traffic is ensured as Strength at 28 days is identical to that of 7 days. Finally, the comparison of semi-rigid pavement with other pavements was carried out.

Keywords: Cement Grout, Open-Graded Asphalt Concrete, Semi-Rigid Pavement.

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Paper Acceptance ID. 87

Comparison of Control and Crumb Rubber Modified Asphalt for Rutting Potential (M-9 Construction)

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Abstract. Pakistan has a street system of around 258,350 km, in which Motorway plays an important role in development. Total length of motorway is 1,010 km, and around 3,690 km of motorway are under construction, which conveys a huge extent of travelers along with heavy cargo activity. Practically the entire length of this system is comprised of flexible asphalt pavement. These pavements are subjected to many sorts of distress, amongst which rutting is considered as a critical issue. Rutting causes surface, sub surface and sub grade deformation due to heavy axle loading and also influences the frictional properties of surface due to gathering of water in the wheel ways. In this way, protected and practical operation of asphalt pavement can be ensured by limiting such distress through effective mix design and developments in asphalt material. The presented study investigated and compared the performance of Control mix and Crumb Rubber Modified Asphalt (CRM) on their rutting behavior. It was investigated that the CRM Asphalt execute better than Control mix. Moreover, the CRM Asphalt is a way to recycle the waste material in an appropriate way.

Keywords: Control Mix, Crumb Rubber, Modified Asphalt, Rutting.

*Corresponding author

Paper Acceptance ID. 107

Traffic Management Plan During Construction of M-9 Motorway (Case Study)

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Abstract. Globally traffic management has become dedicated department in this modern era as transportation is the key factor for the development of trade and business of a country. Thus it becomes indispensable to manage traffic in an effective way. Developed countries like USA, Canada, Australia, England and so on, had given priority to the advancement of the transportation system. The unrestricted growth in the traffic has created many problems for the road users and local community, and thus derived prime concentration of the researchers for betterment of transport system. Jeremy Schroeder, Gerald Ullman (2016) define traffic management plan as, “it is site specific document which covers every detail of the work zone area and adoption of safety measures for the road users and the workers during the construction of roads”. Traffic management plan helps us in managing traffic in an effective way by providing a safe passage for the vehicles within the work zone. This study presents the case study on Karachi-Hyderabad Motorway (M-9), to examine the traffic management during its construction. Traffic has been managed by diverting it to the diversions which are not up to the mark to provide required level of service. The condition of these diversions is so poor so that it causes unnecessary delays, traffic jam which increases frustration in road users so these issues must be sort out to increase the safety of the road users and to avoid unnecessary delays.

Keywords: Construction, Management, Roads, Safety, Traffic.

*Corresponding author

Paper Acceptance ID. 128

**Road Safety Audit of National Highway in Pakistan: A Case Study for
MUET Jamshoro Gate to Jamshoro Intersection**

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Abstract. The transportation framework is the engine of economic activities in all urban countries throughout the world and thus sustains the livelihood of the people. As compared to rail, water and air transport, road transport is significantly less developed and carries more risk of injuries and fatalities especially in low and middle income countries (LMICs). High income countries registered a remarkable decrease in road accident fatalities in the last decade through application of road safety measures. However, Pakistan being one of the LMICs is facing more than 25000 fatalities per year which is considered amongst the highest in the world. The need for road safety measures in countries like Pakistan is alarmingly high. Proactive practice such as Road Safety Audit (RSA) which is relatively new in the developing countries can play a substantial role as a risk management tool for road transport infrastructure. In this study the RSA is conducted on National Highway N-55 section as per recommendation of Federal Highway Administration (FHWA) guidelines, USA. The problems identified include absence of Lane Markings and Traffic Signs, Congestion at Jamshoro Intersection, Undivided road etc. Improvements were suggested in N-55 section i.e. from Mehran UET gate to Jamshoro Intersection (3.4 km). These suggestions encompass installation of New Jersey Barrier, Pedestrian Bridge, Lane Markings and other safety features.

Keywords: Pakistan, Road Safety Audit, Transportation.

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Paper Acceptance ID. 155

An Empirical Investigation of Factors Effecting Crash Frequency on Rural Highways

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Abstract. Present study explored the relationship among highway crashes, roadway geometrics and travel characteristics using a count data modeling technique. Research effort developed a statistical model that can help to identify crash-prone highway segments. A negative binomial regression model was estimated using comprehensive data collected from Grand Trunk Road (N 5, Pakistan), containing information on geometric features and traffic characteristics. Based on the same data various statistical models, including Poisson, zero inflated Poisson, negative binomial and zero inflated negative binomial regressions, were developed for comparative analysis. It was concluded that negative binomial regression has better potential to model crash frequency and was therefore considered as the best alternative. Model results revealed that various geometric and traffic characteristics are significantly associated with roadway crash rate on multi lane divided highways. Geometric features like highway segment length, lane width and number of lanes were found in positive association with crash frequency. Similarly, percentage of single unit truck in traffic stream and highway location was also found to significantly influence number of crashes on a rural highway. Study findings can assist National Highway Authority (NHA) to develop appropriate road safety counter measures to improve highway safety in the country.

Keywords: Crash Frequency, Negative Binomial, Pakistan, Road Geometry, Traffic Crashes.

*Corresponding author

Paper Acceptance ID. 165

Association of Enforcement of Speed Limit Legislation with Highway Safety and Socio-Economic Factors

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Abstract. This research focuses on investigation of factors affecting effectiveness of speed limit enforcement (SLE) which is an essential factor to mitigate road traffic fatalities and injuries across the globe. A random-parameter ordered probit model was estimated on data extracted from global road safety report (2013) published by World Health Organization. The research effort was made to understand the interaction between SLE, socio-economic factors, other critical key risk factors and their enforcement levels. Model results indicated that socio-economic status, public policies and road safety legislation and its enforcement significantly influence effectiveness of SLE which was categorized on a four level ordinal scale like very low, low, medium and high enforcement levels. Besides, effectiveness of seatbelt enforcement and road safety audits of new roads were found to be normally distributed random parameters with their effects varying across the countries. The outcomes of present research can help in understanding the impact of socio-economic characteristics, road safety policies and traffic regulations on enforcement of speed legislation.

Keywords: Ordered Probit Model, Random Parameter, Speed Limit Enforcement.

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Paper Acceptance ID. 167

Effect of Waste Polymers in Enhancing the Properties and Performance of Hot Mix Asphalt

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Abstract. This paper presents a comparative analysis of properties and performance of HMA (Hot Mix Asphalt) modified by various polymer based waste materials which included Low Density Polyethylene (LDPE) in the form of polyethylene bags (shopping bags), High Density Polyethylene (HDPE) in the form of waste plastic beverage bottles and crumb rubber (CR) from waste tires. Polymer was added to coat the aggregate (dry method) and as a modifier in bitumen (wet process). Marshall Method was used for analysis of control and modified asphalt mixes. Dry method yielded better asphalt mix properties. Optimum polymer content was determined as percentage of optimum bitumen content. Polymer modified bitumen exhibited improved stiffness and reduced susceptibility to high temperature effects. Polymer modified asphalt mix is found to have increased stability, rutting resistance, and load bearing capacity in comparison to unmodified asphalt mix. HDPE modified mix was found to be most effective in improving stability and rutting resistance. The research also highlights safe, efficient and environment friendly disposal of waste plastics. Road construction with CR modified HMA was found to be most cost-effective with Rs. 0.166 million saving per lane km, compared to conventional, LDPE and HDPE modified HMA.

Keywords: Hot Mix Asphalt, Pavement Performance, Waste Polymers.

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Paper Acceptance ID. 189

Study of Ageing Characteristics of SBR Modified Bitumen

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Abstract. This study investigates to assess the conventional properties of bitumen concrete mixtures from the effect of bitumen modifier. In this study conventional asphalt bitumen of penetration grade 60-70 was modified with Styrene Butadiene Rubber (SBR) at various modification levels i.e. 1%, 2%, 3%, 4% and 5%. More durable asphalt Concrete mixtures with better serviceability are obtained by using 3% SBR. Laboratory tests are performed on neat and modified bitumen by testing various percentages of SBR and the results are then determined. By using SBR, enhanced physical properties namely increased softening and ductility values and reduced penetration values are observed. In this study effect on physical properties in terms of softening point test, penetration test, and ductility test before ageing and after ageing is also measured. The binders are aged using Thin Film Oven Test (TFOT) by short term ageing. The results show that after ageing softening point & ductility increases and penetration decreases with increasing percentage. The mixtures modified with SBR polymer showed permanent deformation characteristics and improved stability under ageing conditions from the experimental results. The use of SBR exhibits betterment in texture of surface as compared to conventional pavements using bitumen which eventually enhances the safety of roads.

Keywords: Ageing, Ductility, Penetration, SBR, Softening Point.

*Corresponding author

Paper Acceptance ID. 190

Effect of Gradation on Moisture Susceptibility of Asphalt Paving Mixtures

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Abstract. Moisture Damage is one of the chief reasons of premature failures in asphalt pavements. It majorly depends on the gradation of aggregate used in the mix. This study was carried out to evaluate the effect of gradation on moisture susceptibility of asphalt paving mixes. Three kinds of aggregate gradations namely NHA-B (lower), SP-2 (middle) and MS-2 (upper) were used along with two types of asphalt binders of grade 60/70 from different refineries. Modified Lottman Test (AASHTO T-283) was conducted on unconditioned and conditioned samples to find the Tensile Strength Ratio (TSR) of all the mixes. The upper gradation with Nominal Maximum Aggregate Size (NMAS) of 12.5mm showed better resistance to moisture damage, because of its dense structure, followed by middle gradation with NMAS 12.5mm and lastly the lower gradation. Although the Indirect Tensile Strength (ITS) of lower gradation was the highest because of its NMAS of 19mm.

Keywords: Aggregate Gradation, Asphalt Mixtures, Moisture Damage, Tensile Strength Ratio.

*Corresponding author

Paper Acceptance ID. 195

An Analysis of the Competitiveness of Electric Trucks in City Logistics

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Abstract. With low emissions and lower operating costs, electric vehicles (trucks) – EVs – can provide a plausible solution to the emissions-related problems of the urban freight transportation. However, their relatively high initial cost and limited driving range reduce their attractiveness for freight carriers. In this paper, a model for the electric vehicle routing and scheduling problem (EVRPTW) and heuristics solution based on the genetic algorithms have been developed. A case study based on a real road network showed that the reduced driving range of the EVs is the bigger barrier as compared to their higher initial cost. Provision of the charging infrastructure is essential for the competitiveness of the available (or near future) electric trucks (with 90 km driving range). Electric trucks with higher driving range (about 110 km) can replace the conventional trucks for the logistics business in a small city level, as they were found very competitive even if no charging infrastructure is available.

Keywords: Electric Vehicles, Genetic algorithms, Vehicle Routing Models.

*Corresponding author

Paper Acceptance ID. 196

Traffic Lane Signal Control System for Pedestrian Crossing without Traffic Interruption

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Abstract. Pedestrian signal near busy traffic roads causes delays, in addition it creates traffic congestion due to stoppage of vehicles. In order to avoid time delays and traffic congestion, usually pedestrian bridges are built, but they cost millions of dollars. Therefore an economical solution should be followed. If we place lane-use control signal 40-50m before pedestrian crossing, the control signal restricts the driver to use a certain lane. At the crossing a Pedestrian crossing control panel is placed, which allows pedestrian to control the lane signal in order to control the lane-use. When the pedestrian starts moving along the 2 lane road after pressing the button on the control panel. And the control signals are adjusted with respect to passage time of pedestrian. By this not only pedestrian can cross easily but vehicles can also pass without interruption and it provides better pedestrian crossing without building any pedestrian bridge or its alternative facility.

Keywords: Economical, Pedestrian Crossing, Traffic Signal.

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Acceptance ID. 208

Design of Asphalt Mixture Using Cotton Stalk Waste as a Filler Material

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Abstract. Cotton Stalks (CS), which is most often disposed-off after burning in the field, at the end of harvesting. This may result in generation of huge amount of this by product. In construction industry, cotton stalk is being used as a filler material. However, effective use of this product needs better understanding of this material. This study aims to focus on the investigation of physical and chemical characteristics of cotton stalk, preparation of asphalt mixture and comparison with conventional asphalt mixture. Physical characteristics were observed by different size fractions of CS **and** analyzed in terms of weight and length. Chemical characteristics were observed in terms of ash content, moisture content, volatile matter and fixed carbon. Powdered form of CS used as a filler material in different percentages (0,1, 2, 3, 4, 5 and 6) with percentage of bitumen content (2.5, 3.0, 3.5, 4.0 and 4.5) as per National Highway Authority (NHA) mix design. For experimental analysis, total 105 samples were prepared with each percentage of optimum bitumen content with varying percentage of CS. Dry weight, weight in water and saturated submerged weight for all 105 samples were determined. And Marshall stability and flow stability values were also determined. Laboratory results show marshal stability decreases after addition of 4% of CS. However, optimum bitumen content increases as cotton stalks increases and optimum value is recorded at addition of 4% of CS.

Keywords: Asphalt Mixture, Cotton Stalks, Filler, Fixed Carbon, Volatile Matter

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Hydrology, Irrigation & Drainage Engineering

Paper Acceptance ID. 04

**Appraisal of Generalized Likelihood Uncertainty Estimation Approach
in Calibration and Uncertainty Estimation of a Conceptual Rainfall
Runoff Model**

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Abstract. A careful and optimized calibration of rainfall runoff models has always been an imperative milestone to be realized by hydrologists and environmental modelers. A good calibration entails the identification of the most operative parameter set which can mimic the observed behavior of the catchment as strictly as possible. As hydrology is an inexact science, modeling process usually contains lots of uncertainties, and mensuration of those is usually overlooked. In this paper, Generalized Likelihood Uncertainty Estimation (GLUE) has been utilized for calibration, sensitivity and uncertainty analysis of a conceptual rainfall runoff NAM model. A small catchment area named Ilgaz, located in Central Anatolian region of Turkey has been used and hydro-meteorological data from 2013-2017 water years was utilized for the analysis. The model efficiency was checked using Nash Sutcliffe Efficiency (NSE), Root Mean Square Error (RMSE), Relative Volume Error (RVE) and Volumetric Efficiency (VE) metrics while the uncertainty was analyzed using 95% prediction uncertainty (95PPU), P-factor and R-factor. A total of 20,000 simulation runs were performed out of which only 389 parameter sets were found behavioral and used for further uncertainty estimations. Overall results proved that GLUE can be used effectively in model calibration and uncertainty estimation of NAM model.

Keywords: Calibration, GLUE, NAM, Rainfall Runoff Model, Uncertainty Estimation.

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Paper Acceptance ID. 12

Command Area Development of Bazkhando Weir

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Abstract. In Indus basin irrigation developments, a significant gap between water potential and its utilization is witnessed. Similar is the case of Bazkhando weir constructed a few kilometers off Indus highway. The construction of this weir aims at capturing the rainwater of upstream catchment but without any implementation of utilization and related development. Because of this storage groundwater table is raised to near the ground surface. Thus, the only utilization of this stored water is lifting groundwater by limited population of nearby villages. In this research article, various viable options are proposed and discussed for command area development of Bazkhando weir to enhance and optimize the usage of the stored water for achieving optimum benefits. The proposed options include: installation of wind/solar tube wells to lift sub-surface water for meeting agricultural and domestic requirements of water; educating the inhabitants for adopting proper sanitation procedures; provision of agricultural extension services to train the farmers for application of scientific techniques such as land levelling and shaping, suitable cropping patterns, various possible modes of water utilization, etc.; the farmer's participation in water management by developing water user associations (WUAs); encouraging the corporate sector for investment in corporate farming. It is anticipated that by adopting the proposed options, full scale development of the command area can be achieved, socio-economic conditions of the living communities can be significantly improved, and the project can be made productive and proficient.

Keywords: Agricultural Extension Services, Bazkhando Weir, Command Area Development, Corporate Farming, Wind/Solar Tube Wells.

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Paper Acceptance ID. 22

**Validation of Aqua-Crop Model Against Observed Data Under
Different Irrigation Regimes**

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Abstract. This study was based on complete randomized block design including 3-Treatments (i.e. T1 = 30, T2 = 50 and T3 = 70 percentage soil moisture depletion) with 3 replications. In order to determine the crop water requirements under desired treatments, the gypsum blocks were used for computing the daily soil moisture depletion. The experimental site was visited on daily basis and measurement on different crop growth parameters at maturity stage, selected and tagged. Different statistic tests were performed for the validation of Aquacrop model. The total volume of water applied to crop during experiment under T1, T2 and T3 was 9689 m³ hac⁻¹, 5200 m³ hac⁻¹ and 2045 m³ hac⁻¹ respectively. The statistical analysis confirmed that average values of different plant growth parameters, crop yield and water use efficiency was not statistical significant under all treatments at P < 0.05. The results revealed that the simulated sunflower yields showed a good agreement with their measured under T3. The simulated crop yield was 15.53 t ha⁻¹, while the measured yield varied from 12.07 to 14.27 t ha⁻¹. This study suggested that WUE under T3 was more as compared to T1 and T2. The results of this study on T3 give more crop yield in relation to water use efficiency and optimize yield of sunflower crop under water scarcity. The Aquacrop model could very well predict crop yield and water use efficiency at T3 under experiential region for sunflower production.

Keywords: Aquacrop, Gypsum Block, Soil Moisture Depletion, Sunflower, Validation.

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Paper Acceptance ID. 24

Investigation of Hyperbolic Heat Flux for the Flow of Three Dimensional Third Grade Fluid

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Abstract. This communication highlights the effects of hyperbolic heat transfer of three dimensional steady incompressible flow of a third grade fluid over a linear stretching sheet. Effects of heat transfer are taken into account for an electrically conducting fluid. The complete system under consideration based on physical laws which explains the phenomena of linear momentum and heat transfer. The governing system of partial differential Equations (PDEs) are transformed into system of non-linear coupled ordinary differential equations (ODEs) by an appropriate transformation. Governing nonlinear coupled system of ordinary differential equations after applying the boundary layer theory, are treated numerically by using an efficient and reliable algorithm namely homotopy analysis method (HAM). Analytic solutions are obtained in the form of convergent series. The effects of the involved physical parameters on third grade fluid i.e. Pandtl Number (Pr) is discussed graphically for velocity and temperature fields. Graphical description is given for the convergence of analytic solutions and flow behavior of physical parameters on the velocity and temperature profiles are discussed and elaborated comprehensively.

Keywords: Cattaneo-Christove Heat Flux Model, Series Solution, Three Dimensional Flow.

*Corresponding author

Paper Acceptance ID. 28

Assessment of Climate Change Uncertainties in Seasonal Drought Severity-Area-Frequency Curves in an Arid Region of Pakistan

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Abstract. The frequent droughts in Balochistan, an arid province of Pakistan had severely affected the livelihoods of people primarily engaged in the agro-based economy. This study used gauge-based gridded precipitation data obtained from Global Precipitation Climatology Centre (GPCC) to reconstruct historical droughts and downscale future rainfall projected by seven GCMs of Coupled Model Inter-comparison Project phase 5 (CMIP5), under four Representative Concentration Pathways (RCP) scenarios. Support vector machine (SVM) and quantile mapping were used for downscaling and GCM bias correction, respectively. The historical and future projected rainfall data are used to characterize the seasonal droughts using frequency analysis of Standardized Precipitation Index (SPI) estimated for different crop growing periods. The drought severity-area-frequency (SAF) curves for historical (1961-2010) and future (2010-2039, 2040-2069, and 2070-2099) seasons were developed. The uncertainty band of future drought SAF curves were estimated using Bayesian bootstrap at a 95% confidence level. As a result, SVM was successful in downscaling all selected CMIP5 GCMs precipitation. The seasonal ensemble of GCMs projected an increase in rainfall ranging from 8 to 41% under all scenarios. The SAF curves revealed that higher return period, but less severe droughts will be more devastating in the study area. The uncertainty bands of drought SAF curves with higher return periods are found to be much higher compared to those with lower return periods.

Keywords: CMIP5, RCPs, Seasonal Drought, Standardized Precipitation Index, Severity Area Frequency.

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Paper Acceptance ID. 29

Comparison of Gauge-Based Gridded Precipitation Products Over Balochistan, Pakistan

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Abstract. The availability and reliability of long-term data are often hindered in conducting climatological studies. Gauge-based gridded data are often suggested for climate application in the region where long-term reliable observation data are not available. In this study, the gauge-based gridded precipitation data obtained from Global Precipitation Climatology Centre (GPCC), Climatic Research Unit (CRU), Asian Precipitation Highly Resolved Observational Data Integration towards Evaluation (APHRODITE), and Center for Climatic Research - University of Delaware (UDel) was compared with observed precipitation data in a data scarce arid region. The precipitation records from 20 meteorological stations located in Balochistan province of Pakistan for the time period 1961-2007 were used for this purpose. Various parametric and nonparametric statistics of gauge-based data and observed data are compared. The results showed that statistical parameters of GPCC time series are very similar to the statistical parameters of nearby observed stations where quality data is available, which indicates the suitability of GPCC data in climatological study in the region.

Keywords: Arid Region, Balochistan, Gauge-Based Precipitation Analysis, Precipitation, Statistical Assessments.

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Paper Acceptance ID. 61

Shear Thickening Third Grade Fluid Flow by the Influence of Physical and Chemical State Reactions with Melting Heat Transfer

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Abstract. This communication investigates the chemical and physical state reactions of steady two dimensional incompressible flow of third grade fluid in cylindrical coordinates. Effects of melting heat and mentioned reactions are taken in account by assuming the fluid is electrically conducting in the presence of inclined magnetic field. The complete system based on physical laws describes the phenomena of heat and mass transfer. The effects of emerging parameters in third grade like Reynold Number (Re), Pandtl Number (Pr) and Schmidt Number (Sc) are discussed graphically for the velocity field, Heat transfer and Mass transfer equations. The expression for Skin friction (C_f) coefficient and Nusselt number (Nu) are analyzed by using numerical values. The governing partial differential Equations (PDEs) are transformed into the system of non-linear differential equations by applying boundary layer and these non-linear differential equations are solved by using homotopy analysis method (HAM). Analytic solution is obtained in the form of series. Graphical description is given for the convergence of analytic solutions and flow behavior of physical parameters on the velocity, temperature and the concentration are explored.

Keywords: Analytical Solution, Chemical and Physical Reactions, Homotopy Analysis Method (HAM), Melting Heat, Third Grade Fluid.

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Paper Acceptance ID. 62

Application of GIS and Remote Sensing for Flood Management: A Case Study of Larkana Division

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Abstract. Floods are among the most devastating events in nature; they cause a huge amount of damage to infrastructure, crops and destroy many lives. Pakistan has faced several cycles of destructive floods in its history. It is difficult to control a flood. However, if the excess water is managed properly then the extent of the flood and its damages can be reduced. Integration of a Geo Information System (GIS) with remote sensing data gives sufficient knowledge for many hydrological studies including, flood prediction, generating drainage lines, highlighting flood risk zones and more effective flood management. The information extracted from digital elevation models with the help of ArcGIS software is the most helpful approach for making flood risk maps. In this paper, an attempt is made to generate flood risk maps and to generate feasible flow path for the Larkana Division by using digital elevation models employing the GIS approach. Depending on the elevation of the entire area, three risk zones are categorized: low, medium and high. The analysis shows that the most vulnerable site in Larkana Division is Qamber-Shahdadkot. The results also indicate that some of the western locations in Jacobabad and the southern part of Larkana Districts are also at high risk to the flood damages.

Keywords: Digital Elevation Models, Feasible Flow Path, Flood Risk Mapping, GIS and Remote Sensing.

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Paper Acceptance ID. 79

Groundwater Modelling of Coastal Aquifers Near Karachi

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Abstract. The coastal aquifers of Karachi are predominantly recharged due to seawater intrusion, resulting in groundwater contamination. The objective of the study is modelling groundwater solute transport and flow of coastal aquifers for 12 km of Karachi coastline using Visual MODFLOW. The 10 groundwater samples were collected and tested in commercial laboratory for TDS. The maximum and minimum TDS values from the observed data for the study area were 96180 mg/L and 2020 mg/L respectively. The maximum and minimum observed heads were 7.7 m and 2.4 m below the ground surface, respectively. The sensitivity analysis for different parameters was performed before calibration and validation of the model. The correlation coefficients (R) for calibration and validation of the groundwater flow model were 0.60 and 0.55, respectively. The calibration and validation of solute transport model resulted in R as 0.33 and 0.97, respectively. Overall, model proves to be very accurate to be utilized for coastal areas of Karachi.

Keywords: Coastal Aquifers, Groundwater Contamination, Hydrology, Visual MODFLOW, Water Resources.

*Corresponding author

Paper Acceptance ID. 92

**Determination of Aquifer Parameters Using AQTESOLV
Software: A Case Study of Matiari Distributary Command Area**

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Abstract. An important application of groundwater models is to estimate parameters, such as hydraulic properties and flow dynamics, of groundwater systems by assessing and analyzing the field data. For instance, the pumping and the hydrochemistry and environmental tracer tests are two effective ways to obtain such data. The pumping tests over unconfined aquifer were conducted in shallow alluvium in the command of Matiari distributary taking off from main Rohri Canal of Indus River. Two pumping tests were conducted at the head and the tail reaches of the distributary's command. The time drawdown data was recorded from monitoring wells during pumping tests and analyzed on AQTESOLV software. The pumping tests were carried out for the periods of six hours on each tube well. The selection of analysis method depends on the parameter to be determined, like the Storage coefficient (S) and Transmissivity (T) have been determined using Theis and Cooper Jacob methods. The average value of transmissivity and storativity was calculated to be 1868.95 m²/day and 0.00089935 respectively. Furthermore, the software results revealed that S and T values are higher at the head reach than the tail reach by 25% and 32% respectively which points out that soil at the tail reach is less permeable (i.e. flow of water under the ground is slower) and having less storage. Therefore, it is suggested to keep the tube wells in the vicinity of the tail reach shut off for longer period of time compared to those running at the head reach after continuous pumping of same period of time.

Keywords: Aquifer Parameters, AQTESOLV, Groundwater, Pumping Test.

*Corresponding author

Paper Acceptance ID. 93

**Watershed Delineation and Morphometric Analysis of San Nai Basin
Using GIS and RS Technology**

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Abstract. Watershed management is said to be the basic planning unit of all hydrologic analysis and designs. Watersheds are natural hydrological entities that cover a specific land surface from which the rainfall runoff flows to a defined drain, channel, stream or river at any particular point. Nowadays, watershed management has gained the top most importance in water resources sector necessitating delineation of watersheds. In the present study, the watershed of San Nai stream located in the district of Jamshoro, Sindh, Pakistan is delineated using Arc Hydro Tools 10.1 and HEC GEO-HMS extension. The digital elevation dataset (DEM) is obtained from USGS Earth explorer. Raster analysis is performed to generate data on flow direction, flow accumulation, stream definition, stream segmentation, and catchment delineation. Then the HEC GEO-HMS tools are used to find out the various characteristics of the San Nai water-shed such as longest flow path, river length, centroid, centroidal flow path. The area of San Nai watershed is found to be 365 sq.km and the length of San Nai stream is found to be 37.61 km. The longest flow path and centroidal flow path are 68.6 km and 34.3 km respectively.

Keywords: Catchment, Dem, Stream Segmentation, San Nai, Watershed, Watershed Delineation.

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Paper Acceptance ID. 94

**Performance Evaluation of Tertiary Canals of Jamrao West Branch
Under Participatory Irrigation Management**

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Abstract. This study has been conducted to evaluate the performance of Area Water Board and Farmers Organization regarding the water delivered to tertiary canals (distributaries/minors) and its reliable supply at their tail ends. The performance of canal irrigation system was examined by using performance indicators such as delivery performance ratio (DPR), equity, reliability, and tail-end supply ratio (TSR). In this connection Jamrao West branch of NCAWB and its three off-taking Bellaro, Mir and Potho minors has been selected. Data regarding gauge height of water supplied to these canals was collected. The discharges were measured, and Rating Curves were developed. This study reveals the reliability of water delivered to off-taking minors and performance of Mir Minor is “Good” in both seasons. Farmers Organizations are performing well as they are distributing the water among all stakeholders, especially to supply water at tail ends. Tail-end Supply Ratio has been computed for all three minors, which is mostly about 80%, and reaches to 92% for Potho minor. However, during walk through survey, considerable outlets were observed as tempered, which needs improvement in governing the system.

Keywords: Delivery Performance Ratio, Tail-End Supply Ratio, Water Availability.

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Paper Acceptance ID. 127

Water Supply and Demand Analysis of Thatta City Using WEAP Model

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Abstract. Indus River is the one of largest river in world and Pakistan's biggest irrigation networks. It fulfill the needs of domestic water and agricultural water requirements for most of the places in Pakistan. Water resources management in Indus basin is an issue of very high significance because of great socio-cultural, ecological and economic values. Water evaluation and planning (WEAP) provides a seamless integration of both the physical hydrology of the region and water management infrastructure that governs the allocation of available water resources to meet the different water needs. This paper uses the WEAP model to analyze the water supply and demand for Thatta district of Sindh, Pakistan.

Keywords: Indus River, Water Demand, Water Resources, Water Supply, WEAP Model.

*Corresponding author

Paper Acceptance ID. 133

Degradation of Sindh Indus Delta and Proposal for Sustainable Rehabilitation of Habitat

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Abstract. Pakistan is blessed with rich and diverse natural resources; including Sindh Delta as habitat for mangrove ecosystem which develops from the muddy to sandy coast. Pakistan has 0.6 million hectares of mangrove ecosystem, one among the top ten in the world. Indus River delta and its mangroves are fencing for their longevity and endurance, due to scarcity of fresh water from several decades. The degradation of mangroves causes people to migrate away from the locality. After conducting the interviews with local people, it is concluded that viability and life on delta are interfacing a set of problems, uniquely the delta's Flora and Fauna as they mainly rely on the constant flow of fresh water. Salinity in sea water is expanding on the surfaces facing the coastal regions of the Sindh. The fertile land is being converted to infertile land and local citizens are migrating from the area. Delta provides the beneficial condition for fishing growth; approximately 100,000 people rely on Indus delta, deltaic aquaculture and fishing industry. Since many years the deltaic region remained declined and its capability was disregarded. About 42% area of mangrove forests has been shrunk in past twenty years due to the negligence and scarcity of the water. As a result of that, coastal culture is vanishing day by day to a greater extent; therefore, it is proposed to cease such activities for the development of sustainable habitats.

Keywords: Ecosystem, Eco-Tourism, Mangroves, Urban Activity.

*Corresponding author

Paper Acceptance ID. 138

Laboratory Study of Tile Drainage Under Different Depths of Impervious Layer

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Abstract. A laboratory study was carried out on tile drainage criterion in Hydraulic laboratory, Mehran University of Engineering and Technology, Jamshoro. The experiment was conducted in Permeable tank using sandy clay loam soil under different impervious layer from the lateral drains. In this experiment, the hydraulic parameters such as, drain specific discharge (q), hydraulic heads (h), hydraulic conductivity of the soil (k), drain depth above the impervious layer (D), drain radius (r) and spacing between the lateral drains (L) were recorded. The research work includes establishing empirical relationship for the appropriate design of tile drainage. Using statistical analysis, the relationships of qL^2 with kh , kd and kh^2 were developed separately in the form of empirical equations. The research results show that, the drain spacing varies directly with depth of impervious layer below drain, hydraulic conductivity of the soil, hydraulic head between the drains and drain size and; whereas drain discharge varies inversely with drain spacing.

Keywords: Drain Spacing, Design of Tile Drainage, Tile Drainage.

*Corresponding author

Paper Acceptance ID. 158

Modeling of Optimum Discharge Capacity of Sukkur Barrage

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Abstract. During the initial years after Sukkur barrage (Sindh) operation, excessive silting tendency was realized along right bank canals. Poona Laboratories recommended a new right bank approach channel with silt carrying concave river curvature and submerged weir that was implemented in 1942. As a result of this arrangement 10 gates of the barrage got closed permanently. This arrangement reduced the discharge capacity of barrage to 9 lac cusecs and created a lot of operation and maintenance problems especially during the floods exceeding 10 lac cusec. Findings of the latest model study, carried out at the Hydraulic Research Station of Sindh Irrigation and Power Department, are presented here. After consultation, 9 tests were proposed to fix the optimum discharge capacity of Sukkur barrage. The tests were run on 7 different models including the Base test. Initially for the sake of comparison some flow scenarios were fixed for all the tests, but after testing process the flow scenarios were fixed as: 0.7 lac cusecs (minimum flow), 1.5 lac cusecs, 2.5 lac cusecs, 5.0 lac cusecs, 8.5 lac cusecs, 11.4 lac cusecs (maximum recorded flood of 1976), 13.4 lac cusecs and 15.0 lac cusecs (design flow). The arrangement of Test No. 8 performed on Model 6 includes 5 gates Right Pocket, 4 permanently closed gates, 7 gates Tail Chanel, 460 ft Submerged Weir with Crest Level at 184.6 ft and 3 Flow Guiding / Streamline Piers at Submerged Weir. This arrangement is recommended for implementation as it offers the best solution to handle the design discharge of 15 lac cusecs and improves sediment management compared to the existing situation.

Keywords: Optimum Discharge Capacity, Physical Modeling of Barrage, Sukkur Barrage.

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Paper Acceptance ID. 163

Experimental and Theoretical Investigation of Flow Behavior Passing Over Rounded Edge Drop Structure in Open Channel

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Abstract. An experiment was conducted to study the flow characteristics pass over the rounded edge drop structure in rectangular channel. The data regarding hydraulic drop and hydraulic jump was recorded during the experiment including the flow discharge (Q), drop length (L_d), jump length (L_j), depth of flow at the toe of the jump (Y_1), tail water depth (Y_2) for different heights of drop structure (h) and various bed slopes of the channel (S) with rectangular channel width (b). The dimensional data was converted into non-dimensional parameters to develop dimensionally balanced empirical equations using multiple regression analysis for the appropriate design of rounded-edge drop structure. The research results revealed that Y_1 , Y_2 , L_d and L_j depend on discharge intensity ($q=Q/b$), drop height (h), and channel bed slope (S). It was found that Y_2 , L_d and L_j varies directly with q and S but inversely with h ; whereas Y_1 varies directly with q but inversely with h and S .

Keywords: Drop Structure, Flow Characteristics, Hydraulic Drop, Hydraulic Jump.

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Paper Acceptance ID. 168

Analysis of Transportation Potential of Rivers in Pakistan

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Abstract. A recent National Highway Authority report predicts over 4-fold increase in trade volume by 2025 in Pakistan. Current trajectory of transportation infrastructure development in the country points that highways and motorways would take the bulk of this volume. The existing literature, however, suggests that inland waterways can handle 70 and 16 times more cargo than roads and railroads respectively. Additionally, waterways are 700/70 times safer in terms of accidents, 5/3 times more fuel efficient, and, 11/1.5 times less emitting than roads/railroads. Inland waterways, therefore, are an obvious mode for transportation both in developed and developing countries. However, despite having sizeable rivers in Pakistan this mode of transportation remains absent. This study has investigated the potential of inland water transportation in Pakistan and finds that it is technically possible and can become socio-economically sustainable when implemented with a systematic phase-wise plan. The study also points that existing water usage in the agriculture sector, due to its inefficiency and wastage, is the biggest impediment to reach the optimum potential of the inland navigation in our rivers and recommends a parallel approach in improving irrigation efficiency along with the development of inland waterways.

Keywords: Indus Inland Waterway, Indus River, River Navigation, Sustainable Development.

*Corresponding author

Paper Acceptance ID. 181

**Comparative Study of Surface Drip Irrigation and Raised Bed
Irrigation Productivity Potentials**

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Abstract. A research work was carried out to determine onion productivity with surface drip irrigation system and raised bed irrigation system. The experimental work was carried out at a farmer's field at Tando Muhammad Khan. The total area covering the experiment was 1000 m². It was divided into two equal portions. Soil at the experimental site was sandy loam. The field capacity and permanent wilting point were measured to be 26% and 12% respectively. The average bulk density of soil for 0-90 cm depth was 1.31 g/cm³. The pH value of the soil was found out to be 7.15. The results reveal that surface drip irrigation method saved 44.65% water and gave 21.17% more yield as compared to that of raised bed irrigation system. The present research study suggests the farmers to adopt surface drip irrigation method for better result.

Keywords: Crop Yield, Drip Irrigation, Irrigation Efficiency, Raised-Bed Irrigation, Water Productivity.

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Paper Acceptance ID. 191

Water and Energy Smart Irrigation Management

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Abstract. The viability and sustainability of crop production is currently threatened by increasing water scarcity. Water scarcity problems can be addressed through improved water productivity and the options usually presumed in this context are efficient water use and conversion of surface irrigation to pressurized systems. By drip or center pivot systems, the water efficiency can be improved by up to 35 to 45%. However, the associated fuels needed for these alternatives increase energy consumption and cause significant greenhouse gas emissions. When surface water is used, pressurized systems increase energy consumption substantially, by 65% to 75%, and produce greenhouse gas emissions around 1.75 times higher than that of gravity based irrigation. With gravity based surface irrigation, the energy consumption is assumed to be negligible. This study revealed that a novel real-time model REIP has enabled implementation of real-time optimization and control of surface irrigation and it has potential to bring significant improvements in irrigation performance along with substantial water savings of 2.81 ML/ha which is almost equivalent to that given by pressurized systems. Thus, real-time optimization and control offers a modern, environment friendly and water efficient system with close to zero increase in energy consumption and minimal greenhouse gas emissions.

Keywords: Environment Friendly, Real Time Optimization, Smart Irrigation, Water Scarcity.

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Structural Engineering & Concrete Technology

Paper Acceptance ID. 7

Comparative Analysis of Normal and Stone Dust Concrete Blocks

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Abstract. Concrete paving blocs are ideal material for the construction, they are the easiest to handle and have pleasant appearance. In this research, we have investigated paving blocks made of stone dust. Various properties of normal concrete blocks vary from the blocks made by stone dust. Thus, various properties are investigated in this research, such as the economy of using either of the blocks, the strength of each of the block in response to the other and the mechanical and physical properties of the blocks. Production of stone blocks on large amount will result in more benefits. The block itself is an insulant, thus resisting high temperature rise. The block provides sufficient compressive strength ranges from 2200psi to 3000psi, which is more than a normal concrete block, which ranges from 1500pssi to 2800psi in general. Total 7% of cement is used in the production of the block, leading to less carbon dioxide being emitted. On a large scale, 7% cement will produce huge impact over air pollution. The block needs no time to become harden, or water to cure, thus reduction in water for curing saves water and becomes environment friendly product.

Keywords: Paving Blocks, Stone Dust, Environment Friendly.

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Paper Acceptance ID. 11

Theoretical Analysis of Cement for Production Sustainability and Quality

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Abstract. Cement is; without any argument, the most important and necessary material among different types of materials in the world of engineering construction. In the walk of sustainable development, saving heritage resources and improving the performance of cement is of great deal. Nowadays, all the varieties of cement do not show the precise performance in structure due to some sort of defects present in integrity of cement like unsoundness, high heat of hydration, shrinkage, etc. The aim of this research is, to examine the defects present in cement with its causes and effects. And to suggest such a combination of ingredients of cement for avoiding identified defects and improving the performance of cement. In this regards, four number of sophistications have been detected out via theoretical analysis. These sophistications have been investigated by varying the percentage content of ingredients, by replacing the ingredients by adding other additives and waste material as renewable materials, and by changing the physical state of cement particles. Furthermore, these four variations have been done in different manner and sequence. So that, total fourteen types of sub sophistication have been achieved which can be imparted into cement to obtained desirable properties. These variations and replacements have been done with certain scope to cope with required conditions.

Keywords: Sustainable Cement Production, Waste Material, Cement Replacement, Theoretical Analysis.

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Paper Acceptance ID. 13

Enhancing the Concrete Tensile Strength by Using Soft Drink Tins

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Abstract. Concrete plays an important role in construction world. It has more compressive strength and is not enough to withstand the tensile force. This research study is, to examine the tensile strength performance of concrete with addition of some percentage of fiber by weight of cement. Usually, the fibers are added to increase the crack resistance and tensile strength. In this research study, thirty (30) cylinders were cast using Department of Environment (DoE) mix design method at 1:1.69:3.15 mix ratio and 0.54 W/C ratio. The cylinders were cast by utilizing different amount of fibers i.e. 1% 2% and 3% by weight of cement and soft drink tins as fiber having length 0.5", 1" and 1.5". The results presented that with increasing percentage and size of the fibers in concrete, the concrete workability reduced and tensile strength of concrete significantly increased. The maximum increase in tensile strength is 27.3% as compared to the controlled specimen at 1.5" long strip and 3% addition of soft drink tins fiber.

Keywords: Concrete, Fiber, Tensile Strength, Workability.

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Paper Acceptance ID. 27

Study of Rigid Bond Admixture Sprayed Steel on the Strength of RCC Beams

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Abstract. Bond strength between steel and concrete plays an important role in structural design and analysis. This study aims to investigate the effect of rigid bond admixture with brand name Sikadur 31-CF (introduced by Sika Pakistan Pvt. Ltd) on steel reinforcement used in RCC beams. This chemical admixture is an epoxy resin, which is spread on steel reinforcement of concrete beams prior to casting of beams. Total thirty-six (36) RCC beams having size 6”x6”x36” were cast at 1:2:4 and 1:1.5:3 mix ratios. In all RCC beams deformed steel bars were used with two main bars of #4 in each zone (tension and compression zone). While, shear reinforcement of #3 at 9” spacing from center of beam were provided. The bond strength of normal and rigid bond admixture spread RCC beams is compared at different curing ages (i-e 3, 7 and 28 days). A set of three RCC beams at prescribed concrete mix ratio and curing ages are tested up to failure under central point loading condition. Experimental investigation reveals the reduction in ultimate strength at 3 days curing period. Whereas, at 7 and 28 days curing period, ultimate strength of rigid bond admixture spread steel beams is slightly higher than the normal beams.

Keywords: Bond Strength, Central Point Load, Rigid Bond Admixture, RCC Beams.

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Paper Acceptance ID. 36

Effect of Human Hair as Fibers in Cement Concrete

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Abstract. In present era, to recycle the waste and to reduce the environmental pollution are the main objectives of sustainable development. Many researchers are working on new techniques and thinking for innovation in the field of concrete technology by utilizing the waste material in concrete. This research aims to evaluate the effect of human hair (waste material) as fiber on plain concrete with various percentage of human hair fiber i-e 0.25%, 0.50%, 0.75% and 1.0% by weight of cement. In this regards, behavior of concrete checked in terms of machanical properties (compressive strength and spilting tensile strength) and workability (slump test). Therefore, for each proportion of hair, three cylinders and three cubes were cast at 1:2:4 mix ratio with 0.5 water-cement ratio. All specimans were tested at 28 days curing period. The experimental results show that the workability of fresh concrete reinforced with human hair is less than the plain concrete. And it is also observed that human hair as fiber reinforcement increases the compressive strength and tensile strength of concrete by 10.71% and 3.65% at 0.25% addition of human hair in plain concrete.

Keywords: Humain Hair Fibers, Mechanical Properties of Concrete, Sustainable Development

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Paper Acceptance ID. 50

Effect of Marble Dust as a Partial Replacement of Cement on Fresh and Hardened Properties of Concrete

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Abstract. Marble industry has been creating dust waste for long time and that is a concern for most of the marble rich countries. This study makes use of the waste marble, to propose an eco-friendly solution to tackle the waste marble problem. In this experimental study, marble sludge obtained from landfills of Hyderabad, Pakistan. Marble dust was oven-dried first, then sieved and used for partial replacement of cement. The proportion of dust as partial replacement of cement is 0 %, 5%, 10%, 15% and 20% by weight of cement. Total of seventy-five (75) cubes were cast and tested in Universal Testing Machine for compressive strength. From experimental analysis, it is observed that, 10% increase in compressive strength at 5 % replacement of cement by marble dust. On the other hand, for the fresh concrete, the workability of concrete decreased with increase in the marble dust proportion. At 5 % replacement, there was not considerable change in workability, as compared to controlled mix. But, at 10% replacement showed considerable amount of declination in the workability.

Keywords: Eco-Friendly, Marble Dust, Marble Sludge, Sustainable Concrete.

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Paper Acceptance ID. 53

**Experimental Study of Properties of Fresh and Hardened Concrete
Made With Locally Available Rounded and Crushed Coarse Aggregates
in Khuzdar District**

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Abstract. Properties of fresh and hardened concrete are strongly influenced by coarse aggregate fraction in concrete. As, aggregate occupies 70 – 80 % of total volume of concrete. The expected performance of concrete is highly subjective by selection of size and shape of coarse aggregates. This research study is carried out to investigate the effect of locally available rounded coarse aggregate (RCA) and crushed coarse aggregate (CCA) on workability and compressive strength of concrete. Concrete prepared with two different sizes of coarse aggregate i.e. 12.5mm and 19mm. Total thirty-two (32) cylinders (6" diameter and 12" height) were cast. All the specimens were then tested after 28 days curing period. The result depicted that slump value remain higher for the concrete made with RCA. While concrete made with crushed coarse aggregate (CCA) showed higher compressive strength then the concrete made with RCA by 27.5% - 61.4%.

Keywords: Concrete, Aggregate, Size, Shape, Slump, Compressive Strength.

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Paper Acceptance ID. 68

Replacement of Sand by Marble Powder in Concrete Mix

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Abstract. Rapid increase in number of marble industries and their produced waste has been constantly remained a source of hazards to the environment. Out of total marble waste, 70% waste is from the mining, processing and polishing stages of marble production. At the same time, natural sand deposits are decreasing with time. So, there is acute need of an alternate source that can be used as inert material which matches the properties of sand in concrete. Thus, recycling of marble dust can be one of the alternate of sand in concrete. This study has been conducted, to demonstrate the possible use of marble powder as partial replacement of sand in concrete, and to know the effect of marble dust on compressive and flexural strength of concrete at 25%, 50%, 75% and 100% replacement of sand by weight. In this research, total nine cubes and nine beams were cast using conventional concrete mix ratio. All the specimens were tested in Universal Testing Machine (UTM) at 7, 14 and 28 days curing age. From experimental investigation, it is observed that compressive and flexural strength increases 14.5% and 25.3% respectively at 50% replacement of sand with marble dust. Moreover, as percentage of marble dust increases then both the harden properties improved till 50% replacement, beyond this percentage there is decrement in strength. Therefore, this study made it very clear that marble powder can be partially used as replacement of sand in concrete.

Keywords: Marble Powder, Concrete, Recycling, Compressive Strength, Flexural Strength.

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Paper Acceptance ID. 73

Comparative Study of the Compressive Strength of Concrete using River Indus Sand as Fine Aggregate

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Abstract. In construction industry, the use of hill sand in concrete as fine aggregate has increased enormously. But, hill sand deposits are natural and limited, so rapid use in huge amount will cause shortage of resources which adversely impact on sustainable resources for the generations to come. This paper presents the comparative study of the compressive strength of concrete using river Indus sand as fine aggregates. In this study, compressive strength tests were performed at curing ages of 7, 14, 21 and 28 days respectively using three mix ratios of 1:2:4, 1:1.5:3 and 1:1:2 at 0.5 water cement ratio. Slump test was also conducted for each type of concrete mix. The results showed that the slump of concrete was reduced with the use of river Indus sand as fine aggregate. Furthermore, 20%-30% reduction in strength was observed in concrete samples with river Indus sand as fine aggregates than those of hill sand. Therefore, the river Indus sand can be beneficially used in concrete as fine aggregates.

Keywords: Compressive Strength, Slump, River Indus Sand Hill Sand.

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Paper Acceptance ID. 74

Evaluation of Mechanical Properties of Dry-Stack Block Masonry

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Abstract. The expanding interest in earth development as a practical building arrangement has prompted the advancement of current earth development systems. Specifically of brick/blocks masonry, made of compacted masonry units known as Dry-Interlocking Masonry Construction. Dry-Stack masonry, in the absence of mortar joints has few advantages over the ordinary masonry like its simplicity of development, easy construction technique, less requirement of skilled labor and higher compressive quality, which make it different from ordinary masonry construction. From the experimental results, it is concluded that compacted Hydra-form Dry Interlocking blocks have higher compressive strength and higher prism compressive strength, as well. The initial deformation in prism test was observed which is due to the unevenness in dry contacting surfaces of bed plane, results reduction in prism strength. It was also observed that water absorption of Hydra-form blocks is very less as compared to other masonry units. And thermal performance has also been assessed theoretically by calculating U-value of Dry-Stack masonry for which the thermal conductivity of masonry units/blocks was measured experimentally.

Keywords: Hydra-Form Blocks, Dry-Stack Masonry, U-Value.

*Corresponding author

Paper Acceptance ID. 76

Semi-Permanent Structures (Sandwich Panels)

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Abstract. Polyurethanes (PU) are some of the most versatile plastic materials. This insulated panel is made up of a rigid core sandwiched between two metal sheets. The rigid core is made of polyurethane which is well known for its excellent heat insulation properties. Polyurethane sandwich panels are also the standard building material for cold rooms and controlled atmosphere application throughout the world. Furthermore, the panel's high insulation properties can be used for low temperature applications in cold rooms. PU sandwich panels can hold temperatures from - 45 degree Celsius to + 80 degree. These panels are manufactured in a continuous process of joining the insulating core with external lining, most often metal plates. The final product is a sandwich panel consist of several layers. Metal lining protects against weather conditions, such as rain or snow. While, the core, made of polyurethane foam which guarantees thermal and acoustic insulation. When these parts joined with lining, becomes a barrier protecting against fire, snow load, wind, temperature and other factors. The annual worldwide consumption of polyurethane for the use of insulation is approximately 662 Million Kilograms. It is a great composite prefabricated building material that can help to save energy, increase safety and add to daily comfort, and thus significantly improving the quality of modern life.

Keywords: Polyurethanes, Plastic Material, Thermal and Acoustic Insulation.

*Corresponding author

Paper Acceptance ID. 81

**To Investigate the Effects of Locally Available Recycled Coarse
Concrete Aggregate on the Properties of Concrete**

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Abstract. The rate of demolition of concrete structures has been intensely increased in the recent decade. Due to scarcity of land for dumping these demolished concrete structures and rising cost of natural aggregates. It is suggested by researchers for recycle the demolished concrete to obtain recycled concrete aggregate. This research work focused on the use of possibility of recycled coarse concrete aggregate (RCA)-obtained by crushing demolished concrete collected from different areas in the vicinity of Khuzdar in Pakistan. This experimental study comprises on the comparison between controlled concrete and concrete made with partial replacement of RCA i.e. 0%, 15%, 30% and 45%. For experimental investigation, total twenty-four (24) cylinders (6 inch diameter and 12 inch height) and twelve (12) beams (6inch x 6inch x 20inch) were cast with concrete mix ratio of 1:2:4. It is observed that there was no negative effect on the mechanical properties of concrete up to 30% while significant changes were noticed on 45% replacement of natural coarse aggregate by RCA.

Keywords: Demolished Structure, Concrete, Recycled Aggregate, Natural Aggregate Mechanical Properties.

*Corresponding author

Paper Acceptance ID. 83

Study of Mechanical Behavior of Concrete Made with Partial Replacement of Lakhra Coal Power Plant Fly Ash

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Abstract. The overexploitation of natural resources has affected the environment drastically. It is, therefore, need of the hour to use, recycle and manage safely the waste material. In this research waste obtained from combustion of coal in power plants is used in concrete manufacturing. This research aims at studying the compressive strength and tensile strength of concrete made with ordinary portland cement (OPC) in comparison with Concrete made by partially replacing cement and fine aggregate with fly ash and bottom ash respectively. In the experimental work total 30 cubes and 30 cylinders were cast. Total work was carried out in five trials, each consisting of six cubes and six cylinders. First trial was made on manufacturing of normal concrete at 1:2:4 and w/c 0.5. In remaining four trials, the cement is replaced with 10% of fly Ash, however, the bottom ash is replaced in varying degrees in each trial. In second trial, fine aggregate is replaced with bottom ash by 20%, 25% in third trial and 30% and 35% in fourth and fifth trials respectively. Cubes cast had the standard dimension of (6”x 6”x6”) and cylinders were of 12” in depth and 6” in diameter. Results in terms of compression and tension were observed after curing the sample for 7 days and 28 days. The research results suggest that, at 35% replacement the compressive strength increases by 26.34 % and tensile strength increases up to 18.04% at 7 days curing. At 28 days curing, 14.4% increase in compressive strength was achieved at 20% replacement of bottom ash with fine aggregate and maximum tensile strength was achieved at 30% bottom ash with fine aggregate that is 29.21% more than normal concrete.

Keywords: Environment, Coal Ash, Ordinary Portland Cement.

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Paper Acceptance ID.132

**Experimental Analysis on Compressive Behavior of ECC using
Polypropylene Fiber**

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Abstract. Concrete is a material with certain extraordinary properties however, it is not an ideal material in terms of its bending. The compression of normal concrete is within the range of 20 – 28 MPa, however it is not sufficient for some cases where intensity of load is too much high. A modern kind of material is studied in this research i.e. Engineered Cement Composite (ECC) from a previous research by Professor Victor Li from University of Michigan. It is a bendable concrete made with fine materials like cement, sand, fly ash and certain amount of polyvinyl alcohol (PVA) fiber. The portion of coarse aggregates and fine aggregates replaces by sand and fly ash respectively. Using cement (OPC), sand (250micron pass and 150micron retained), fly ash (Class F) with addition of polypropylene fiber from 0%, 0.25%, 0.5% & 1%. Compressional property of specimen was measured by testing cubes of 4x4x4 in³ in UTM. Results revealed that, 101.40 % increment in compression was found at 0.5 % of fiber. The study concludes that compressive strength of ECC is double the normal concrete. This composite could substitute the normal concrete where high compression is the ultimate requirement.

Keywords: Engineered Cement Concrete, Compressive Strength, Polypropylene Fiber.

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Paper Acceptance ID. 137

Structural Stability of Multistory Buildings with Floating Columns

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Abstract. Floating columns are the structural compressive members, generally erected up from normal sections of primary beams, girders and sometimes from slab which create structural stability problem. Such type of columns is mostly being adopted by many local construction builders without any proper analysis and design; to save the construction cost and to increase living space as per client's satisfaction which ultimately brings the structural stability in critical situation. This research aims to analysis multistory buildings with floating columns and to calculate threaten parameters associated with different loading types like gravitational and seismic loads, with different loading intensities on different parts of structure. For simulation and analysis purpose, a commercial, twelve story building- under construction process located in Hyderabad, Sindh were chosen. Selected building is analyzed in Extended Three-Dimensional Analysis of Building System (ETABS) for both static and dynamic loading conditions. The seismic input parameters are ($C_a = 0.22$, $C_v = 0.32$ and $Z = 2A$) and soil profile S_D is used. In this research, exterior gird columns and interior (centrally located building zone and ramp grid for parking floor) columns are taken as floating columns. For Structural stability, interpretations are drawn in terms of structural parameters including base shear, overturning moments, lateral displacement, lateral drift and time-history analysis. These parameters are taken separately for building with floating and non-floating columns. Ultimately, comparison is made between both types of columns with the help of graphs which recommends many suggestions to be under taken for structural stability.

Keywords: ETABS, Floating Columns, Seismic Analysis, Structural Stability.

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Paper Acceptance ID. 141

Effect of Rice Husk Ash as a Partial Replacement of Cement on Fresh and Hardened Properties of Concrete

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Abstract. Pakistan, being one of the most prominent rice producing countries in the world, produces approximately 6 million tons of rice each year. During milling of paddy, 78% of paddy is received as rice and 22% is received as rice husk. And when this husk is burnt, about 25% of rice husk ash (RHA) is generated. This paper presents the effect of (RHA) as a partial replacement of cement on the fresh and hardened properties of concrete. The rice husk ash obtained in a muffle furnace was burned at 750°C and passed through #200 sieve. Specimens were cast at 0.49 water cement ratio and their strengths were evaluated at 3, 7, 28 and 56 days. The compressive strength and workability were determined at different percentages of RHA (0%, 5%, 10%, 15% and 20% of cement weight). The result showed an optimum value of compressive strength occurs at 10% replacement of RHA while the workability of concrete decreased as the proportion of RHA increased.

Keywords: Rice Husk Ash, Cement Replacement, Workability, Compressive Strength.

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Paper Acceptance ID. 160

Statistical Assessment of Compressive Strength of High Strength Concrete Mixtures with Hybrid Blends of Metakaolin and Fly ash

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Abstract. This research aims to investigate the influence of binary and ternary blending on compressive strength of high strength concrete mixes prepared with metakaolin (MK) and fly ash (FA) as a partial replacement of cement. The experiments were designed by using response surface methodology (RSM) prior to performing the test. Total nine mixes were prepared with various combinations of aforementioned materials. The replacement proportions for MK were 5% and 10%. On the other hand, for FA were 15% and 30% by weight of cement respectively. The effect on compressive strength was evaluated by analysis of variance (ANOVA) at 7 and 28-days. The empirical relationship between MK and FA was obtained by using regression analysis. It was observed that the MK showed better strength enhancement than FA. The workability of concrete mixes was significantly improved with FA, whereas the drop in compressive strength was recorded at all ages of concrete. Binary blends of cement with 10% MK presented highest compressive strength of concrete, whereas, concrete mixtures prepared with ternary blends of cement, MK and FA excluded the adversative effects on compressive strength caused by the binary blending of cement with FA. The concrete mix with 15% FA and 10% MK provided almost similar compressive strength compared to control concrete mix at 28 days.

Keywords: Compressive Strength, Fly Ash, High Strength Concrete, Metakaolin, Response Surface Methodology, Workability.

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Paper Acceptance ID. 166

Effectiveness of Screens in Energy Dissipation Characteristics of Tuned Liquid Dampers

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Abstract. Reducing structural displacements due to wind or earthquake has always remained a challenge and primer design requirement. Active dampers and Passive dampers are commonly used as one of the methods to control the structural drift. Passive dampers, if designed properly, can reduce the structural displacements without adding any supplementary devices. Tuned liquid damper (TLD), a passive energy damper, is an overhead water tank based system mounted on top of the building which can reduce structural drift by increasing inertial and viscous friction forces. It had been observed from past experimental studies, that TLD only performs, if it is tuned with the natural frequency of the building in the limited range of frequency ratio. Also depth of water in tank and dimensions of tank was found dominating parameters in effectiveness of TLD. In this research, focus was made to optimize the current technique so that it can work for different liquid depths. For this purpose screens were inserted in TLD to modify the sloshing behavior of water in tank. A free vibration test was performed on a scaled medium rise building model, to determine its dynamic characteristics. Performance of TLD was determined at different depth of water for both cases i.e. with and without screens. In case when no screens were inserted, it was found that there exist an optimum depth of water which results in maximum damping ratio which means that it will have maximum reduction in drift. While in case of screens, the system was found effective for wide range of water depths.

Keywords: Drift, Energy Dissipation, Free Vibration, Structures, Tuned Liquid Damper (TLD)

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Paper Acceptance ID. 202

Numerical Strategies for Damage Assessment of Reinforced Concrete Sandwiched Panels (RCSPs) Subjected to Blast

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Abstract. The explosives occurring in urban areas or near buildings and protective structures may cause significant damage and loss of life. Many countries have initiated extensive research on the impact of explosion analysis and protection of building technologies to develop ways to protect it. This paper presents the behavior of reinforced concrete sandwiched panel (RCSPs) subjected to blast loading by using simplified Finite Element numerical approach. An RCSP is made of an EPS (Expanded Polystyrene) foam core which is sandwiched between reinforcement meshes and shotcrete. Blast load was analytically determined as a pressure-time history by using Unified Facility Criteria (UFC) 3-340-02 and RCSPs model is analyzed in SAP2000v14. The results validate that it is possible with conventional software to simulate an explosion effects and give a preliminary assessment of the structure damages. On the basis of results the governing failure criteria for RCSP under blast loading were developed and necessary mitigation options are also analyzed for safe design. It was concluded that RCSP has greater capability of absorbing and dissipating energy generated by blasting and a sustainable solution to the blast as well as stable against scattering as compared to other typical building systems used in Pakistan.

Keywords: Blast, Numerical, Finite Element, RCSP (Reinforced Concrete Sandwiched Panel).

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Paper Acceptance ID. 206

**A New Open Iterative Method for Solving Nonlinear Equations Arising
in Civil Engineering Problems**

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Abstract. In this paper a new open iterative method has been suggested and analyzed for solving Civil Engineering problems. The purpose of proposed iterated method is proposing a mathematical tool for solving all possible roots of polynomial of higher degree functions and transcendental functions which arises in a practical application in Engineering, Physics, Chemistry, Biosciences, etc. The proposed open method has second order of convergence, and is derived from Quadrature Formula. Few physical problems to demonstrate the competency of proposed iterative method with the Newton Raphson Method. C++ and EXEL are used to examine the outcomes and graphical representation of proposed method. Henceforth, it has been observed from the results and comparison of new open method is that the new second order open method is superior to Newton Raphson Method.

Keywords: Application Problems, Quadrature Formula, Order of Convergence, Accuracy & Error.

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Urban Planning & Architecture

Paper Acceptance ID. 21

The Strategy for the Development of Urban Green Spaces in Hyderabad City

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Abstract. The green spaces in urban cities can provide optimum benefits such as a strong local identity, well socio-cultural environmental services and simultaneously healthy for mental and physical health of citizens. That is direct reason to control increasing air pollution, and eventually promote tourisms and valuable investment. One of the main cause of damaging values of Hyderabad city is lack of green spaces that is also leaving poor impacts on life style of dwellers. This title of research is about to analyze both requirement and supply of green spaces in Hyderabad city. The idea for the research starts from the observation that the amount of green spaces in Hyderabad city and to understand the actual reasons which fails the green spaces management of the city moreover, how to cope with the failure of the green space challenges accordingly. These observations provide both inspirations and challenge to policy makers to make Hyderabad city more sustainable. In a city like Hyderabad, where natural resources are very rare and opportunities for spending green infrastructure are very infrequent, it is essential for any new development to be based on a clear understanding of the situation in the city. This research paper tries to make a clearest picture yet to be achieved of urban green spaces provision in Hyderabad city. It is accessible for policy makers, planners and investors to help in improvement of the lives of future generations of this great city Hyderabad.

Keywords: Planning Strategies, Social Sciences, Urban Green Spaces.

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Paper Acceptance ID. 35

**An Investigation of Present Situations of Burn Care Units in Vicinity of
Hyderabad**

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Abstract. Burn care is one of the most neglected health care issues in Pakistan. The mortality rate for victims with 40 to 50 per cent body burns is almost 86 per cent in Pakistan. While the mortality rate is less than 10 per cent in the developed countries for victims having 50 per cent burns. According to an estimate 195,000 deaths are reported every year due to burns in which majority of cases belong to low socio economic class of our country. None of the burn units in Pakistan is giving satisfactory treatment to the patients. The situation is even worst in Hyderabad. The lack of awareness is clearly reflected by the civil hospital of city. This study is aim to highlight the present situation of burn care units in Hyderabad initially. Also it aims to investigate the causes of burns in interior Sindh patients. The research work includes unstructured interviews with the concerned doctors and head of departments of burn units. The causes of burns were determined through a questionnaire survey from relevant medical practitioners and by physical visits of hospital units in the vicinity of Hyderabad. This study proposed a new specialized burn care center with required capacity on the basis of frequency of patients and necessary facilities for patients. This investigation of present condition & suggestions is a road map for top management of Hyderabad and Jamshoro Civil Hospital.

Keywords: Burn Care Units, Causes of Burns, Health Care, Hyderabad.

*Corresponding author

Paper Acceptance ID. 42

Sustainable Infrastructure to Make Our City Sustainable: A Case Study of Karachi

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Abstract. Karachi is a developing mega city; the population has soared to in excess of 23,000,000 and is growing by approximately 4.90%. Mass urbanization can escort to social instability, undermining the ability of cities to be environmentally sustainable and economically unbeaten. Such mega developing cities are supposed to be planned in a way to provide ample job opportunities. In short term, surge of income and availability of jobs can be impacted by factors such as energy shortage, political upheaval, etc. To remain the city economical sustainable, the city government should focus on, transport infrastructure, electricity and natural gas. Also food scarcity and educational facilities are obligatory to create a skilled labor force and maintain the country economy. The present study aims at providing a methodological approach for the mega policies of Karachi. Hence we should focus attention on the sordid infrastructure and its impact on the life styles in the urban areas.

Keywords: City Economy, Social Instability, Transport Infrastructure.

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Paper Acceptance ID. 57

Accuracy Measurement of Google Earth Using GPS and Manual Calculations

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Abstract. Measuring the long distance and larger area is always remained tedious job for surveyor due to various factors like, it consumes more time, bad weather, error in instruments being used etc. But among all, the most important factor is time required to accomplish the particular task. Certain time, Civil engineer requires preliminary survey data regarding the distance between two points or area of particular place quickly for deciding the possible alternate routes and knowing the area of particular location accurately. Manual surveying using chains, taps, level machines etc. require time and financial help to accomplish the task. On the other hand, recent developments in Global Information System (GIS) made this task easy to perform by remote sensing and using Global Positioning System (GPS) application based software. But accuracy of GIS is need to be determined for getting the precise measurements. Therefore, this research aims to investigate the accuracy in distance and area of selected location using Google Earth Pro (GIS application software). From field survey data and manual calculations, it is observed that manual calculation of distance and area is more accurate than that of Google Earth Pro measurements.

Keywords: Accuracy Measurement, Global Information System, Global Positioning System, # Google Earth Pro, Remote Sensing.

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Paper Acceptance ID. 98

Trip Generation Model of Citizens of Hyderabad City to Civil Hospital

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Abstract. The accessibility to different places within and out of city from resident places is very imperative in facilitating the life. Location and distance are important criteria in selecting the mode of travelling from resident place to the desired place. It also depends on the possible routes and mobility which helps in designing land use patterns. One of the most important places for citizens to travel regularly is hospital. Thus, this paper has focused on designing travelling behavior of the people from various places to civil hospital Hyderabad. Through questionnaire survey various important aspects required for assessing travelling behavior were determined. Frequency analysis was performed through statistical software package SPSS. Based on data, a model was developed with ArcGIS to show the travelling areas and distance of the people. Results of the data analysis indicated that most preferred mode choice for the trips to civil hospital was the bus and motorized transportation modes. Analyzing the trip time it was realized that most of the people consumed more than 50 minutes time to reach the hospital. Their trip to civil hospital was affected by bad conditions of roads, long distance to the destination, traffic congestion and poor traffic management. Majority of the respondents showed dissatisfaction over the public transportation. Hence, it can be concluded that there is serious problem with the public transportation of Hyderabad City. ArcGIS accessibility model showed that over 70% of the respondents travelled more than 3 Km to reach the civil hospital. In order to make smooth journey, this model and findings of the study can provide basic and useful information for authorities to improve road conditions and facilitate the public to have proper access to reach at civil hospital.

Keywords: Accessibility Mode, Civil Hospital, Hyderabad, Travel Choice.

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Paper Acceptance ID. 108

**Current Status and Improvement of Neighborhood Parks in Qasimabad
Town, Hyderabad**

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Abstract. Neighborhood Parks are amusement places where people enjoy the recreational facilities in their leisure time. The role of neighborhood parks and their need has been discussed in various researches since the advent of modern technology innovations. Neighborhood parks are the essential parts of public infrastructure that provides beneficial functions for the city environment. They are basically amenities that offer recreation to enjoy and can provide people with healthy activities which are essential for the good health of the people. Neighborhood parks play a pivotal role in promoting quality of life in urbanized areas. The neighborhood parks in Qasimabad town, Hyderabad are decaying since a long time which has compelled people to access parks which are far away from their homes. The neighborhood parks are decaying due to inadequate infrastructure, improper ground fields, mismanagement of local government, lack of security and privacy. The study aims to save the neighborhood parks from further decaying by improving the mentioned factors. The present condition of neighborhood parks was determined through questionnaires which resulted that recently the people have no other place to enjoy the recreational services within their walkable distance and most of the people have stated that the neighborhood parks in Qasimabad are in decaying. The study suggests that the improvement of neighborhood parks must be taken into consideration, so that the residents of Qasimabad can enjoy the recreational services within their reach and thus a healthy, safe and sound environment could be created.

Keywords: Decaying of neighborhood parks, inadequate infrastructure, recreational services, and walkable distance.

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Paper Acceptance ID. 130

Revitalization of Keti Bandar Waterfront by Sustainable and Ecological Urbanization

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Abstract. Pakistan has a very rich and diverse ecosystem that can be beneficial in terms of ecology, trade and economy. Keti Bandar is a standout due to its mangroves, marine life, and aquaculture, historical and geographical traces of sustainable development. Its history is as old as the civilization of Sindh. There is an utter need of the development of waterfront at the Keti Bandar which has also been realized by various organizations, recently due to its high credentials and potentials. The aim of this research is to bring the eco-tourism in the region for sustainable socio-economic development. The development would also create direct links in vector form between the local ports through the water which are distant on the land. The research focuses on the urban activity that does not pose existential threat to the species and habitats; rather they may be preserved and exhibited to attract the tourists. The aim of eco-tourism can be achieved by building a recreational hub and subsequently commercial and residential facilities. It can bring occupation to the general public and ultimately lead to rehabilitation of the waterfront and revival of lost coastal culture and communities.

Keywords: Ecosystem, Mangroves, Eco-tourism, Urban Activity.

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Paper Acceptance ID. 136

Access of Low Income People to Housing: How Far Khuda Ki Basti-4 Housing Project Kalashah Kaku, Lahore is Meeting Housing Need of Low Income People?

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Abstract. Like many other cities in the developing world, Lahore is also facing a severe housing problem. In this regard, government has taken number of initiatives but these have proved to be inadequate and un-affordable to low income people due to high land prices. Private sector has also taken initiatives to provide housing. In this context Saiban, an NGO has launched Khuda-Ki-Basti-4 housing project at Kala Shah Kaku in Lahore with the view to replicate Khuda-Ki-Basti housing scheme initiated at Hyderabad and which proved to be a successful project primarily due to incremental development approach. This research attempts to assess that whether KKB-4 is serving its purpose and that land speculators have not jeopardize the access of low income people to housing. Results of interviews with residents show that the criteria necessitating stay in the reception area within 45 days is one of the key factor ensuring that only low income people have access to plots. People are happily living there and proud to be part of Khuda-Ki-Basti project despite some concerns relating to infrastructure and amenities. The project has the potential to be replicated by the public sector agencies provided it gets conceptual acceptance of decision makers.

Keywords: Housing, Khuda-Ki-Basti, Low Income People.

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Paper Acceptance ID. 140

**Revival Organic Material in the Light of Growing Energy Crises and
Human Comfort in Residential Building**

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Abstract. The advancement of the humankind at the turn of the nineteenth and twentieth hundreds of years brought the immense development in the world. On the contrary, this development caused high amount of energy wastages. At the point when uninterruptedly the necessity for the energy is increasing, and capacities of expanding the supply of energy are constrained, there is intense need to utilize the natural resources. As Pakistan is exceptionally rich in architecture with history of 5000 years of building development. The old architecture is comprise of organic and natural materials utilized as a part of the structures to provide natural thermal comfort to the users without the utilization of non-sustainable energies. The burnt bricks and even adobe walls in Moen-jo-daro are existing even today. The utilization of natural materials in the building require less energy and provide more thermal comfort to the inhabitants. Furthermore, the utilization of less energy would generate less greenhouse gasses outflows in the built environment. Keeping in view the current energy crisis, this study highlights the importance of old architectural material and provides suggestion towards revival of old architecture.

Keywords: Built Environment, Revival of Organic Material, Sustainability.

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Paper Acceptance ID. 144

Impact of Wrong Architectural Conservation on the Authenticity of Heritage Buildings

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Abstract. An old architecture that consists of robust art, crafts and construction techniques is an important asset of any society. Sindh is very rich in architectural heritage since 5000 years to colonial period. Worldwide, the heritage buildings are protected either by preservation or conservation to maintain their historical context and message that the monuments carry behind it. The restoration works that require to carry out, depends on the scale of dilapidation and damage caused to the monument. The conservation works require highly sophisticated efforts and careful interaction. Unfortunately, Pakistan has no trained conservators, thus most of the restoration work carried out is done without scientific conservation methods. Instead of saving monuments, the wrong interaction vanishes out their particular message behind it. This paper focuses on case studies of two monuments. The first one dates back to Kalhora period namely Tomb of Ghulam Shah Kalhoro and the second one is from Talpur Period named as Miran-ja-Qubba. Both are situated in Hyderabad, Sindh. This paper briefly describes the architecture of these monuments and the wrong conservation carried out recently. The paper draws conclusions and recommendations regarding the impacts and its effects of wrong conservation.

Keywords: Authenticity of Monument, Message, Wrong Conservation.

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Paper Acceptance ID. 145

**Study of Urban Sprawl and Its Social and Environmental Impacts on
Urban Society in Latifabad Town, Hyderabad, Pakistan**

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Abstract. By the year 2016, Latifabad town accommodates 0.7 million, which was essentially proposed for 60,000 people. Some of the problems of Latifabad town include excessive traffic congestion; pollution, increment in infrastructure costs for community services; fragmentation of housing with low density areas and increase in energy consumption that causes social segregation and environmental degradation. For evaluating social and environmental impacts of sprawl, various factors were derived based on socio-environmental impacts. Quantitative results were generated using Yeh's index of satisfaction and SPSS software; which were based on questionnaires which filled by 480 occupants. The average satisfaction index from this analysis is found out to be -41.1431, which shows a highly dissatisfaction level of residents of Latifabad town. Some smart growth opportunities can be useful in reducing the urban sprawl as to advertise the problem and raise awareness; to enforce population control, compact developments to suit their needs and enhance the use of new technology to facilitate more people to be able to work from home. The research is beneficial to reduce the sprawl as the result of this study can give the directions to local development authorities, if considered the research proposal results, the urban sprawl can be controlled at certain level.

Keywords: Urban Sprawl, Urban Growth, Urban Development, Urbanization.

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Paper Acceptance ID. 186

Analysis and Conservation of the Tomb of Jam Nizam Al-Din at Makli

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Abstract. The tomb of Jam Nizam Al-Din is situated in Makli and holds a great significance owing to its complex construction technique and unique architectural elements and historical background. Dating back to the early 16th century the tomb represents ideal handcraft in stone carving. Sultan Jam Nizam al-Din Shah, known as Jam Nindo, ruled from 1461-1508. The objective of this research is to determine the existing condition of the tomb viz. cracks and missing parts of structure. And to study the art, deco and architecture as well as to propose measures restoration of members to conserve the site for a long lasting structure. From the physical survey, it has been deter-mined that the entire building is subjected to a tilt of maximum 8” towards east. The method of the research is based on quantitative survey. The outcome of this research will be a restored tomb preserved for a long.

Keywords: Heritage Conservation, Rehabilitation, Sustainable Structure.

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Paper Acceptance ID. 188

Determining Resident's Perception about Housing Affordability (A Case Study of Hyderabad)

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Abstract. For living life, to own a HOUSE is prime need but in the recent times this a very prime need becomes unaffordable according to people satisfaction especially for low income people. Therefore it is core object of study to identify the factor which are affecting the housing affordability. For achieving this object a questionnaire survey was adopted, in which 53 questionnaire were filled as per the sample size, people were selected randomly to fill the questionnaire. It came in to information through analysis of data with SPSS that most of people are not satisfied from their current houses and they are unaffordable to purchase a house to satisfy their need. So according to suggestion of experts it has been recommended to build small affordable housing schemes in the outskirts of city.

Keywords: Affordable Housing, Satisfaction, SPSS.

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Paper Acceptance ID. 193

**Study on Sustainable Architecture and Built Environment and Its
Application on High Rise Buildings**

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Abstract. The sustainable urban forms and their design concepts have been analyzed in this research study. Moreover, the query for certain urban practices involvement more than others to sustainability have also been discussed. A confined analysis has been used with the infinite body of sustainable development and environmental planning. Solidity, sustainable transport, mixed land uses, diversity, passive solar design, greening and consistency are the seven main sustainable design concepts that have been analyzed with the identification of sustainable urban forms like nontraditional development, the urban containment, the compact city, and eco-city. Sustainability arose as one of the major issue in architectural design, which has very low built/natural environment. In this research, for energy conservation we propose solar glass in windows, on roof tiles and wind catcher method for cooling of building. Treated waste water is proposed for gardening purpose. Different Computer application software like 3D studio Max, Revit Architecture, Photoshop has been used in designing purpose of the project to make aesthetic views of building and to show the circulation and functions that how it will appear. The key findings of this research are practical use of renewable energy technology, pointing the impact of sustainable development on nature and offer a pattern of sustainable urban form for supporting the planners to achieve the sustainability in architecture.

Keywords: Sustainability in Architecture, Sustainable Construction, Built Environment, Energy Conservation.

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Paper Acceptance ID. 194

Assessment of Housing Characteristics of Katchi Abadi Dwellers in Old Wahdat Colony Hyderabad, Sindh

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Abstract. Housing is often considered as one of the basic human needs. It is ranked second after food and there after clothing with an insightful impact on the life-style, health, happiness as well as efficiency of the individual. The living condition and lifestyle of the households can be assessed indirectly by asking respondents about their housing characteristic. Old Wahdat Colony is Katchi Abadi of Hyderabad in which most of the people are low income and are unable to improve their living conditions. The study's aim is to examine the housing characteristics, which put a direct impact on housing dwellers in order to provide guidelines to improve their life style. Close ended questionnaire was established for data collection regarding housing characteristics. After collection of data it was analyzed through frequency distribution and percentage distribution. Findings from the study revealed that living conditions of residents were substandard as their income level was low. It was also found that contaminated water was supplied in the area. So, there is a critical need for the installation of proper water supply system for providing clean drinking water, and also identification of the resources present in the study area by which they can utilize their skills, which can help them to improve their economic conditions.

Keywords: Housing Characteristics, Hyderabad, Planning.

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Paper Acceptance ID. 203

Jacketing a New Structure over the Old Mausoleum of Saint 'Saman Sarkar' at Pangrio, District Badin

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Abstract. The tomb of famous Sufi Saint SAMAN SARKAR is situated in District Badin. The Old mausoleum was built in the era before partition and its appearance suggested the Architecture of Kalhora period. The 24'-0" x 24'-0" room size of the existing structure was getting too small for thousands of devotees visiting the place and the need arose for extension of the building. With the same objective and to find newer, cheaper and faster methods for building the site having same 'Shape Grammar' as that of the old structure, the idea of amalgamating traditional Architectural Shapes with modern construction techniques came up. Thus the new octagonal structure having four minarets on GF, four minarets on FF and a dome was erected over the existing structure and thereby removing the old structure underneath the new one. As an outcome of this research and development a new sustainable RCC frame structure was produced having the same Shape grammar as that of the preceding structure.

Keywords: Heritage Conservation, Rehabilitation, Sustainable Structure.

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Paper Acceptance ID. 204

**Piloting a Floating Base Structure for the Old Mausoleum of Saint
'Saman Sarkar' at Pangrio, District Badin**

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Abstract. The tomb of famous Sufi Saint SAMAN SARKAR is situated in District Badin. The Old mausoleum was built in the era before partition and its appearance suggested the architecture of Kalhora period. The 24'-0"x24'-0" room size of the existing structure was to be extended to 50'-0"x50'-0" room size. Considering the traditional brick masonry architecture to be highly expensive and time consuming today and also the scarcity of proper skilled personnel, a plan for using RCC framework instead was devised. Due to low load bearing capacity of the surrounding sandy soil, an idea of expanded and floating footing was decided upon. As an outcome of this research and development a new sustainable RCC frame structure was produced having two layered ring shaped plates in the base that has withstood earthquakes of (BHUI) up to 7.5 Richter scale and heavy floods due to rains of 2010.

Keywords: Heritage Conservation, Rehabilitation, Sustainable Structure.

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