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Book of Abstracts

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LPG Recovery Plant and Recovery OF LPG from NGL through Traditional Technology By Using HYSIS Software

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Abstract

Textile Engineering and Technology / 2

Enhancement of anti-microbial activity by natural finishes prepared from herbal spices and wastage peel of fruits applied on textile substrate.

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Fabrics with antibacterial assets have become essential to organize and manage the infestation by microbes, and to reduce the formation of odor. The fabrics with antimicrobial finishes are highly hygienic in all dimensions particular, when consumed by human beings. In order to evaluate antimicrobial activity, we have prepared natural and organic extracts from herbs and wastage of fruits like Pomegranate. The fabric samples were tested for antimicrobial activity against bacterial strains like Staphylococcus, E.coli,under qualitative analysis method AATCC 147.
The results indicated that the cotton fabric show a better microbial resistance against the above mentioned strains by both two natural finishes on untreated and treated substrate. As per qualitative analysis, the fabric treated with extract showed best reduction against Staphylococcus by analyzing antimicrobial activity. The results were improved by binding agent sodium bicarbonate, which helps to improve the antimicrobial finish bind with fabric.

Key words: Textile fabrics, Natural Extract, Fruit peel , antibacterial activity, Staphylococcus Aureus, Escherichia coli,

Architecture and Town Planning / 4

Disaster Mitigation Strategies for Adobe Houses: A Case Study of District Awaran, Balochistran

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Every year disasters affect hundreds of millions of people globally causing damage that can take years to recover from. The process of rebuilding and re-establishing is vitally important to the successful continuation of life, industry and growth of affected societies and communities. Besides human casualties one of the most visible and striking effects of any major disaster is the destruction of houses. Construction of houses will be a major activity in the reconstruction phase of a disaster. The impact of disasters caused by natural hazards such as earthquakes can have serious consequences. Vulnerable populations are faced with unforeseen hardships, misery and death if their houses and buildings collapse and supporting infrastructure is severely damaged. Awaran District, Balochistan is one the least developed areas of Pakistan with very low Human development index (HDI). In 2013, an earthquake of M 7.7 occurred in the region, causing damage to houses and human lives. The study covers the findings of the field survey for the damages occurred to the adobe houses in Awaran due to earthquake and analyse the causes of failure of the structures. It further suggests the design strategies and measure for the mitigation and prevention against these damages in order to decrease the loss to housing stock and lower the risks to human life due to failure of structures during earthquake.

Keywords: field survey, earthquake, adobe houses, disasters, design strategies, Awaran

Civil Engineering / 5

STRUCTURAL DEFECTS IN RESIDENTIAL BUILDINGS: A STUDY OF QUETTA, PAKISTAN

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Housing plays a very important role in the human life and our society. Housing has a great social and economic impact on our lives and the way we live. It has direct and immediate effect on health, education, economy, environment, political and social life of any society. In today's technologically advanced world, the quality of housing and its maintenance in a livable condition yet remains a challenge in many parts of the globe. This study identifies the various types of structural defects present in the residential buildings of Quetta city. The data was collected from selected areas of the city using questionnaire, physical identification survey, and conducting interviews based on the fundamental knowledge of structural defects and their effects on buildings. It was found that houses in Quetta cantonment area possess the highest number of structural defects followed by Pashtoonabad area. Apart from identifying the most affected area, an overall state of the residential buildings in Quetta city regarding structural integrity was also determined. Since, the city of Quetta is located in earthquake zone, it is very important that these types of structural defects should be avoided in future residential buildings and necessary maintenance should be carried out in existing houses to avoid any serious damages to houses and loss of human lives due to the occurrence of any possible disaster.

Keywords: Housing survey, structural defects, residential buildings, disasters, Quetta

Civil Engineering / 6

A study of effect of tempered glass fines in concrete at elevated temperature

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Waste management is a major issue worldwide. Glass is one of the solid wastes. Being non-biodegradable, it is inappropriate for landfill. One of the ways of disposing it off is its use in concrete for partial replacement of aggregates. In this study, tempered glass fines were used as partial replacement of aggregates in order to enhance the fire resistant properties of concrete. Concrete cubes with varying percentage and size of glass fines were tested for compressive strength at normal and elevated temperature (790 degree Celsius). Maximum increase in strength (119% at normal temperature and 50% at elevated temperature) was observed for the 5% replacement of sand with glass fines of size passing ASTM sieve # 4 and retained on sieve # 12

Architecture and Town Planning / 11

Deterioration Morphologies of Historic Brick Imitation Ornamented facades of Mughal Architecture

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The brick imitation ornamentation was initiated in the Jahangir period of Mughal architecture. It was more appreciated during the Shah Jahan period due to its aesthetically appealing craftsmanship and skilled labor. The ornamentation of large geometric surfaces characteristic of Mughal architecture with brick imitation amalgamates these surfaces in a rich cultural harmonious flow with the other ornamentation styles. The brick imitation style of ornamentation vanished with the decline of the Mughal rule and the use of fare face bricks during the colonial period. This paper is focused on the documentation of brick imitation style of the Mughal architecture along with the study of deterioration processes responsible for their weathering in the selected heritage sites of Mughal architecture. This diagnostic study and identification of the deterioration morphologies suggested the preliminary strategy for the conservation of these facades with further scientific analysis for their restoration.

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Real-Time Image Compression Subsystem for satellites using Xilinx Virtex-5QV space graded FPGA

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Abstract—The paper unfolds a methodology for compression of real time images received from the on-board satellite cameras sing the JPEG2000 image compression algorithm).It will enable the satellite image data to be transmitted much quickly and will help in efficiently utilizing the available bandwidth. The JPEG2000 compression scheme was chosen due to its better compression capability as well as allowing for both lossy and lossless image compression. Due to its usage of wavelets,

multiple resolution decompressed images can be obtained as required. The compression rate can be adapted in orbit for transmission bandwidth, compression ratio, decompressed image quality and other features through user-supplied parameters. The system prototype is visualized to be implemented on Xilinx Virtex-5QV space graded FPGA during its development stage. The hardware platform is dynamic-ally reconfigurable, fault-tolerant and scalable. It enhances the robustness, flexibility and survivability of the satellite system. This subsystem will be significant for development of real-time image processing systems for satellites which can be utilized for e-agriculture, road mapping, surveillance, and estimation of damage in case of natural disasters e.g. earthquakes, floods etc.

Textile Engineering and Technology / **14**

NOVEL TECHNIQUES TO ANALYSE THE COMFORT OF CAR SEAT

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The comfort performance of car seat is important factor while producing car seats, each layer of the car seat is tested separately on classical testing machines, which lacks the real car seat performance when all layers are sandwiched. The complication of car seat design and the testing method bring a great demand of portable device which can measure the comfort performance of the real car seat. In this research a novel portable device is designed which work with special heat flux sensor and the device is connected to computer by USB port and values of heat flux temperature of the water and temperature of the surface is provided by the software. Heat flux sensors measure the heat transfer through a surface, and are expressed in kw/m2. The software controls the heating plate adjustment using PID controller. The device is tested with real car seat and shows repeatable and reproducible results.

Mechanical and Material Engineering / **15**

Thermodynamic investigation of M-cycle assisted open-cycle desiccant air conditioning systems

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There is a necessity of low-cost air-conditioning (AC) systems for the agriculture sector of Pakistan e.g. product storage/preservation, greenhouse growing and thermal comfort of animals etc. Solid desiccant air-conditioning (DAC) system can be a handy solution in this regard. The present study gives a detail overview of DAC assisted with the Maisotsenko cycle (M-cycle) system and its applicability for the agriculture sector and livestock applications. Ideal humidity and temperature requirements for the agricultural and livestock applications have been represented on psychometric charts. Comparison between DAC and conventional AC systems has been given which shows the significance of DAC technology in the AC sciences and also represented this difference as graphically. Desiccant (AC) systems are getting lots of attention in order to control the humidity in various air

conditioning applications e.g. product storage, greenhouses and thermal comfort for the livestock. Different materials and arrangements are checked as which desiccant material and arrangement is more suitable in Pakistan situation in the desiccant air conditioning system. Additionally, some analysis has been made to investigate the DAC system which shows the importance of DAC in this field of agriculture as well as in livestock. Results show that the DAC can be low-cost heat driven air-conditioning system for the agricultural sector of Pakistan.
Keywords: desiccant; air-conditioning; M-cycle; agriculture; product storage; Pakistan.

Chemical Engineering / 16

Fluidized Bed Heat Exchange Capacity of Alumina, Coal-char and Bio-char Solids

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Fluidized bed heat exchanger (FBHx) units have significant applications in various industrial processes. Heat transfer coefficient, pressure drop and superficial gas velocity are the most salient parameters used to characterize the behavior of solids in the FBHx. This research broadly identifies the pressure drop and surface heat transfer coefficient of Alumina, Coal-Char and bio-char solids in FBHx. The pressure drop and heat transfer coefficient were calculated at fixed bed height of 6cm by maintaining air flow rate of 8-100 Liters per minute (LPM). Digital temperature sensors are used to measure the bed temperature, air inlet temperature, and heater surface temperature. The results of this study suggest that the effects on surface heat transfer coefficient and pressure drop in FBHx are influenced by bed materials. Among the tested materials, pressure drop and heat transfer coefficient were found of order Alumina>coal-char>bio-char.

Chemical Engineering / 17

Desulphurization of Machh Coal by Leaching Process

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Coal desulfurization prior to usage is frequently subjected to pre-processing to achieve clean fuel and reduce environmental impacts. In this study, desulfurization of Machh coal field of Pakistan was carried out with NaOH and HNO3 as leaching agents. The effects of particle size (6-10 Mesh) and solvent concentration (5-30wt%) on sulfur removal were investigated. The results indicated that sulfur recovery increases with increasing mesh size and solvent concentration. The highest decrease in the sulphur was observed of 44.85% with 30 wt% HNO3 and 10 mesh. Sulphur removal

was observed 24.72% with NaOH under similar conditions. In comparison, HNO3 was found effective leaching agent when compared to NaOH.

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PRODUCTION OPTIMIZATION BY MODELING.

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Scop:
Since most well performance modeling employed today utilizes well productivity software such as PROSPER, the objective of this work is to evaluate a software tool of this nature to determine if this software detects differences in gas/water fluid flow behavior and optimize the production from well. For the main modeling work, the software package PROSPER will be used, as it is readily available and a popular the program utilized in industry.
Method:
While running the Software Prosper, And using Black Oil Model for optimization production. And including all the important properties of well that have to optimize its Production.This study evaluates the capability of the well productivity software PROSPER to the use of data for two wells located in a tight gas and other reservoirs. The wells used in this study have different geometry but were drilled from the same pad. Using the well data and fluid PVT properties, a fractured well model is constructed and matched to the well□s production. It will help us in many other well Design and tubing optimization.
Results:
Results from this work illustrate a slight advantage for the well configuration based on the screening criteria applied. However, it should be emphasized that standard well productivity software is limited in modeling this problem. While the result depends upon the input data. Those limitations are identified in the work.It is also possible to use one of the reservoir simulation tools available in the industry such as Prosper which will capture the detailed well optimization and relevant effects in the reservoir. More focus on developing a new/improved model for analysis of flow behavior and critical rate in wells should be investigated.
ADDITIVE INFORMATION OF PAPER:
Our Abstract is based on the additive information to the existing body of literature that can be of benefit to a practicing engineer.

Mechanical and Material Engineering / 19

Classification of Malignent Mesothelioma Cancer Using Support Vector Machine

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To control the invasive nature of cancer, researchers have prioritized to identify the disease in its premature stage. Environmental issues, life style and genetic heritage are the main causes of can-

cer. Malignant Mesothelioma (MM) is one of the fast growing neoplasm tumor, that originates due to mesothelium cells in the various parts of the human body, and directly affects the pleura. The main causes of MM are asbestos exposure, exposure to the high doses of radiation to the chest or abdomen, genetics disposition and the infection of simian virus 40. The main challenge that arises in safeguarding against the tumor is to detect the tumor, in its early stages, of being malignant or benign. For that purpose, an accurate classification technique is indispensable to diagnose the disease and properly cure the disease. Artificial intelligence (AI) has revolutionized pattern recognition and classification in recent decades, and medical field is one of its paramount applications. Suport Vector Machine (SVM) is the proposed method for the classification of MM. İn this method the SVM is trained on features extreated in the form of symptom of MM cancer, SVM is used as binary classifier, using linear kernel to classifiy the tumor as malignent or benign based on extracted features. SVM shows the best results with the accuracy of 98%, which transcends the Probabilistic Neural Network (PNN) classification method.

Environmental Engineering and Management / **20**

Particle size of Acacia Modesta gum powder changes the properties of self-compacting paste ssytems

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Acacia Modesta gum powder is the novel material which has recently found its uses in cementitious systems. Particle size of powdered Acacia Modesta (AM) gum affects the fresh and hardened properties of self-compacting paste (SCP) systems and this aspect has not been researched so far. This paper focuses on the effect of particle size of botanical Acacia Modesta (AM) gum powder incorporated in self-compacting paste systems (SCPs). Powdered Acacia Modesta gum with an average particle size (D50) of 307 microns, 135 microns and 47.5 microns were used with variable Acacia Modesta (AM) gum dosages in the range of 0.25% to 1% by weight of the dry cement. The result showed that with the decrease in the average particle size of AM gum powder, the water demand, viscosity, yield stress, Vicat setting times, water absorption capacity, air content and maximum shrinkage values of SCPs were reduced while super-plasticizer (SP) demand, compressive strength, fresh and harden cement paste densities got increased.

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Using Different Mordanting Methods for Dyeing Tencel Fabric with Punica Granatum Peel Extracted Dye

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Introduction
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Results and Discussion
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Mechanical and Material Engineering / 22

Hydrodynamic and combustion behavior of low grade coals in a circulating fluidized bed combustor

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In order to burn low grade coals for meeting stringent emission requirements in large industrial steam generators, over the years Combustion of Circulating Fluidized Bed (CFBC) technology has been used. For introducing CFBC needed for control of SO2 and NOx emission is one of the important pulling force. However, much is needed to be understood as when heat, mass and momentum heat transfer are interlinked, in order to encounter the complex flow patterns. Understanding of the major fluidization across the CFB loop for low grade coal having various particle size was the main objective of this work. Fluidization behavior of a CFB studied, when various solids e.g. rice husk, Thar coal, sand, etc were fluidized by building a lab-scale CFB test rig. The exit geometry being influenced by riser height along with velocity contours was observed. The experimental work gave useful knowledge on the use of the CFB technology for efficient combustion of low grade coals. For a hot riser of Circulating Fluidized Bed (CFB), combustion behavior for coals of low grade from Baluchistan, was investigated. The influence on emissions has been established by analyzing the effects of changing the primary air and feed rate. In the CFB rig, thermocouples recorded and continuously monitored the temperatures at different locations and the GC analyzer recorded the concentrations of CO, CO2 and O2 in the produced gas. From the sampling port, the flue gas was analyzed by keeping constant the fluidized air for primary air flow rate. The coal feed rate was changed and the temperature variations for various feed rates were recorded. As the feeding started to reach about 900℃, it was noticed that at the top of the CFB, the temperature increased fastly. A practical experience of burning a low grade coal from Pakistan was demonstrated. It is an encouraging study for building power plants on large scale coal fired for ending a drastic shortfall of power in Pakistan.

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Investigation of carbon based adsorbents for the development of thermally-driven adsorption cooling systems

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Adsorption cooling systems are considered as energy efficient and sustainable technologies from the prospective of environmental safety and thermal energy utilization. These systems possess zero potentials of ozone depletion and global warming. In adsorption cooling processes, knowledge of adsorbent-refrigerant pairs (e.g. adsorption equilibrium, kinetics and heat) is important. The system performance is directly related to interactions between the adsorbent and refrigerant. Thus, overall thermodynamic performance of the system can be improved accordingly. In this study, numerous carbon based adsorbents are explored in detail with different types of refrigerants (e.g. ethanol, methanol, CO2, R134A etc.). in order to select the optimum adsorbent-refrigerant pair. The analyses in the study are based on the experimental data of various adsorbent-refrigerant pairs available in the literature. Various adsorption isotherms models including: Dubinin-Astakhov, Tóth, Freundlich etc. present adsorption equilibrium data. Consequently, overall system analyses have been conducted

by means of pressure-temperature-adsorption equilibrium (P-T-W) diagram. The P-T-W diagram is also drawn for the ideal cycle analysis in order to explain the performance of adsorption cooling systems. The coefficient of performance of the system has been calculated accordingly for the studied adsorbent-refrigerant pairs.
Keyword: adsorption cooling; activated carbon; refrigerant; optimization

Geological Engineering and Geosciences / 25

Hydrocarbons prospects in the Kohat-Potwar Sub-Basins: An overview of Petroleum Play

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The Kohat-Potwar Sub-Basins, located on the northwestern margin of the Indian Plate, are structurally defined petroliferous regions. Sedimentation on the passive margin of the Eastern Tethys was taken up in Paleocene after the break with the deposition of the clastics which end up enduringly with the shallow marine/lagoonal deposition of the Lower to Middle Eocene, which provided an excellent plateform for the accumulation of hydrocarbons. Kohat-Potwar fold-and-thrust belt is a constantly explored prolific hydrocarbon province having many proven petroleum systems with considerable values of organic content. Mainly the potential reservoirs range from Mesozoic to Tertiary with anomalous oil and gas potential in Paleocene mixed clastics and carbonates of the Kohat-Potwar Sub-Basins. Source rock data designates that good oil-prone source potential exists in the Infra-Cambrian sediments of the Kohat-Potwar Sub-Basins. Permian sediments have TOC value up to 4% with primarily gas potential; while this value increases up to 8% in some expanses. Similarly, thermal maturity of the region also shows exceptional values that range from 0.3 to 1.8% i.e. Cretaceous and Permian rocks have 0.6 to 1.1% and 0.65 to 0.95% respectively. Both structural and stratigraphic traps managed to survive in these basins. However, only structural traps have been continuously evaluated which are represented by antiformal stack, flower structures, thrusted anticlines and fault propagating folds. The Cretaceous and Jurassic truncations, thrusted anticlines and gentle folds could also be the potential targets. In short, the Kohat-Potwar Sub-Basins can be ranked excellent in the context of potential of hydrocarbons.

Textile Engineering and Technology / 26

Synthesis of Advanced Textile Functional Materials Using Titanium Dioxide Nanoparticles for Self-cleaning Applications

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Due to their predefined size and shape, nanoparticles have gained much attention for material development in daily life applications. In textile industry, the modifying of conventional textile is required that can alter the entire property of the textiles. Therefore, it was need to develop a fabric which is antimicrobial and self-cleaning as well as protective against UV-irradiation without compromising

the comfort of the fabric. Herein, the silver and titanium nanoparticles prepared via simple synthetic routes in a chemical laboratory are loaded in the commercial finishes for textiles to yield antimicrobial characteristics. The finished fabric constituted of 100% polyester, and blends of mod-acrylic and high performance polyethylene with viscose was generated by keeping in mind the upholstery applications. The product designed through this process can be used in many domestic and commercial applications including medical textiles. The nanoparticles are characterized via X-ray diffraction and Dynamic Light scattering analysis and overall antimicrobial characteristics of textile materials are evaluated by using standard methods. The characterized nanoparticles of 68nm (on average) in presence of binders are coated over the fabrics with modified structures via pad-dry-cure method. The nano-coated functional textiles yielded good air-permeability, moisture comfort properties, hydrophobicity (evaluated through contact angle measurement) and UV-protection factor (for coloured fabrics only). The whole textile material was also evaluated against gram negative and gram positive bacteria for its antimicrobial characteristics. Novel textile finishes using common laboratory chemicals have been developed and it is believed that these finishes contain excellent fabric comfort properties.

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Effect of Brick Dust on Strength and Workability of Concrete

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the aim of this research is to utilize the waste generated in concrete. Brick dust is lavish material which on dumping not only occupy land but also it has environmental problems which is hazardous to livings. This waste is generated in brick kilns, brick masonry construction sites and during transportation. By recycling brick dust the problem could be solved up to some extent. In this research brick dust was used in plain cement concrete to check its fresh and hardened properties. Brick dust was used to check the workability and strength of concrete, using the water cement ratio of 0.55 which was kept constant during research. Three samples were casted for each 3, 7, 14, 28 and 56 days with 0%, 5%, 10% 15% and 20% incorporation of brick dust. The test results reveals that replacing cement with brick dust shows higher workability than control sample for 5%, 10% and 15%, of which 15% was greater of all. However, strength results were quite competitive, replacing cement with 15% brick dust shows higher compressive strength. The split tensile test were also conducted, which shows high tensile strength by replacing cement with 15% brick dust. This research shows that cement can be replaced with brick dust

Chemical Engineering / 29

Study the effects of epoxy/tri functional mercaptan resins structure based PDLC films

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The present investigation is focused on to find out the effects of the structure of epoxy/trifunctional mercaptan resins based polymer dispersed liquid crystal (PDLC) films on the morphology of polymer matrix via heat curing system. The interaction between epoxy reaction and polythiol group (-SH) resins turn played an essential role in step-growth polymerization reaction for the preparation of PDLC films. In addition to this, the polymer morphologies in this heat curing system have been regulated from polymer beads to porous polymer matrix by changing the liquid crystals (LCs) contents, chemical structures of epoxy trifunctional mercaptan resins, and functionality of thiol hardeners. On the other hand, the thiol group (-SH) fractured the PDLC films continuously with changing driving voltage radically. With the enhancing content of the epoxy resins, the LC domain size decreased, while the thiol had a various effect on the LC domain size. It was of great importance for the optimisation and the possible applications of the PDLC films.

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Environmental Consequences and Compressive Strength of Cement Mortar with addition of Marble Dust and Coconut Dust

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The world has become global village where the rapid growth of human needs in many sectors has not only created an ease of life but a significant decrease in the availability and viability of the natural resources is also threating the world. The high volume production is associated by considerable amount of waste materials that are produced through various sources and it has an adverse impacts on the surrounding environment.

One of the major waste generating industries is the marble production in world especially the rapid growth industries of marble in Pakistan has greatly threatened the environment as it has not only cause bio degrability problems but also disturbed the eco-system. This paper addressed the possible environmental impacts that might generate from ornamental stone production as a rapid growth industrial sector in Pakistan and to review the adequacy of Pakistan environmental legislations in controlling the environmental protections norms associated with such industry. The 25 % of marble dust is transported into upper atmosphere directly, thus the environment is highly polluted.

Mortar is a workable paste which is made by mixing cement, aggregates (fine) and water in suitable ratio. Sometimes admixtures are also added to get desirable properties.it is used as a binding agent in holding blocks together to form a unit mass. In this study coconut husk and marble dust were incorporated in mortar in various percentages to check its properties and to study the use fullness of its use in concrete by comparing its consequences with environment. Coconut husk and marble dust are waste materials which are dangerous to environment. During the polishing and grinding operation of rocks/marbles 25% of the actual marble is lost into the upper atmosphere in the form of dust thus causing various environmental problems including lungs diseases. In this study coconut husk and marble dust were added by weight of mortar in the ratio of 5, 10 and 15% by weight of mortar paste of 2×2×2 inches. Cement to sand ratio was kept as 1:3 while water to cement ratio was kept as 0.5.All the blocks were prepared in normal manner with proper compaction and were then cured in ordinary way at room temperature for 3, 7 and 28 days. Results revealed that that with addition of coconut husk in mix ,the compressive strength first increased however by further increasing the percentage of coconut husk the compressive strength decreased at all stages of curing. According to results the addition of coconut husk in mix up to 5% showed highest 3day strength, 10 %

showed 7 day strength while addition of 15% coconut husk showed lowest compressive strength at all stages of curing. Similarly results showed that addition of marble dust into the mix, the compressive strength increased at some stages. Addition of 5% of marble dust showed highest 28th day strength, 10% showed 7 day strength while addition of 15% marble dust in mortar mix showed highest 28th day compressive strength. However with further increase of percentage of marble dust into the mix, the compressive strength increased at 7 day and 28 day. However with further increase of marble dust in mortar beyond 5% the compressive strength was reduced at all days of curing compared to reference mortar because as the percentage of marble dust increased the saturation of calcium silicate hydrate gel increases due to which the compressive strength greatly reduced.
The increased usage of marble dust and coconut husk in mortar and concrete largely reduces the pollution/percentage of such wastes in environment and thus played an important role in reducing the environmental consequences of such wastes.

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Use of Slate in making lightweight Concrete

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This research was implemented to develop and to determine that how much self-weight of concrete decreases with the increase of Lightweight Aggregate and what its effect on the strength. Laboratory tests have been carried out to investigate the properties of fresh normal concrete as well as lightweight concrete and the strength development of hardened concrete. Five composition of the concrete mix design were prepared and tested 0% of the Light Weight Aggregate, 10%, 20%, 30% and 40%. The workability was determined for each and every batch separately. The compressive strength test was carried out at the ages of 3, 7, and 28 days to examine the strength development of hardened concrete (normal + lightweight) mixes. Three Standard concrete cylinders were casted comprising of mixed, cured and tested, for analyzing the compressive strength and weight. The results show that water cement ratio increases with increase of Light Weight Aggregate in concrete mix and their strength gradually decreases after the 10% use of LWA. It has been observed with different tests that up to 10% mix of Light Weight Aggregate in normal concrete, the strength increase 12.8% compared to normal concrete. It is practically concluded that addition of Light Weight Aggregate in concrete mix, the dead load reduces about 2.5% with the increase of every 10% batch. The trend of lightweight concrete uses is increases due to their lower dead load, strong thermal, acoustic, environmental, fire retardant qualities and also reduced the building time.

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Effect of Lime on Engineering Properties Subgrade Soil of Gujranwala

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Subgrade acts as the foundation for road structures. The life and performance of roads structures greatly depends on the strength properties of subgrade soil. It is very common in Pakistan that engineers encountered with weak subgrade layer not suitable for construction of highways. The subgrade soils of Gujranwala are mostly low and medium plastic clays. These clays have high swell potential and low strength values. Clayey soils have degraded properties like low shear strength, low bearing capacity, high shrink and swell potential, low CBR and compressive strength value and high compressibility. These degraded properties are the common reason for most of the foundation failures. With the interaction of water clayey soils undergo volumetric change. With the increase in population density and increased demand of infrastructural development avoiding clayey soils for future construction is not possible. Soil improvement techniques should be applied on such soils before construction. Engineering properties of the site should be improved by some economical mean

This study has been carried out to check the suitability of Lime for the improvement of subgrade soil of Gujranwala region. Lime is available in Pakistan at a very low cost and is also a naturally existing material in Pakistan. When subgrade soil was treated with Lime a significant amount decrease in swell potential of soil was noted. Improvement in CBR value of treated soil was more than 6 times to the CBR value of untreated soil. A change in index properties of soil was also observed. Significant decrease in Plasticity index of soil was noted. After treatment of soil a decrease in Maximum Dry Density and increase in Optimum Moisture Content was observed.

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EFFECT OF BRICK DUST AND LIME POWDER ON THE PERFORMANCE OF PLAIN CEMENT CONCRETE

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This paper illustrates the partial replacement of cement by brick dust and lime powder. The environmental condition is getting worse around the globe. One of the major causes of environment is waste generated from factories and working sites. The waste goes into dumping which not only occupy land but also cause ill effects to living. This unruly can be solved up to some de-gree by using these wastes in concrete as a cement replacement. An effort is made in this research to use lime powder and brick dust in plain concrete as cement replacement. The lime powder and brick dust was first used separately in concrete and then used as combination of brick dust and lime powder. Lime powder and brick dust was used separately in concrete up to 20% replacement with 5% interval. Then 5% brick dust was used with 15% lime powder, 10% brick dust with 10% lime powder, 15% brick dust with 5% lime powder. Using 20% brick dust separately in concrete gives good workability but less compressive strength compared to control sample. Replacing cement by 20% lime powder enhanced 3% compressive strength compared to control mix. Whereas replacing cement with 15% lime powder and 5% brick dust gives optimum compressive strength compared to control mix. The results shows that lime powder increase the compressive strength compared to concrete made with brick dust. Using 20% lime and brick dust can save cost of cement in range of 7.2%- 12.5% which ultimately save the cost of a project.

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Development of Textile Based Strain Sensor from Polypyrrole

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The conducting polymers are polyconjugated, which possess electronic properties of metals, while retaining the mechanical properties and processability of conventional polymers. Conductive polymers can only withstand limited strain before breaking and cannot perform well in evaluating large strains. The aim of this study was to develop a low cost, small to large strain sensor using Polypyrrole and Latex/Polyamide 6 yarn. The stretchable yarn was chosen as the substrate due to its excellent resilience and elasticity. Polypyrrole was coated as thin film onto the substrate by means of vapour deposition technique. The response of resistance of the samples on 2% deformation and relaxation during 40 cycles was analysed. The sensitivity or the change in resistance per unit deformation was used as a tool to figure out the suitability of strain sensor. The high resistive sample gave better sensitivity as well as uniformity as compared to low resistive sample which made it suitable to use as a strain sensor.

Civil Engineering / **37**

Partial Replacement of Cement in Plain Cement Concrete with Bentonite Clay and Quarry Dust

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Construction industry is constantly faced with a challenge to meet the everyday increasing demand of construction materials, with a growing concern in mind not to harm the environment. Cement is mostly costly material in concrete. Environmental pollution problems can be solved up to some extent using waste material in concrete The option of use of supplementary cementitious materials which are either byproduct of construction industry or some other production process has been explored in past which has resulted in discovery of many very useful materials in concrete industry. The present study focus on suitability of using quarry dust and bentonite clay as a partial replacement of cement in concrete. Quarry dust and bentonite clay contents were progressively increased from 0% (control sample) to 20% with increments of 5%. Both these materials were used simultaneously as cement replacement. Optimum contents were established using many concrete tests. Higher compressive strength is achieved at 10% replacement of cement with quarry dust and bentonite clay. Workability of mixes tends to decrease by increasing content of bentonite clay and quarry dust. Mixes prepared with bentonite clay and quarry dust shows resistance to acid attacks. The average weight loss due to acid attacks tends to decrease. Bentonite clay and quarry dust can be effectively used in concrete.

Interdisciplinary / **38**

E-Textile based strain sensors

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This paper is based on E-Textile based strain sensors where sensors were fabricated using strain sensors. These sensors were sensitive to strain. Due to there conductive geometry change in resistance is recorded. But these sensors faces some losses like non linearity, hysteresis losses and sensitivity issues. in this paper we discussed about the sensors designs and their new methodology of sensors testing.

Chemical Engineering / **40**

Features of Convective Heat Transfer on MHD Peristaltic Movement of Williamson Fluid with the Presence of Joule Heating

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In this article, Peristaltic motion with the effects of heat, mass transfer and radially varying MHD of a Prandtl fluid in an endoscope has been studied. The formulated equations of velocity, temperature and concentration field are simplified using long wavelength and low Reynolds number assumptions. The coupled non-linear differential equations are solved analytically by means of the homotopy perturbation method for small values of material parameters. The salient features of pumping and trapping are discussed with particular focus on the effects of Soret, Schmidt number and magnetic parameter. It is observed that temperature and concentration profile shows the opposite behavior. Expressions of pressure rise, friction forces and their graphical results has been also represented. Another is the graphical display of pressure gradient. Stream lines pattern for five different wave frames are also represented. It is observed that trapping bolus of the triangular wave is smaller than the other wave forms.

Mining Engineering / **41**

Numerical modeling of main/tail gate of a long wall mining operation

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Coal mines opting for longwall mining or one of its variations rely on the main and tail gates for production of coal from a panel. Therefore stability of these entries or crosscuts is crucial in coal mining operations. Failure of roof/strata may be fatal and may lead to a loss of property, and delayed coal production. Failure of the gates may be a function of many factors including the mining method, width of pillar, mining depth, caving speed, weak roof etcetera. In Pakistan the coal is mined through a variation of longwall mining method with almost no mechanization while using timber as a support system. Timber support as choke is very useful in coal mines specially when it comes to supporting an overhanging face. Similarly gate entries are supported through choke

supports throughout the entire length. In this paper the stability of the longwall gate is assessed for a typical mine in Pakistan using finite element code. It is shown that the elasto-plastic analysis is essential for assessing the stability of a gate entry. A model parametric study is performed for some of the factors. It is demonstrated that the default practice of mines is not suitable and there is a need to review the mining approach.

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Adapting to Climate Change through an Integrated Approach of Water Conservation and Water Storage - a case study of Karachi

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Climate is defined as an average weather pattern of a place that includes: temperature data, precipitation, humidity, wind velocity, changing seasons. Climate Change is due to the burning of fossil fuel: oil, natural gas, coal. Burning of fossil fuel results in emission of greenhouse gases (GHG) like CO2, CH4, N2O, HFC. Contributors'of GHG include power plants, industry, land use conversion or indiscriminate cutting of trees, agriculture transportation system emitting CO, wastewater, use of HVAC, our lifestyle common use of air conditioners, sprays etc. GHG is also essential as without GHG average temperature of earth would reduce to -18Oc. An optimum level of GHG is necessary for our survival. GHG is a natural process that enables us to retain some energy of sun rays to sustain life on earth. Excessive of GHG depletes protective ozone layer O3. After industrial revolution component of GHG has increased. Climate Change has a far reaching affect in giving shape to natural eco-system, human socio-economic conditions cultural activities, landscape and temperament of people. Rise in global temperature has caused variation in hydrological cycle. As a result there has been accelerated melting of polar ice and inland glaciers (Hindukash, Karakoram, Himalayas) and higher rate of precipitation. Under these circumstances we tend to lose our water reserves. Pakistan depends on single source the Indus River System and its tributaries. Rapid population growth in urban areas particularly Karachi has led to increased water demand creating gap between demand and supply of water. There are 35% water losses in the transmission and distribution of water. An integrated approach is urgently needed in Karachi to reduce water losses. This paper focus on new approaches of water loss reduction, system strengthening, reduction in non revenue water, water conservation at macro and micro level through consumer awareness and education and enhancement in water storage capacity to cope with natural or man made disaster.

Interdisciplinary / 44

SWOT Analysis of Institutional Framework for Engineering Diplomas in Technical and Vocational Education and Training (TVET) System in Pakistan

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The theoretical underpinnings of SWOT analysis for institutional framework of engineering diplomas is used to highlight its components of strength, weaknesses, opportunities, and threats. The TVET system disseminates approximately 29 associate engineering diplomas in one, three, and four years of duration in Pakistan. Strength includes establishment of provincial TEVTAs as apex TVET authorities, TVET system, technical education and vocational trainings in private and public sectors, trade testing boards, and signatory of ILO and UNESCO. Weaknesses captures TVET deficiency, administrative and legal issues, highly skewed technical education, inadequate number of technical colleges, traditional engineering technologies, trade quality compromises, and non-collaboration among TVET institutions and authorities. Opportunities lies in demand driven market diplomas, local and international markets for earnings and employment, national skill policies, and economic fortunes of mega projects. The threats are present in low skill formation, technical skill deficiency for females and rural areas, international in-competitiveness in labor markets, Chinese skilled immigrants, expansion of TVET trades to modern and emerging fields, imbalanced technical education in TVET set-ups, and low socio-economic standards of common Pakistanis for the development of TVET system in Pakistan. Policy recommendations are devised to develop TVET system for human resource development in Pakistan.

Mining Engineering / **46**

Investigation of raw materials for cement industry of Upper Hunza, Gilgit-Baltistan

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Abstract
Limestone represents the main raw material for cement. In this study, six natural limestone's samples from different geological beds of Khyber Karimabad Upper Hunza Valley, Gilgitbaltistan were chemically and mineralogical investigated as suitable raw material. These samples were investigated with Thin Section, X-ray diffraction (XRD), Scanning electron microscopy coupled with Energy-dispersive X-ray spectroscopy (SEM-EDX), X-ray fluorescence (XRF) and reserve estimation with Geological Information System (GIS). The mineralogical, elemental and reserve estimation indicate that the local raw materials are suitable for cement industry. Geological review shows that there is a good potential for industrial-grade limestone, the composition of this limestone can be generally expressed in terms of CaO, MgO, Al2O3, and SiO2, that may be used in place of similar commodities of good quality cement raw materials.
Keywords: Limestone, dolomite, mineralogical, elemental, CaO and MgO.

Civil Engineering / **48**

Effect of Lime treatment, moisture and fine content on the Permanent Deformation Behavior of Unbound Granular Materials (UGM)

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This paper presents permanent deformation behavior of untreated and lime treated base/sub base course materials at varying gradations and moisture conditions. Two types of base course gradations (NHA-A and NHA-B), three varying moistures i.e. optimum moisture content, optimum to dry condition and optimum to wet conditions and lime treatment of UGM investigated. Performance test (Permanent deformation) of selected materials was carried out by using Wheel Tracker (WT) test technique. The results show that gradation with high percentage of fines increases the permanent deformation of UGM upto 29%. Moisture content has adverse effect on the unbound base/sub base layers material, specifically when moisture increases from optimum to wet conditions. By increasing the moisture from optimum to wet conditions, permanent deformation increases by 32%. Lime treatment technique has proven to reduce the permanent deformation of UGM by 79%.

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ASPEN HYSES V8.8 Design for the simultaneous removal of thiols, hydrogen sulfide and carbon dioxide from natural gas stream using DEA + MDEA + Piperazine aqueous solutions

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Natural gas and petroleum industries are dealing with raw materials containing variable concentrations of acid gases (CO2, H2S) and traces of mercaptans and dimethyl disulfide and many others. Treatment processes have to remove not only H2S and CO2 but also OSS and prohibited compounds because worldwide regulations for environmental protection are forcing the petroleum industry to decrease the sulfur content in petroleum fluids. Furthermore, any mercaptans (RSH), carbonyl sulfide (COS), and carbon disulfide (CS2), not absorbed with from the sour gas through amine purification units, complicate the process scheme for downstream liquid treatment.
In this work case studies have been carried out on Aspen HYSYS V8.8 for the simultaneous removal of H2S and organic sulfur species for natural gas. Solvent concentration in the aqueous solution has been varied from 0-60 % by volume for simultaneous removal of H2S, Methyl mercaptan, Ethyl mercaptan and n-Propyl mercaptan. While using DEA as the solvent the simulation results show an increase of 14 % Ethyl mercaptan, 49 % Methyl mercaptan and 111 % CO2 removal while a decrease of 41.82 % and 40.66 % was observed in H2S and n-Propyl mercaptan removal respectively vis a vis MDEA.

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Zirconia Based Heterogeneous Catalyst Development for Biodiesel Production Using Waste Cooking Oil

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Zirconia Based Heterogenous Catalyst Development for Biodiesel Production Using Waste Cooking Oil
1.1 Abstract
Waste cooking oil is valuable and cheap feedstock for the production of bio-fuels as compared to virgin edible oil. It not only helps to reduce environmental impacts of waste cooking oil but can also contribute to the future energy demand. Catalysts used in this process are usually acids or bases in both homogeneous and heterogeneous processes. In most cases, sodium hydroxide and potassium hydroxide are used as alkaline catalyst and mineral acids are used as acidic catalysts in homogeneous reaction, because of their higher reaction rates, availability and low cost.
Homogeneous catalysts although cheap and efficient present a number of challenges which include but are not limited to toxicity, their corrosive nature which inevitably raises the material cost for process construction and problems regarding separation of products from the reacting mixture. On the other hand, heterogenous catalysts can be made to be nontoxic, non-corrosive and are easily separable. But the biggest advantage is that saponification reactions can also be avoided by using heterogeneous acid catalysts, which expand the raw materials to vegetable oils or animal fats with high contents of FFAs, such as deep-frying oils from restaurants and food processing. This is important from an economic point of view as virgin oils not only classify as important food stock they are also considerably expensive per unit of sale. In the present study we are investigating the activity of zirconia based catalyst on biodiesel production from waste cooking oil.

Environmental Engineering and Management / 51

SCARCITY OF WATER RESOURCES IN RURAL AREA OF QUETTA DISTRICT: CHALLENGES AND PREPAREDNESS

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ABSTRACT
This research was motivated by the statement appearing in the media and in the government reports that Quetta is going to run out of water in the near future. The study aims to explore the causes and impact of water scarcity from socio-economic perspective. The study is based on both the primary and secondary data. The primary data is collected in rural area of Quetta district from farmers through a well structure questionnaire, whereas secondary data is collected from the online accessible sources. The results indicate that water level has reached to an alarming level in the selected area, primarily due to subsidy on electric tubewells, indiscriminate installation of tubewells, violation of tubewells spacing norms, growing of high delta crops, population growth and poor drought management. This affects the people of the area in terms of decline in Kareze irrigation system, depletion of ground water level, deteriorating health conditions, and uncalled migration from the area. Based on the results, the study recommends effective strategies for putting restriction on the installation of new tubewells in the study area. Moreover, there is a need of instantaneous campaigns for educating farmers on the efficient use of water and awareness regarding conservation of water resources.
Keywords: water scarcity, enormity, perception, subsidy, efficient use of water.

Environmental Engineering and Management / 52

Air Pollution Deterministic Index Modeling (APDIM) for Pakistan: Application in Quetta City

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Mathematical model are applied to predict the sensitivity of climate to changes produced by natural phenomena and human activities. In this paper Air Pollution Deterministic Index Modeling (APDIM) for Pakistan is developed with the practical implication in Quetta City. The modeling is based on deterministic model and Pollution Indices to monitor the Ambient Air condition in Quetta City. The novelty of the model is adding a constant in the basic deterministic formula. The values of the constant balance the theoretical and experimental validations for Ambient Air. The APDIM gives the alerts about the weather conditions in simple indices or colour coding displays. These indices indicate the air pollution situation in the city by a single number or colour code. The application of the APDIM is done in Quetta city, six criteria pollutants (CO, SOx, NOx, O3, TSP and PM10) are chosen for modeling according to the WHO criteria which have lethal health effect on the communities. The results of the APDIM indicate that the gases (CO, SOx, NOx, and O3) are touching the boundary of satisfactory to un-satisfactory zone. The cause of concern is TSP and PM10, which lies in the hazardous zone. Air Pollution Deterministic Index Modeling (APDIM) is an important tool of decision making, which determine the risk assessment for communities. The aim of the APDIM is to inform the general public of the local area about the severity of ambient air pollution, and the potential health risk it would impose, particularly on vulnerable groups such as children, the elderly, and those with existing cardiovascular and respiratory diseases. Further the tool helps the environmentalists and policy makers to modify the policy and strategies according to the provided air data.

Environmental Engineering and Management / 53

Study of the Fluoride assessment in correlation with different physicochemical parameters in drinking water of some areas of Quetta, Pakistan

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Water (H2O) is a universal solvent found worldwide where the life exists. The fluoride level in drinking water has been controlled in order to get rid of dental and skeletal fluorosis. Therefore, the current study was mainly focused to check the quality of drinking water and to assess the fluoride content with the correlation of other physicochemical parameters. By applying an even sampling plan with the samples distribution taken from tube wells of different sites of Quetta, where the drinking water quality is known to have been deteriorated. The study shows that the Concentration of fluoride varies from 0.32ppm to 3.0 ppm (Hazara town to western by-pass area of Quetta) as compare with WHO (world health organization) guidelines of drinking water for fluoride (i.e., 1.5 ppm).The excessive fluoride concentration is expected from poor calcium aquifers andfluoride bearing minerals or cation exchange of sodium for calcium. Furthermore, it is observed that the pervasiveness of fluoride related health problems in study areas with high fluoride in water sources. On the account of the results, defloridation of the identified sampling sites and regular monitoring of drinking water is recommended at government level to avert further fluorosis risk.

Civil Engineering / 54

Emprical SPT-CPT correlation for soils from Lahore, Pakistan

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Standard Penetration Test (SPT) and static cone penetration test (CPT) are the most widely used in situ tests to depict the soil stratigraphy and determine the geotechnical properties of the subsurface soils. The CPT leaps out because of its capability to trace the resistance continuously and due to its accuracy, it is still considered to be reliable than the SPT. The outcome of these tests is very important for the design procedures to be implemented for various geotechnical purposes. To effectively utilize all the available data, there is a need of updating a correlation between these two widely used in situ tests. This study implements the statistical linear regression model using a 107 SPT and 47 CPT measurements across the city of Lahore, Pakistan to develop SPT-CPT correlations between the cone resistance (qc) and the uncorrected SPT blow counts (N) for various soils. The developed correlation is compared in terms of qc/N ratios with the previous published studies.

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Volumetric Substitution of Waste Polyethylene Terephthalate PET Coarse Aggregate as Clone of Natural Coarse Aggregate in Concrete.

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- Plastics (including Polyethylene Terephthalate PET), being user friendly, is outrageously increasing, creating a huge amount of solid waste, which is quite dangerous to the environment. It needs to be managed and disposed properly, so new techniques of the proper disposal other than landfill and incineration are being studied and adopted. While concrete technology is focusing on the sustainability with the possible way of utilizing lesser natural resources and self-weight of the concrete is also the major concern. In this study replica PET coarse aggregates were volumetrically substituted having (7%, 14%, 20%, 22%, 24%, 30%) replacement ratios. PETCA were manufactured keeping granulometry in view. ASTM standards were followed to manufacture concrete cylinders having mix ratio of (1:2.1:2.7), which were casted and cured for 13 days. Then different comparisons were done mainly focusing the compressive strength and modulus of elasticity. The final results showed that replica PETCA can be substituted up to 7%-14% for structural and comparatively light weight concrete.

Key-Words: - Granulometry, Polyethylene Terephthalate, Coarse aggregates, Light weight Concrete, Incineration, Landfill.

Civil Engineering / **56**

Development of Mobile Ecosystem for Smart Sharing of Domestic Water Efficient Collection and Supply Management, for Quetta City

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Abstract

This study focuses on the communication among various devices to share real-time information on smart devices. In this paper, we proposed a novel concept for domestic water collection and supply (DWCS) information sharing over a wireless sensor network (WSN), which uses mobile communication networks (MCN) for a Smart Mobile Ecosystem (SMES). This paper proposes a smart sharing of DWCS based on SMES on five components for efficient collection and smart supply sharing of domestic water, viz., inputs, facility, communication, event evaluation, and output. This approach develops ubiquitous computing to meet the desirable domestic water requirements. The smart collection and sharing of domestic water supply uses Information and Communication Technology (ICT) for connecting water and sanitation agency (WASA). The WASA authority linked to the main server through assigned IPs. The aggregated information is shared with end-users. Our propose SMES platform establish IP-DWCS components communication among each other, central processing room (main server), WASA links with end-user.

Keywords: Domestic Water Collection and Supply; Smart Mobile Ecosystem; Smart Sharing; Information and Communication Technology; Water and Sanitation Agency; Mobile Communication Networks.

Environmental Engineering and Management / **57**

Land use changes impact on groundwater quality using remote sensing and GIS in Quetta Valley

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Land use/land cover (LU/LC) changes have been impacted environmental ecosystem, especially groundwater system. Availability of freshwater quality is drastically affected by human activities.

Water is vital for humans, plants and animals but its availability and quality is depleting in the world. Quetta Valley is facing water scarcity and land management issues. In this paper expansion of land use and land cover of last twenty years in Quetta Valley and their impacts on groundwater quality and availability are represented. The spatial and temporal land cover changes show significant impacts on limited natural resources. DEM models from Landsat-8 were downloaded and used remote sensing applications to explore land cover changes of various time periods. GIS software was employed for groundwater modelling and to compare spatial/temporal land cover changes. Key findings showed large scale land cover over last twenty years and stress increased on aquifer system regarding water quality and quantity. Due to unsustainable land use planning has blocked groundwater recharge zones, while overexploitation and anthropogenic activities are observed major source to groundwater deterioration. Hotspots of low water quality are highlighted which can be useful for management and planning of water resources for future. Findings of this research work can be use to design a comprehensive research with high quality data. The results are useful for general public and concern department.
Key words: Quetta, Land use and Land cover, water quality, GIS, Remote Sensing

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Operational Effect of Replacing Traffic Signal by U-Turns-Case Study of Khanapul on Islamabad Expressway

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This paper analyzed the widely-used access management treatment in Rawalpindi/Islamabad, Pakistan: using U-turn instead of traffic signal or direct right turn. Data was collected from a very congested traffic signal at Khanapul traffic signal, Islamabad. The traffic signal was recently closed and traffic was diverted to newly constructed U-turns placed at downstream. Level of service, delay travel time and emissions were computed for both scenarios using Vissim and Synchro 9. It was fund that the provision of downstream U-turn was effective in reducing the delay and improving traffic operation.
Keywords: Traffic delay; Travel time; U-turns; Traffic signal; Traffic management.

Interdisciplinary / 59

Empirical Estimation of Mincerian Wage Equation for Engineering Technologies and Polytechnic Engineering Skills in Balochistan

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Engineering technologies and polytechnic engineering diplomas are sought for earnings, decent work, employment, and other socio-economic prospects by the individuals. This paper empirically estimates Mincerian Wage equation for 21, 18, and 16 years of engineering education, and 13 years of

engineering diplomas education of qualified individuals in the context of labor markets in Balochistan. Full pledge questionnaire was designed for cross sectional primary data collection from approximately 150 qualified engineers through three stages of stratified sampling technique. Statistical methodology of ordinary least square model and instrumental variable approach was used to estimate the relationship between income earnings of different levels of engineering education. The empirical estimation indicate the magnitude of income earnings in percentages that accrue to an engineer by getting one year of additional/extra of engineering education in the context of Balochistan. The earnings estimated of different engineering degrees in public and private sectors and its employment provision sets new direction of wage prospects for the qualified engineers. The results of this study also highlights the impacts of newly announced policy of employment generation by the Pakistan Engineering Council, in case of earnings, for the qualified engineers. The empirical results may contribute to the literature of engineering education, its empirical estimates of earnings, employment aspects of engineering technologies, human capital theory, and human resource development on theoretical, methodological, and empirical bases.

Chemical Engineering / 60

Process Optimization of Microwave Assisted Co-prolysis of Coal and Oil Palm Shell Blend with Carbon Surfaces

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The energy insecurity and CO2 emissions from fossil fuel utilization demands sustainable and cleaner fuel resources. Bio-fuels and chemicals from waste biomass have been recognized as the renewable energy resource. Coal has the potential to become an important source for liquid and gas fuels. Co-processing of coal with waste biomass to produced fuels is considered a step towards sustainable and clean coal utilization. In this study, Oil Palm Shell (OPS) waste biomass and coal were subjected to Microwave (MW) co-pyrolysis conditions. The effects of process parameters on the efficiency of co-pyrolysis blended fuel were tested to identify the optimal processing conditions. The results of this study suggests that co-pyrolysis blended fuel over 35-55-75wt% carbon loading with 3-Layer method at 600W and 4LPM of N2 flow rate suggests that increasing the carbon loading increases the oil yield. This suggests that experimental design space for carbon loading can be narrowed down. Therefore, 55wt% carbon loading was selected as the minimum and 75wt% carbon loading as the maximum range. The levels of MW selected power were 600-720W, where the highest is based on the maximum rated capacity of multi-mode MW oven (i.e. 800W). The response surface methodology was used to establish model yields. The co-pyrolysis oil obtained under various MW operating conditions was analyzed using GC-MS for chemical composition. The process temperature of blended fuel solids with 3-Layer method were recorded by online thermocouples and discussed.

Chemical Engineering / 61

Estimation of Linear Heat Conduction and Thermal Conductivity of Bio-char and Coal-char

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Waste biomass is now considered as a potential source of renewable energy to meet wide variety of energy needs, such as electricity generation, domestic heating, fueling vehicles and providing process heat in industrial facilities. Large amount of waste biomass and coal are being used to produce heat in industrial boilers. These industrial heating processes generate ample amount of coal-char and bio-char as by-product waste. The disposal of coal-char and bio-char waste causes significant environmental concerns if not handed carefully. In this study, the coal-char and bio-char were investigated to evaluate their applications as source of conducting and insulating materials. The linear heat conduction of char produced at different temperature were tested and discussed. The thermal conductivity (k) of pure coal-char was found 46.20 W/(m. K), whereas pure wheat straw and pine-nut bio-char showed 22.90 W/(m. K), 10.60 W/(m. K), respectively. The thermal conductivity of 50/50 wt% coal and wheat husk blended char and 50/50 wt% of coal and pine-nut blended char were estimated 12.30 W/(m. K), 53.60 W/(m.K), respectively. Coal-char with high thermal conductivity can be used in heat sink applications. Among the tested materials, pine-nut bio-char showed lower heat conduction of 10.6 W/(m.K) which can be utilized as a source of thermal insulation. The results indicated that the thermal conductivity of material depends mainly on the type and its composition.

Keywords: Bio-char, coal-char, blended char, linear heat conduction, thermal conductivity

Architecture and Town Planning / 62

Common Ground in a Liquid City (Urban Entertainment Destination: A Tool against Classism)

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Classism is one of the most widespread social problems plaguing the world today. Varying from the type of economic society and government regulation, classes are formed accordingly to how the rules of these institutions are set. Economic status ranges from the liberal socialists to the conservative capitalist. The purpose of this research is to congregate the Elite and Lower Middle group of class, on one platform by finding the common ground between two classes. Credit masks poverty and most of us are stuck in an income bubble, we tend only to see and associate with people who are like us, economically, people should get out of their collective comfort zone and create conversations across the income divide. The project aims to raise a question, "How could be the issue of social stratification solved architecturally?"

As a solution, Urban Entertainment Destination is considered in order to confront this issue of social stratification because public spaces are a powerful instrument of social inclusion.

This project research attempts to explore the significance of UED's by conducting a literature review and case study analysis of five UED's across the globe. Studies extracted from each module revealed the importance of six key strategies: Place-making, Multi-Anchoring, Contextual Links, Critical Mix & Mass, Programmability, and Branded Identity. These strategies were used as a basis for developing a set of site selection criteria that were in turn applied to the development of a new UED in Karachi, Pakistan.

Geological Engineering and Geosciences / 63

Planktonic Foraminiferal Biostratigraphy of the Maastrichtian strata, Lower Indus Basin, Pakistan

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The Maastrichtian rocks of Lower Indus Basin (Mughal Kot Formation) have been investigated in detail to establish planktonic foraminiferal biostratigraphy and assign age to the strata. Due to influence of local tectonics that forces the rate of Cretaceous sedimentation to be very high in the Eastern part of Tethys, very less number of taxa in these thick hemi-pelagic sediments has been preserved. Total of thirty one species of Planktonic Foraminifera were identified in thin section and through extraction technique and planktonic foraminiferal biozone of the Mughal Kot Formation is established. Based on presence of abundant planktonic foraminiferal species of Globotruncana, Globotruncanita and Hetrohelix, a single planktonic foraminiferal biozone has been reported, named as Globotruncana-Globotruncanita-Hetrohelix Assemblage Zone which corresponds to Maastrichtian age. This biozone is marked in the lower part of the Mughal Kot Formation which is of Maastrichtian age. In the upper part of this formation there is no preservation of marker planktonic foraminifera showing shallow shelfal deposition that might be the drastic influence of local tectonics at the region. However, it is assumed that the upper part also corresponds to the same age due to the overlying strata of Maastrichtian age.

Architecture and Town Planning / 64

Architecture becoming a global cliche'

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Architecture becoming a global cliché is conceptualization of a uniformity witnessed in the practice of architecture across the global society we live in today. Iconic architecture in recent times has mostly become a hegemonic project of the transnational capitalist class. Where an architects essential role has not just been that of developing cities, rather they create economic assets for agencies and international organizations reaching beyond or involving several state borders. Adapting to an increasingly capitalist society, architects today have mostly taken the responsiblilty to curate exhibition spaces. Spaces that make evident the economic conditions of a state. If on one hand these grandeur architecture spaces act as magnets; attracting foreign communities and creating within themselves a world of movement and mixture. These international hubs are on the other hand also constantly facing challenges of risking their cultural identity. To a greater or lesser degree urban cities are reinforced with an insecurity of building largest and biggest making use of latest technology. The research presents an account on how architectural icons are moulded through capitalist market forces. It departs from the standard analysis of "iconic", to develop a framework within which architecture icons in our world can be analysed based on the literature of capitalist globalization. If the role of architecture is being limited to promote new urbanity in cities. How relevant is national identity and cultural ecology of local communities in a global society? If architecture has to carve out the character of newly expanding urban cities across the globe, there is need to question the ideology of the plural societal structural conditions. Should the latest trends in architecture trick the consciousness of ethnic people, their vernacular language and social beliefs? Since the impact of catering to a global audience is very powerful in present times; have the ethics and values of the past already faded away?

Textile Engineering and Technology / **65**

Isocoumarins: Compounds having unique applications

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Isocoumarins are benzo derivatives of ⍰-pyranone (2H-pyran-2-one), a six-membered oxygen heterocyclic compound. These isocoumarins and 3,4-dihydroisocoumarins are secondary metabolites found naturally in a wide variety of fungi, lichens, molds, insects and plants. This class of aromatic lactones has a wide range of industrial and pharmacological applications such as pharmaceutical, food, agriculture, cosmetics, nutraceutical, UV absorbers, fluorescent agents, sweeteners, healthcare products, antibacterial and antifungal agents etc. Isocoumarins and 3,4-dihydroisocoumarins are very stable compounds and the structure of these molecules can be modified according to the required properties. These molecules can be used for imparting different functional properties to textiles like UV absorbance, fluorescence, antifungal, antibacterial etc. This class of compounds can be effectively explored for new functional materials to be used in the field of textile.

Environmental Engineering and Management / **66**

Mitigating Freshwater Needs by Reuse of Greywater for Residential Apartments in Islamabad

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Pakistan is facing the issues of water scarcity in almost all major cities including the capital city of Islamabad. Water scarcity has become well pronounced due to many reasons such as increase in population, increase in population density, change in hydrology due to climate change, mismanagement of water sources etc. There is need to look for alternative water resources including Greywater recycling, rainwater harvesting etc. The perception of Greywater recycling and reuse is being considered as the major step towards saving needs of freshwater. Greywater is the waste water that comes from wash basins, showers, laundry, and sinks and does not include waste water from urinals and water closets. This Greywater constitutes almost 70% to 80% of daily per capita water demand. This Greywater contains some minerals, organic waste materials dissolved or suspended in it. This paper presents monthly water need analysis and simple adoptable measures for an apartment residential project in Islamabad, in which Greywater is proposed to replace 50% needs of potable water by constructing septic tanks to take care of black water and filter beds (gravel + sand) to treat Greywater for use in toilet flushing, irrigation, car and floor washing. It is recommended that internal plumbing of a house shall be planned with separate pipes for black and grey waters. Overhead water storage and piping shall also be separate to supply water for flushing, irrigation, car and floor washing to further save potable water.

Civil Engineering / **67**

Role of masonry infill wall on the seismic behavior of typical four-storey building in Pakistan

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Masonry infill walls are used as partition in reinforced concrete frames and are considered as a non-engineering structure for design and analysis purposes. The goal of this study is to compare different response parameters such as displacement, storey drift, base shear and ground overturning moment of a multi-storey RC frame structure with and without infill walls. For this purpose, a four-storey building is selected, which is supposed to be situated on stiff soil type (SD) and seismic zone 2B according to the Building Codes of Pakistan. Openings are neglected in the building. Non-linear static pushover analysis method is used to check the behavior of building during earthquake using SAP-2000. To find the width of compression struts, FEMA-356 is used. The results are compared and shown in the form of graphs. It is concluded that the masonry infill walls may have significant effects on the seismic response of the reinforced concrete frame structures, therefore, infill walls needs to be considered during the design and analysis of the building.
Keywords: Reinforced concrete frame, masonry infill walls, compression struts, pushover analysis, seismic resistance

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ARCHITECTURE PEDAGOGY: INVESTIGATING THE PHYSICAL ENVIRONMENT OF DESIGN STUDIO FOR PEDAGOGICAL NEEDS

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Environment of design studio is built up with the various types of activities, habits, experiences and pattern which combine together, give a studio culture environment by completing its physical facilities for its built environment. The design studio is considered as an important component in architecture education. It retains an environment of different attributes such as cultural, psychological and user's physical needs. Environment of design studio plays an important role in students productive work outcome. Within the designated environment of the studio along with its limitations of area utilization, learners are not exhibit and share their work to their fellows from different groups even during presentations and critic sessions. The purpose of this paper is to investigate the physical needs and expectations of students in the design studio for their project design process and productive results. The required data is collected from the third-year and fifth-year students of Architecture Department CEAD, MUET Jamshoro through a survey questionnaire. The results of this study support the stability of previous findings and strengthening the physical environment of the University according to the pedagogic needs of students.

Architecture and Town Planning / 69

Material Archives; Understanding Urban Geographies Built from Material Circulation

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The physical world is highly materialized; materials fabricate our living spaces, construct our economic and geopolitical conditions. It is the materials that define urban functionality and designs the ultimate purpose of a space. Materials have become more than how they appear to the eye, affecting not only the architecture but also other things and people around them. If one is uncertain of the visual conditions, administrative laws or social ecology on which the description and networking of a space rests. It is best to set the description against the materials and resources; the terms begin to explain themselves.
A new architecture for material circulation has been visualized by the two neighbouring countries - Pakistan and China. It is thought to challenge our existing resource system. It has been observed globally that exploitation or mismanagement of a certain high valued materials or resources have often been cited as a key factor in triggering, escalating or sustaining violent conflicts across the globe. The purpose of the research is to explore the geographic importance and the prospects of a newly established market place under China-Pakistan Economic Corridor. Such knowledge can generate perspectives on current conflicts, or obstruct the peaceful resolution of existing ones.

The architectonics of the research is strictly geographical. It defines the strategies of governance that influences urban spaces where production or distribution of material and resources is carried out. Cutting across geographies the aim is to presents circulation patterns forming global chains and networks. Perhaps, the emphasise remains, that architecture and infrastructure of cities, need to be understood in terms of protocol and systems of material.

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E-Textile Based Strain Sensor Glove for Appliance Control

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Non-verbal communication or hand gestures can be incorporated in machines to control digital devices through gloves based on E-Textile strain sensor which will provide aid to partially paralyzed people to control home appliance without anyone's assistance thus creating a Human Machine Interface (HMI).

Environmental Engineering and Management / 71

Rainwater Harvesting, an important measure to meet water requirement in arid areas of Pakistan.

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Rainwater Harvesting, an important measure to meet water requirement in arid areas of Pakistan.
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Abstract:
Pakistan is located in semi-arid region of the world where water scarcity is a major issue. In such

areas, rainwater harvesting (RWH) is considered to be the best alternate source of water supply. Rainwater harvesting is being considered as an integral part of the sustainable water management in many parts of the world. Rainfall patterns in arid areas are typically highly variable, both spatially and temporally. Hence, there is always need to evaluate rainwater harvesting keeping in view the seasonal variations for a specific area. In Rainwater harvesting, a mechanism is designed to collect surface runoffs effectively during rainfall times. In this paper, it has also been analyzed that rainwater has a great potential to be taken as a source of water demands in residential colonies of major cities like Islamabad being our study area. Here, five marla housing pocket has been considered as a model site for which various water demands have been calculated depending upon residential needs and horticulture requirements of the study pocket. Rainwater from roads and walkways have also been collected and used to beautify the road-side horticulture water needs. Rainwater from rooftops has been used to reduce freshwater needs of the houses. As a result, residential water demands for fresh water have reduced by almost 30 to 80% for driest to wettest seasons, respectively.

Interdisciplinary / **72**

Synthesis of Magnetic Nano-rods of Cobalt using Templet from the Anodization of Aluminum as Anodic Aluminum Oxide (AAO)

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Anodization, Anodic Aluminum Oxide (AAO), two steps of Anodization, Barrier Layer(BL), Templet, Synthesis, Magnetic Nano-rods, Cobalt (Co), Electrodeposition.

Interdisciplinary / **74**

Stability Assessment of Microgrid with Virtual Synchronous Generator control based Battery Energy storage system

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This work examines the efficiency a microgrid for parallel multiple voltage source inverters. One of the inverters is traditional VSI inverter, whilst the other inverter is a VSG based inverter for battery storage. Battery inverter. The stability of a PV-BESS microgrid is a bit more challenging than ordinary microgrid. Rather than finding the ration of the impedances of inverters and terminal impedance, the framework steadiness is surveyed based on a progression of Nyquist graphs each inverter individually after stepwise connecting them to the main grid and passive loads. In this way, the effect of the terminal impedances of Right Half Plane (RHP) zeros on the bases of parallel source-source VSI inverters can be discarded. Nyquist graphs also help to show the relation and effect of terminal impedance and passive components. Nyquist Criterion is used to examine the effect of Voltage controller and current controller in both Islanded and grid-connected conditions. Finally, this work is supported by multiple simulations.

Civil Engineering / **75**

Hybrid Artificial Neural Network Finite Element (ANN-FE) Model for Predicting the Structural Response of RC Structures

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The aims of present work is to develop a radically new stable, robust and computationally efficient structural analysis procedure capable of realistically and objectively predicting the nonlinear response of reinforced concrete structures. This procedure will be suitable for both research and practical applications and will be capable of effectively solving design optimization and reliability problems which require extensive parametric studies. Unlike existing finite element packages employed in practice, the proposed structural analysis method is capable of accurately predicting brittle and flexural modes of failure of RC structures. This hybrid (i.e. artificial neural network finite element ANN-FE) tool requires significantly less computational resources compared to traditional approaches of structural analysis (usually employed for the research purposes) which are based purely on the use of the non-linear finite element method (NLFEA). The stability and robustness of the proposed hybrid ANN-FEA tool, as well as the validity and objectivity of its predictions, is confirmed through a comparative study of its predictions concerning the behaviour of RC structures under static loads with its experimentally and numerically (i.e. SAP2000 and ABAQUS) established counterparts.

Geological Engineering and Geosciences / **76**

Enzymatic Stabilization of Expansive Soil

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Expansive soils are problematic soils and are not suitable for infrastructure construction due to their downgraded properties like low shear strength, low bearing capacity and high shrink and swell potential. Soil stabilization is an effective and useful technique used to enable expansive soils for the construction purpose. Microbial geo-technology deals with the application of biological products on soil to make the soil more feasible for infrastructural construction. Some of these biological products are terrazyme, permazyme, urease, fujibaton, etc. Soil used in this research was taken from Gujranwala region. And the enzyme used in this research was terrazyme. Soil was treated with three different dosages of terrazyme. For optimization of enzyme content unconfined compressive strength test was performed. For compaction characteristics of soil modified proctor test was performed. Increase in optimum moisture content and maximum dry density was observed in treated soil. Atterberg's limit test was performed and decrease in liquid limit and plasticity index was noted in treated form. Unconfined compressive strength test was performed to check the strength characteristics of soil. UCS test was performed for both soaked and unsoaked conditions. In unsoaked conditions 6 times improvement was observed in in soaked conditions improvement was more than 25 times. One dimensional swell potential was noted and decrease in swell potential was observed and in treated form swell potential was decreased to 0.73 percent from 5.1 percent. Increase in soaked CBR was almost 5.5 percent.

Textile Engineering and Technology / **78**

Development of nanofibers based neuropathic patch loaded with Lidocaine to deal with nerve pain in burn patients

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Burns wounds are difficult and different when compared with other wounds. The management of burn wounds is divided into three main categories; pain management, infection management and healing. Various commercial products are available to treat and prevent infection in burn patients but, for the management of pain, intravenous (IV) route is preferred which is associated with different side-effects. The local release of analgesic agent for nerve pain can reduce the IV related side effects and can provide quick and effective nerve pain management in burn patients. In this study, electrospun nanofibers of sodium alginate/PEO were loaded with lidocaine to reduce nerve pain and the effect of parameters were studied to get optimized bead free nanofibers. The drug release was tunable (from minutes to hours) and other properties like liquid absorption were studied against distilled, saline and solution A. The combination of moist environment and strong nerve pain inhibitor could be salient features as well as the use of antidepressant drugs could be skipped.

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Effect of Silica Fume and Lime on Compressibility of Baleli Soil

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Title

Abstract

Key Words

Textile Engineering and Technology / **80**

Development of antibacterial fibers and study on effect of guar-gum addition on properties of carboxymethylcellulose/alginate fibers

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The effect of carboxymethylcellulose (CMC) addition on the tensile and absorption properties of alginate fibers had been reported in the previous research. Great increase in absorbency was observed due to addition of CMC to calcium alginate fibers but were not balanced with mechanical strength. Because, by addition of CMC dry and wet strength of composite fibers was reduced, therefore, a balance was needed between the absorbency of the fibers and mechanical strength. In this paper the effect of introducing a third component Guar gum on overall mechanical and absorbency characteristics is reported. In comparison to calcium CMC/alginate co-spun fibers, it was shown that inclusion of Guar gum improves the tensile strength as well as absorbency. Guargum/CMC/alginate fibers were extruded through two different coagulation conformations. In first step the dope solution was extruded through CaCl2 coagulation bath. The dope of optimized composite fiber formulation with adjusted mechanical property and absorption was extruded then through 50:50 CaCl2 and ZnCl2 coagulation bath. The formed guar-gum/CMC/Zn/calcium alginate composite fibers were found excellent for medical applications with super absorbency along with equivalent mechanical strength and high antibacterial efficacy.

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Identification of Brittle and Ductile Zones of Reservoir by Using Well Log Analysis

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1.OBJECTIVE/SCOPE:
Brittleness and ductility play very important role in the stimulation design of unconventional reservoirs as it controls the fracture length and shape of hydraulic fractures. The estimation of mechanical properties of the reservoir rock is very important for the successful execution of reservoir drilling, production, and development operations; selection of bit according to formation strength, wellbore stability analysis, selection of brittle zones for better propagation of hydraulic fracture and subsidence of reservoir strata.
2. METHODS, PROCEDURES AND PROCESS:
Mechanical properties are calculated using well log responses for selected reservoir section. Brittleness is accessed from empirical correlations based on mechanical properties estimated from well logs response, uniaxial compression strength and tensile strength, after sorting the best representative data for the reservoir. Brittle-ductile categorization is done for identification of brittle, less brittle, less ductile and ductile reservoir lithology in each studied well.
3. RESULTS,OBSERVATION,CONCLUSION:
The petrophysical properties used in the estimation of mechanical properties of sandstone reservoir was compared with measured properties of the reservoir. High values of young modulus and corresponding low values of Poison's ratio were indicating the brittle zones in the reservoir. Brittle-ductile zone identification based on Young's modulus, Poison's ratio, tensile strength and uniaxial compression strength were giving consistent results. The workflow of this research study enables us to understand the brittle-ductile behavior of the reservoir rock using mechanical properties and their correlation with such parameters which are easily available from well logging.

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Effect of Different Weaves and Seam Designs on the Seam Efficiency of Woven Fabrics

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Abstract
The purpose of this study is to investigate the effect of different weaves and seam designs on the seam efficiency of woven fabrics used in home textile industry. Six bleached fabric samples of plain, twill and satin weave design were prepared from a Be Be Jaan Textile Mills, each with two levels of weft densities. Thirty Specimens in both warp and weft direction from each type of woven fabric samples were sewn with five different sub-types of two seams. The results obtained from the testing of samples were analysed by using Minitab software through analyse factorial design. The contribution of selected parameters was represented in the form of factorial Plots i.e. main effect plot. It was found that the type of seam has statistically significant effect on seam efficiency of the stitched fabrics. Lapped seam was found to have the lowest efficiency among all the tested seam sub-types; while superimposed seam exhibited the best efficiency in the fabric weft direction. Seam strength and efficiency of satin weave is higher as compared to plain and twill due to the strength of basic fabric.
Key Words:
Fabric strength, Seam strength, Seam efficiency, General full factorial design, Main effect plot

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EXTRACTION OF OIL FROM ALGAE FOR BIODIESEL PRODUCTION

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EXTRACTION OF OIL FROM ALGAE FOR BIODIESEL PRODUCTION
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1. Department of Chemical Engineering, Balochistan University of Information Technology, Engineering and Management Sciences Quetta, Pakistan Email: abeera.malik@buitms.edu.pk The world is facing the energy shortage and environmental issues in this century due to increased industrialization and overuse of natural resources such as fossil fuels. The burning of fossil fuels generates greenhouse gases which aggravate the global warming. Researchers across the world are focusing on renewable, less CO2 and NOx emissions transport fuels. These fuels are important for sustainability and green economy. Bio-diesel from Algae is emerged as the promising alternative fuel, technically and environmentally acceptable and easily available. In this study different parameters of Oil extraction processes were studied. Samples of algal species Spirogyra were collected from Chashma chuzai Quetta, Pakistan and employed as a feedstock for biodiesel production. In the first step, oil from Spirogyra was extracted using n-Hexane as solvents. Effects of solvent to oil ratio, size of algal biomass and contact time on the percentage yield of oil

extracted was studied and analyzed. It was observed that maximum amount of oil was extracted from Spirogyra biomass by using the greater ratio of solvent to algal biomass, maximum contact time, smaller algal biomass size.

Civil Engineering / 84

Site Specific Ground Response Analysis of Peshawar, Pakistan

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The study discusses the site-specific ground response analysis at a selected location in Peshawar University. The ground is modelled in one dimensional ground response analysis software DeepSoil using the standard penetration test results data. Based on the average shear wave velocity the site is stiff SD according to building codes of Pakistan. The input ground motion applied at the base of ground model is selected compatible to the seismic hazard of Peshawar. The soil non-linearity is modelled using shear modulus degradation and damping curves. The surface response spectrum shows overestimate at short frequency and underestimates at high frequency in comparison to design response spectrum of Peshawar.
Keywords: Ground response analysis, Deepsoil, Peshawar, Response spectrum

Civil Engineering / 85

Seismic Hazard Analysis and Ground Motions for Peshawar Metropolitan City, Pakistan

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The seismic hazard at a site can be well quantified in term of fault rupture mechanism and site effect on seismic stress waves propagation. The input ground motion is an important parameter for the seismic characterization of ground response analysis and engineering structures. The presence of several active reverse faults in the vicinity of Peshawar Metropolitan city makes it vulnerable to permanent seismic hazard. The worldwide earthquake records compatible with the local seismic hazard of Peshawar is a good alternative as Pakistan lacks regional arrays of seismographs. Based on the seismic hazard parameters of reverse faulting this study evaluated seven representative input motions from PEER strong motion database that can be used in ground response analysis. The resulted ground motion shows that the seismic hazard at Peshawar is capable to produce earthquake of magnitude 7.0 and above. Furthermore, the resulted peak acceleration at bedrock is in the range of 0.16g to 0.24g as specified for seismic Zone-2B. The resulted response spectrum of ground motions

is strong between time period 0.15 to 0.20 sec.
Keywords: Seismic hazard; Peshawar; Ground response spectrum

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Strategies to Manage Aquifer Recharge in Balochistan, Pakistan; an Overview

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Strategies to Manage Aquifer Recharge in Balochistan, Pakistan: An Overview

Abstract

Balochistan plateau dominated by the drainage system of eighteen river basins, where precipitation recharge consolidated and unconsolidated aquifers. In eleven river basins the groundwater levels are steadily decreasing for the last three decades due to unsustainable long-term groundwater extraction. The cumulative decline of water-table ranges from 2 to 3 meters/y. The most significant decrease, i.e. 60m in the last 12 years has been recorded in parts of Quetta valley. The estimated total groundwater recharge in an average year of all river basins is 2.21 Mm3, whereas the withdrawal is 2.66 Mm3 causing an overdraft of 0.45 Mm3. To increase the groundwater recharge, many proposals have been developed and several studies have been carried out by different public and private sector organizations, encompassing artificial and natural groundwater recharge. However, implementation of the recommendations of these studies remained limited with little progress. Assorted strategies have been developed by the concerned government departments for the protection of natural resources, including water, but a comprehensive provincial strategy to address and augment groundwater recharge in Balochistan is yet to be formed. In this article the natural resource protection strategies and their sub-strategies that are directly or indirectly associated with the natural recharge of groundwater have been reviewed and summarized. The policies that are reviewed in this article include water policies and environmental policies for the water sector. The sub-strategies include; a) strategy for climatic variability, b) strategies for aquifer recharge, c) strategies to improve governance, d) Balochistan conservation strategy, e) environmental strategy, f) biodiversity strategy, g) integrated water resources management strategy and h) participatory groundwater management strategy.
In some of the previous studies certain measures have been proposed for the improvement of water resources. These measures include; a) ban on agriculture tubewells in urban areas, b) water loss reduction and leakage control, c) provision of recycled wastewater to farmers, d) effective monitoring and metering system, e) rehabilitation of drainage system, f) development of new water resources, g) construction of storage and supply dams, and h) construction of delay action dams (DADs). Subsequently, 326 DADs with an overall storage capacity of 276 Mm3 were constructed in different river basins. The construction of 100 DADs to mitigate groundwater decline is in progress. To assess the impact of DADs on aquifers, studies were conducted on 14 and 25 dams in two phases during 1997 and 2008 respectively. These studies show that estimated seepage of groundwater through 14 DADs was 5.46 Mm3/y and 28.38 Mm3/y from remaining 25 DADs. The estimated discharge through Karez (underground water channels) located in the downstream side of 25 DADs also increased from 6.86 Mm3/y to 24.27 Mm3/y. These studies represent that in current circumstances, the DADs are the most appropriate means to recharge aquifers if supported by comprehensive catchment area specific water management strategies. The effectiveness of DADs may be further enhanced by the increased height of the dam and storage capabilities to supply for community utilization and introducing outlet systems for sediment-free water recharging.

Chemical Engineering / 88

Catalytic Pyrolysis of microalgae (Chlorella sp.) Using Zeolite as Catalysts in a Fixed Bed Reactor

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The potential of catalytic pyrolysis of non-edible biomass derived from microalgae (Chlorella sp.) for bio-oil using commercial and synthesis nano-crystalline HZSM-5 catalyst in a fixed bed reactor was studied in this work. The Chlorella sp. biomass was used as the feedstock and the chemical and elemental components of the Chlorella sp. were identified by proximate and ultimate analysis. The maximum yield of bio-oil was optimized in order to find the optimum condition of the operation variables. In addition the obtained bio-oils were analyzed by elemental GC–MS and FTIR. The results revealed that at 500 degree C with 2.5 gram of nano HZSM-5 in fixed bed reactor for 90 minutes is the optimum conditions which provides the maximum yield of bio-oil around 33% by weight. The whole bio-oil derived from microalgae biomass is comprised of a various chemical compound of oxygenated compounds, various aromatics and their derivatives, long-chain alkanes, and nitrogenous compounds.

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Evaluation of Compaction Characteristics of Soil Using Dynamic Cone Penetrometer

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Abstract: The engineering properties of soils are highly variable which makes this material complex. In addition, some of the properties like shear strength, settlement, California bearing ratio (CBR) and permeability are difficult and time consuming to determine. Further, the soil is a porous, uncemented and un-aggregated material having significantly low stability as compare to weak rocks or weak concrete. Due to this reason, digging undisturbed soil samples and transporting those to laboratory is a major issue. Above all, the main problem is disturbance of confinement of soil sample when these are excavated from underneath the ground. Ifits confinement is gone then the sample, by no means, gives the true representation of site conditions. Therefore, it is better to obtain the properties of soil by performing in-situ tests.This study aims to investigate the in-situ properties of a soil, using the Dynamic Cone Penetrometer (DCP), and to develop the correlations which can be utilized to estimate the compaction characteristics of various types of soils. In this regard, different soils (Clay, silt and sand)were collected and proportionally mixed to obtain different groups of soil according to AASHTO soil classification. DCP test was performed on each group of soil and the correlations were generated between Maximum Dry Density (MDD)& Optimum Moisture Content (OMC)with DCP. Hence, the developed correlations will guide the local industry for estimating the compaction characteristics of soil from DCP. Providentially,these relations willsave the time and resources

Textile Engineering and Technology / **90**

Fabrication of copper oxide nanoparticles and their application on textiles to make it multi-functional

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With growing demands for hygienic and smart textiles, development of multifunctional textile is increasing day-by-day. Researches have been continuously working on such textiles. In this study copper oxide nanoparticles were synthesized by aqueous precipitation method using different concentrations of CuSO4.5H2O, Na2S2O4 and NaOH, then, characterized by X-Ray diffraction spectroscopy (XRD) and scanning electron microscopy (SEM). Afterward, prepared nano-dispersion was applied on cotton textile by padding then dried at 100oC for 1 minute and cured at 150oC for 3 minutes using cross-linker to make it durable. Finished cotton fabric was investigated for antibacterial, resistivity and UV protection properties. The treated fabric showed electrical conductivity along with UV protection and excellent activity against bacterial strains (S. Aureus and E.coli) upto 15 washes. This textile can find application in sports wear, medical textiles and textile based flexible solar cells.

Mechanical and Material Engineering / 91

Surface Mechanical Characterization of Semicrystalline Polymers

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Effective selection and design improvements of materials in surface engineering and tribological applications require knowledge of their near-to-surface mechanical properties. A better understanding and control of the surface mechanical properties of polymers is required for their optimal use as engineering materials. This is particularly important when these materials are used to improve the contact mechanical properties, where polymers are adopted in optical, coatings and plastic engineering applications for consumer products, or tribological performance of bearings. Therefore, this experimental study seeks to elucidate an understanding of the response of semicrystalline polymers in single point contacts. The experimental study is based upon the indentation and scratching techniques for surface mechanical property characterization. Indentation is a relatively simple and virtually non-destructive means of assessing mechanical properties of materials by an indenter, inducing a localized deformation into a solid surface. The load-displacement curves, the hardness, the elastic modulus, the plasticity index and the creep response data and associated analysis for polymeric surfaces are presented as a function of the contact displacement. Scratching of an asperity contact on the material surface is one of the most significant stresses from the widest range of chemical and mechanical stresses that a solid polymeric product might experience in its life. The scratching process is a well known concept and is generally defined as a kind of surface abrasion, provoked by the relative friction of two material objects where one is significantly sharper and harder than the other. Perceiving, or assessment, of a scratch is usually correlated to the visual detection by the observer as these may be of any size and length. Scratches were produced on polymeric surfaces using rigid cones of different cone included angles and under different normal loads. The prevailing deformation mechanism and geometry of damage on the scratched polymeric surfaces were assessed using scanning electron microscope (SEM) and an optical profilometer. Deformation maps of the polymeric surfaces have been constructed under various contact conditions using the scratching technique. These maps provide a convenient means to report the deformation behaviour of the polymeric surfaces when the imposed scratch conditions are changed. The penetration depth of the imposed scratch in the material has a significant bearing on the resultant deformation, in addition to the previously reported effects of the indenter velocity, normal loads and attack angle.

Petroleum and Gas Engineering / 92

Cost effective and optimized production completion technique for gas well

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A well completion is an integrated set of equipment and components that has been specifically designed to produce hydrocarbons from a particular reservoir as cost-effectively and safely as possible. Well completion is a very challenging job, because it is not that easy to select an appropriate completion design according to the reservoir characteristics without compromising on safety and economics of the well. As main objective of completion design is the completion should be the simplest as possible, in order to maximize productivity and minimize initial capital cost.
In a conventional well completion it is not possible to keep design so simple because it contains a number of completion equipment. These equipment cause major pressure drop in completion string due to their different internal diameters and make the completion more expensive particularly for the marginal wells. Monobore completion is solution to this problem. The well can be completed with the constant ID's throughout the tubing string. This would minimize the pressure drop and consequently improve productivity. Its simple design reduce the number of completion equipment like SSD, nipples etc. also minimize initial capital cost of completion.
This paper presents the modeling of both monobore and conventional completion designs using PROSPER software. Based on the comparative analysis, the productivity of well was found optimum with monobore completion than conventional. The conventional well produce 33MMscf/day and production of monobore is 35MMscf/day. Frictional pressure drop in completion string is also reduced from 1005psi to 917psi. Hence, it is concluded that monobore completion is suitable for gas wells in order extend its life and to reduce the overall cost of completion.
Keywords: Completion, Monobore, Pressure drop.

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PREPARATION OF PHASE CHANGE MATERIAL ON POLYESTER/COTTON BLEND

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Fundamental principles of science are now increasingly employed for the manufacturing of innovative textile products which protect the consumer from dangers and risks; protection from extreme environment is one of the properties of textile products. This research is based on study of concentrations of phase change material (PCM) in textiles which can produce thermo-regulating characteristics to control body temperature useful for various daily wear and technical textiles. The latent

heat which is absorbed during the process of phase change is studied and discussed in this research. Polyester cotton bland fabrics were treated with phase change material (microencapsulated paraffin wax) by a pad dry cure. These microcapsules are bounded onto the fabric surface by using a binder. The microcapsules and their effectiveness are tested by using DSC(Differential Scanning Coloring Meter). The testing is further extended to the physical property in term of air permeability, stiffness and tensile strength to ensure the performance properties of the textile fabric. All the properties of treated fabric were evaluated with respect to the add-on of binder.

Interdisciplinary / **97**

Extraction and quantification of chlorophyll from microalgae Chlorella sp.

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Algal biomass emerged as a potential resource of bioenergy and valuable derivatives in recent years. The major characteristics such as high oil contents, carbon sequestration, high growth rate, availability and valuable by-products (pigments) are leading it to compete in the market with traditional sources. The aim of current study was to (i) extract chlorophylls (a and b) at temperature (30, 35 and 40 °C) and time (60, 90 and 120 min) from marine Chlorella sp. by ultrasonication assisted solvent extraction using methanol: hexane (2:1 v/v), (b) find suitable dilution factor for chlorophyll quantitation using UV-spectrophotometer considering 1:10, 1:15,1:20 ml/ml and (c) determine suitability of dissolving solvents (methanol, ethanol, and acetone) for chlorophyll quantitation using respective simultaneous equations. Maximum extraction in terms of total chlorophylls (a and b) was 18.43 µg/ml achieved at 30 °C and 120 min. The absorbance spectra peaks were found good with a dilution factor of 1:20 ml/ml, while acetone was observed more attractive towards chlorophyll solubility on resuspension of extract. These pigments have a high market in pharmaceutical, dietary products, and food industry and recovery of these compounds can play an important role to make bioprocess industry more economical.
Keyword: microalgae; marine Chlorella; ultrasonication; chlorophylls; spectrophotometry

Architecture and Town Planning / **98**

THERE AND BACK AGAIN (Identifying the unidentified)

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All fine Architectural styles are adaptive in nature from Egyptian to Islamic Architecture; in spirit of their notable elements and identifiable vocabulary, these architectural styles have contributed towards major physical landmarks leading them to gain a unique historic reputation worldwide. When it comes to identifying Sikh Architecture, a perception of the majority assumes that Sikh Architecture does not exist. The purpose of this research paper is to question and compare within a chronology, the features and structural elements which have been classified as noteworthy for various architectural styles and are regionally acclaimed; but not recognized as being inherited or structurally modified during the great legacy of Sikh rule in the Indian Subcontinent.

Communities across the globe desire to create a belonging, a sense of place, one that resembles the native land and also reflects its culture. A city is a vital organism that thrives when a society is formed and along with it culture, language, religion, and an overall belief system flourishes. Therefore, implementing development plans that would provide a sense of unity and integration in relation to the city as a whole is necessary. The aims of this research is to shed light upon the architectural developments that took place during the Sikh Empire to strengthen the community catering to their religious and social needs. It mostly takes into consideration the cities which now lie within the borders of Pakistan and explores the fundamental elements of Sikh Architecture, elements which were present to glorify a young religion in its birth cradle and those which highlight the power of an Emperor, under his leadership the Sikh Empire become the last major region to be conquered by the British.

KEYWORDS: Sikh Architecture, Building Elements, Architectural style, Cultural restoration.

Geological Engineering and Geosciences / 100

Improvement of Bearing Capacity of Soft Clayey Soil by Inclusion of Sand Columns

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Abstract: Civil engineering structures need adequate foundation to carry the imposed loads safely, but natural soils of good performance do not exist on each site. Alternatively soil improvement / modification are needed to improve the soil in hand. In this study an attempt is made to evaluate the bearing capacity of soft clayey soil containing sand columns. Three parameter of sand columns including size of columns, spacing of columns and pattern of installation were studied for their effects on bearing capacity. For this purpose clay beds with and without sand columns were prepared in a test tank of 250 mm x300 mm x250 mm in a standard manner and then tested in a compression testing machine for finding load settlement behavior of the samples. It was observed that inclusion of sand columns in clayey soil considerably improved the load settlement characteristics of the soil and hence bearing capacity. The triangular pattern of sand columns installation was found most effective in improvement of bearing capacity, however; by increasing centre to centre spacing of sand columns the improvement was decreasing while variation in size of column did not show much effect on bearing capacity.

Key Words: Soil, Improvement, Sand, Columns
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Simulation of downdraft gasifier for bioenergy production from coal and biomass: An application of aspin plus

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Depletion of natural energy resources and environmental pollution are challenging global issues. Renewable fuels such as solid biomass emerged as a promising candidate to cope with issues of fossil fuels. Gasification is one of popular thermal treatment route to convert biomass into bioenergy at high temperature. Producer gas, biochar, and bio-oil are main products of gasification reaction. Currently, developed technology contributing a significant role in terms of process optimization, process design, product quality and performance enhancement. This work aims to simulate downdraft gasifier to investigate the potential of local coal and wheat straw (biomass) for gas production. Raw samples collected from local market were analyzed. Proximate composition such as, volatile matter, ash, fixed carbon moisture content was found 45%, 9.2%, 45%, 25% and 83.9%, 11.2%,16.2% ,0.60% respectively for coal and biomass. The CO in gas from biomass and coal was found 23.1% and 26.8% respectively in a simulated reactor, while from literature, it was observed 20.3 and 24.5 % respectively. The simulated model was found satisfactory and in a fair agreement with available experimental data in terms of gas composition and performance.

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Manufacturing of high performance multilayer stitched fabric on a hand loom

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Textile composites are made by intimately combining two or more different substances each with its own characteristics. Since the physical and mechanical properties of the resultant products are superior to those of the original components, they have found many application fields such as aerospace, automobile, marine construction, sports, defense, and medicine. Textile composites made of 2D laminates show better stiffness and in-plane strength but lower out-of-plane resistance because of the absence of third dimension reinforcement. To overcome this demerit, 3D textile structures have been developed using different manufacturing techniques like weaving, knitting, and braiding etc. with technical improvements in them. Among them 3D weaving is extensively used for making most advanced forms of composites for hi-tech industries like aerospace and automobiles. However, the weaving machines used for making 3D fabrics are quite expensive. Because of this reason, such equipment could not be introduced in textile industry and textile composites manufacturing in Pakistan is negligible.
This research focuses on successfully developing the multilayer stitched fabrics ranging from four to ten layers on a hand loom using 1420 denier Kevlar® 49 multi-filament yarn. Such multilayer stitched fabrics can be produced on mechanical weaving machines with dobby attachment and the constructed structures can be used for making soft body armor or as reinforcement for high anti-ballistic composite materials.

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Fabrication of Antimicrobial Electrospun Nanofibers using Cupressus pods extracted pitch

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Over the last 10 years great research interest has been directed towards antibacterial Nanofibers produced by Electrospinning from natural plant extract. The Cupressus fruits are one of the nonedible fruit which is not utilized for any specific application. In this research extract of Cupressus pods was used to develop Antibacterial Nanofibers as the Cupressus fruits are natural source and ecofriendly. Currently many finishes are available for textiles to introduce antimicrobial properties but offer poor adhesion properties. Cupressus plants found mainly in warm temperature regions in the Northern Hemisphere, including western North America, where as in Pakistan they are found in Quetta, Swat etc. In our exploration Pitch was extracted using methanol as organic solvent to produce Nano-fibers. As the Cupressus extract is antimicrobial in nature it was assumed that produced fibers will provide worthy adhesion properties. The antibacterial property of Nano fibers would be analyzed according to AATCC 147.

Key words
Cupressus, Nanofibers, Electro Spinning.

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Evolution of Economical Structural System of Single Storey Long Span Halls

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The composite structure consisting of steel truss or girder with concrete columns is most commonly used technique in long span structures. In short span structures, columns cover a lot of space, and create visibility problem that's why it is better to design long span halls so that internal space can be used more efficiently. For a given span, economy of truss depends on its configuration, panel length and height of truss. As, there are no guidelines available to fix these parameters which lead to minimum weight of truss, that's why an attempt is being made to obtain economical configuration of all trusses. The selection of most economical steel roof system is a major concern these days. The work focuses on most common steel roof structural system to propose cost effective roof for long span. The span selected for roof is 120ft long. Three different types of trusses (Arch, Quadrangular and Pratt truss) and lattice girder are selected. Dead load, live load, seismic load and wind load are considered for design of these structural systems. The codes used were ACI 318-14, UBC 1997, and ASCE 7-05 for dead, seismic, and wind load respectively. Steel roof structural system (steel trusses and steel girder) are analyzed and designed in ETABS and total weights of each structural system are obtained. The one with minimum weight of material is considered as economical structural system. It is observed that among these steel roof structural systems, lattice girder is more economical as compared to steel trusses.

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Effect of Confinement on Axially Loaded Short Concrete Columns

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This paper presents experimental investigations of Reinforced Concrete columns strengthened with steel strips and steel jacket under axial compression loading. Total of six specimens were prepared in the laboratory, out of which; 1) two columns were unconfined columns, 2) two columns were strengthened with steel strips and 3) remaining two columns were strengthened with steel jacket. All specimens were subjected to axial compression loading in increment till the failure of specimens using UTM at NUST. It was concluded after the experimental work that the steel strips enhanced axial load carrying capacity by a factor upto 1.54 times and steel jacketing enhanced the capacity by a factor of 2.38. It has also been observed that the steel confinement increased the cracking load by a factor upto 1.5 to 2.66 for strips and jacketing respectively. Failure occurred due to crushing of concrete and buckling of steel strips and jacket between the fasteners. The confinement of concrete with steel strips and jackets is quite viable and economical option to increase its axial load carrying capacity.

Petroleum and Gas Engineering / 106

Analysis of Environmental Impacts of Produced Water

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**Produce water is considered biggest waste of petroleum fields. Water production increases with the increase in maturity of reservoir requiring more consideration for treatment. In Addition, water which comes from subsurface to surface contains number of elements including heavy metal, hydrocarbons, organic material and other chemicals constituents. These all elements present in produced water can pose hazard to the environment if left untreated, so before discharging water in open pit, it is necessary to treat it or at least reduce these elements up to given national environmental quality standard (NEQS) of Pakistan.
This paper presents the evaluation of Environmental impact of produced water from gas field located in Lower Indus basin through laboratory test. According to experimental results the PH of produced water, TDS, amount of oil and grease, phenolic compounds, chloride and other components are higher in value than the given NEQS of Pakistani Government.
However, large volumes of these waters are discharged into evaporation pits or reinjected in to the earth, without treatment contaminating surface and ground waters and soils in producing field/area ultimately detrimental to livings organisms and vegetation.
In conclusion, proper handling methods are required to dispose it off considering National Environmental Quality Standards. Treatment of water from Primary to tertiary will be helpful to have less impacts as well as access to water for masses of that area.
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Effect of Bagasse Ash on engineering properties of low plastic DGK Soils

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Roads constructed on expansive clays may be adversely affected by the behavior of the clay. Expansive clays which contain the montmorillonite mineral suffer volume change due to changes in the seasonal moisture content which causes heaving, cracking and the breakup of the road pavement. Stabilization of these types of soil is necessary to counteract swelling and increase the strength of the soil and thus partially decrease the thickness of road pavement layers. The use of by-product materials for stabilization has environmental and economic benefits.The study has been carried out to investigate the stabilization potential of the subgrade soil of D.G.Khan. Bagasse ash is a by-product of sugar industry, while bagasse is burnt for the purpose of electricity generation. Bagasse ash contains high silica and alumina contents and is therefore a pozzolanic material, reacting with calcium to form cementitious calcium silicate and aluminate hydrates. Result of unconfined compression tests show an increase of almost 30 times in soaked strength. Soil also experienced an increase in CBR value. Swell potential of the soil also reduced from 2.5 percent to almost zero.

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Analysis of Drilling Parameters to Mitigate Problems by Using the Managed Pressure Drilling Simulator”

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Drilling is one of the most crucial processes in petroleum industry after the exploration phase. World’ s economy relies completely on an oil market. The low price of oil will make a trouble for oil industry to continue routine operations. It is a key challenge for petroleum industry to utilize a cost effective method to reduce Non Productive time (NPT) and to mitigate the various problems encountered during drilling such as stuck pipe, lost circulation and Gas and water influx etc in very narrow pressure window. The high NPT may increase the rig cost. Thus nowadays the Manage Pressure Drilling (MPD) technology has been widely used worldwide by which it is possible to drill the well safely and economically.

The present study focuses on the simulation of available drilling parameters by using standard ERDS software for managed pressure drilling (MPD) and its applications that can mitigate various drilling problems and significantly reduce NPT. The series of simulations was performed by selecting the shale, sand and lime stone formation with maximum interval of 20 ft and depth of 4280ft. The water based mud having density of 16.7ppg with flow rate of 750gpm was used to simulate the drilling parameters such as Equivalent circulating density (ECD), pressure profiles and velocity profile in narrow window. This technique is mostly applied in depleted formations with reduced pressure and save the drilling economy by controlling the down hole factors desired pressure window.

Keyword: ERDS Software, Dtilling parameters, NPT.

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Development and Characterization of Textile Strain Sensors Using Different Weave Designs

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Smart textiles are the textile structures that can sense the stimuli and respond accordingly. These stimuli may come from mechanical, thermal, electrical or chemical sources. Textile strain sensors are one of the product of smart textiles in which sensors resistance change with applied strain. This study involves the development and characterization of textile strain sensors by using different weave designs and different blend ratio of conductive materials in the yarns. Three different woven structures of textile strain sensors are developed. Material used for these sensors are conductive yarn (Polyester/Silver blend) and lycra. 3/1 twill and multilayered structures are developed on the semi-automatic weaving machine while braided structure is also manufactured on braiding machine. After development of sensors, these sensors are tested for stretch recovery by using Tensile testing machine and electrical resistance of as developed sensors is measured by using electrical multi-meter. This study described the best suitable blend ratio and weave design for textile strain sensors. This study also explained about the sensor with best sensitivity and stability. These sensors can be used in medical field for monitoring the human respiration, for rehabilitation purposes, for monitoring the joints movement etc.

Keywords:
Strain Sensor, Conductive Yarn, Braided Structure, 3/1 twill Structure, Multi-layered Structure, Polyester/Silver blend

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GREEN MATERIAL APPLICATIONS FOR FUTURE

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The growing environmental problems, the problem of waste disposal and the depletion of non-renewable resources have stimulated the use of green materials compatible with the environment to reduce environmental impacts. Therefore, there is a need to design products by using natural resources. The focus of Green Materials relates to polymers and materials, with an emphasis on reducing the use of hazardous substances in the design, manufacture and application of products .Basalt is an environment friendly natural material. It is used for basalt fibers production. Basalt fiber is obtained from dark colored, fine grained solidified volcanic rock. The raw materials to be tested were Basalt (B) and Jute(J) .Sandwich composites structures were produced with different combinations ,i.e Bw/Bk/Bw,Bw/Jk/Bw and B/Jw/Jk/B/Jw. Evaluation of the mechanical properties of composites are studied . These hybrid materials can be used for automobiles application.

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Development of GIS-based geotechnical guidance map for real estate industry

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Foundation design of a structure needs soil investigation to avoid failures due to settlements. This soil investigation is expensive and time consuming. Developments of new residential societies in Islamabad involve huge leveling of large sites that is accompanied by heavy land filling. Poor practices of land fill for deep depths cause differential settlements and consolidations of underneath soil that sometimes result in collapse of structures. The extent of filling remains unknown to individual developer unless soil investigation is carried out. Construction cost at such filled sites increases significantly due to the subsoil conditions. Soil investigation cannot be performed on each available site due to involved costs. However, fair estimate of bearing capacity can be made if such tests are already done in the surrounding areas. The proposed geotechnical guidance maps can provide a fair assessment of soil properties. The development of GIS-based guidance map basically correlates the bearing capacity of the site to the extent of cut or fill. Previously, GIS-based approaches have been used to develop maps using extrapolation and interpolations techniques for bearing capacities, underground recharge, soil classification, geological hazards, landslide hazards, socio-economic, and soil liquefaction mapping. No research work has been previously done to develop a relation between bearing capacity and cut or fill. A regression model is developed to establish correlation between cut or fill to the bearing capacity of the soil. Survey data and digital elevation model (DEM) before and after the development is used to estimate cut and fill at site. SPT data of surrounding sites were already available. Google Earth is used for digitization of collected data. Simple regression is performed in MS Excel to find a linear relationship between bearing capacity and cut or fill extent. Few points were considered for data calibration and validation. Resultant GIS-based guidance map are helpful to anticipate the bearing capacity in real estate industry. Application of this technique on additional sites will enhance confidence in the findings and may help in development of more reliable geotechnical maps.

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TOWARD INDUSTRIALIZED BUILDING SYSTEM (IBS) IMPLEMENTATION IN THE NIGERIAN CONSTRUCTION INDUSTRY

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Nigeria, like any other developing country, considers the construction industry as one the main contributors to its Gross Domestic Product (GDP). However, there are unresolved issues arising from the ongoing and widespread adoption of the traditional method of construction such as; poor workmanship, delays in production and delivery time, unnecessary wastages and lack of sustainability practice. The Nigerian Government has to take the leading role to persuade the construction industry to engage a more systematic approach and methodology in construction. As such the Nigerian Government has to adopt a rigid policy toward the implementation of IBS thereby encouraging the construction industry to abide by the policy, which is considered to be an important part of sustainable construction initiative. An important issue which is likely to influence the wider and successful implementation of IBS is the role that knowledge management plays in this regard. This relates to such issues as the knowledge ability and skills of the workforce, and the role that knowledge sharing plays in effective decision making processes to do with IBS implementation in its many and

different disguises. Through comprehensive review of literature and from a knowledge management perspective, this paper highlights some of the main issues that may contribute to the implementation of IBS in the Nigerian construction industry. It also reviews existing strategies associated with the adoption for IBS, especially as they relate to lack of knowledge and awareness among industry players and stakeholders. Some conclusions are offered relating to the level of knowledge needed to change the readiness and perception of key stakeholders toward successful and wide adoption of IBS. These include, the need for improvement of existing university curricular related to design and construction process, continuous learning among professionals, training and knowledge sharing initiatives. This paper recommends that a robust and holistic approach to the adoption of IBS is vital in order to tackle the many and related issues to do with both the adoption and implementation of IBS in Nigeria. This integrated approach should consider the knowledge awareness, strategic procurement, production process philosophies, contractual arrangement, strategic policy and decision making process to mention but a few.

Keywords: Industrialized Building System, Implementation, Knowledge management

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Comparative analysis of heat transfer coefficient for wood and non-wood pulp fiber suspension

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The abstract is considered in the present condition.

Chemical Engineering / 119

Microbial Fuel Cells: Electricity Generation from Sludge and Mud using H2O2 and Sugar as a Catalyst

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Energy crisis and increasing CO2 emission from fossil fuel consumption promoted great interests in microbial fuel cells (MFCs) to produce electric power from wastewater streams without contributing net carbon emission. MFCs harvest electric energy from wastewater by breakdown of organic matters in the presence of microorganisms. In this study, MFCs with two vessels were constructed designated as aerobic and anaerobic chambers, where one filled with water and aerated, and other filled with sludge or mud samples and sealed air-tight. The chambers were connected with proton exchange membrane or salt bridge. Aluminum and copper wire mesh were used as electrodes. Different mud and sludge samples collected from nearby university wastewater streams were tested

on electricity generation without and with varied concentration of sugar and hydrogen peroxide (H2O2), used as catalyst. The highest electricity generation of 638 mvolt/m (0.638 volt/m) resulted of using 10 Kg of sludge sample with H2O2 catalyst. The mud sample results in lower electricity generation of 490 mvolt/m (0.490 volt/m) compared to sludge samples of 510-638 mvolt/m (0.510-0.638 volt/m). The results of this study suggests that sludge samples collected from wastewater streams resulted in higher electricity generation due to the presence of higher amount of organic matter present. The potential to develop series of MFCs for small local community to treat wastewater and produce electricity needs to be explored in future work.

Keywords: MFCs, sludge, mud, sugar, H2O2, electricity generation

Civil Engineering / 120

Numerical Evaluation of Slope Stability measures: A Case Study of Birham Landslide

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Slope failures endanger the public safety and one of major hazard considered in mountainous terrain. In this paper, slope stability measures have been evaluated using the kinematic approach of limit equilibrium (LE). A case study of slope failure from Birham land slide, Murree, Pakistan has been modeled using LE based software SLOPE/W. In-sitboring tests are performed to collect labortary test specimens. Geotechnical properties (i.e. shear strength and stiffness parametrs) for the idealied slope sections are based on labortary tests. Slope stability measures are evaluated in terms of factor of safety (FOS) for unreinforced and reinforced slopes with piles. Based on computed FOS for various combinations of pile locations and numbers, slope stability measures havebeen discussed.

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Finite Element Analysis of Structural Concrete Insolated Panels Subjected to Dynamic Loadings

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The growing human population around the globe imposes the need for highly sustainable and least energy intensive built environment. In the conventional building systems, enormous amount of energy is consumed for heating, ventilation and cooling applications to provide thermally comfortable

environment for the occupants. Thermal insulations or energy storage materials are usually applied to reduce the energy consumption of the building. However, these materials not only increase the construction cost but also enhance the dead weight of the structures. In this regard, structural concrete insolated panels (SCIP) may provide efficient thermal performance while ensuring structural stability and economy. SCIP is a relatively new technology in which insulation material is sandwiched between layers of concrete. These panels may be produced onsite or prefabricated and transported to the site for rapid construction. In the present research, the performance of a typical building incorporating SCIP has been evaluated by using three-dimensional finite element analysis. Further, the response was also compared with the conventional building systems in terms of safety and serviceability. The results show that the SCIP-construction is economical, less time consuming and capable of withstanding higher dynamic or earthquake loadings as compared to the conventional building systems.

Architecture and Town Planning / 122

Interactive Bus Stops: Enhancing user experience to encourage the use of Public Transportation

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Creating interactive local bus stops are not only an absolute necessity for anyone who wishes to use public transportation, but also for those who refrain themselves from travelling by public transportation. Bus stops should be considered as vital points of interaction to not only improve the urban environment but as well as to encourage citizens to use more public transport rather than private vehicles. Unfortunately, in our society bus stops are either considered as an unnecessary waste of space or poorly designed that it creates a more nuisance for the user rather than to provide shelter while they wait.
Majority bus stops in our locality lie deep in grit and garbage. Users prefer to wait on the road side rather than the bus stop or in many cases it is observed that people tend to run towards bus which makes situation not only dangerous, it is highly inconvenient for the waiter as well as for the arrival of the bus along with flow of traffic on the road.
This paper intends to present a design case study based on various ideas and attempts by architects, artists and psychologist to enrich experience of bus stop user's thorough designing bus stop more user interactive as well as user friendly .
Aim of the conceptual designs proposed for bus stops were to assess:
i) Impact of proper designed public space on the mental health of the society member.
ii) Creating more sustainable urban environment within a community through design integration in the form of a prototype bus stop which is more user interactive and user friendly.

For the case study researchers have selected Karachi, a metropolitan city of Pakistan, where public transportation is widely used as mode of transportation amongst all the mediocre and lower class residing within the city. Comparative study is carried out between people who prefer public transportation and those who prefer private.

Objective and goal of the study is to suggest and present conceptual design with the research to propose the idea of improvement of a public space that will encourage the use of public transportation. Moreover use of public transportation will lead to reduction in carbon foot print as well as it may help Government in improving public transportation through revenue generation as it may attract sponsors to put their interactive adds on the bus stop.

Petroleum and Gas Engineering / 123

• Effect of Ultra-High Temperature & Pressure on Rheological Properties of Oil Based Drilling Fluids

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Generally, the temperature and pressure of drilling fluid increase with the increase in depth. By the increase in pressure, viscosity of the drilling fluid increases due to compression whereas high temperature decreases its viscosity due to thermal expansion. Under these extreme conditions, well control problems become more complicated. Current logging tools even at their best are unreliable because the provided temperature of the bottom-hole is often well beyond their operational limits. This literature shows the limited experimental data on the properties of the drilling fluid over 350°F and 20,000psig. The way of extrapolation of the properties of fluids at extreme-HT/HP (XHT/HP) conditions could result in significant inaccuracies in the well hydraulic calculations. This study is focused on developing a methodology of testing the drilling fluids at HT/HP conditions using viscometer, which is capable of accurately measuring the drilling fluids properties up to 600°F and 40,000psig. A series of experiments were performed on typical XHT/HP oil-based drilling fluids to investigate the effects on rheological properties at these extreme conditions (200 to 600°F and 15,000 to 40,000 psig). The results of experiments demonstrated that various drilling fluids disintegrate at different temperatures depending upon their composition. In short, the combined effect of the temperature - pressure on the rheology of the drilling fluid is complex. This research is important because correct design of drilling fluid is a first important step to control the rate of incidents often associated with operation of the HT/HP. According to Minerals Management Service (MMS), more than 50% of the reserves of oil and gas in the U.S. are under 14,000ft subsea. So the drilling in HT/HP is quickly becoming commonly faced phenomenon particularly in the Gulf of Mexico, where HT/HP resistant drilling fluid is commonly used to ensure safe and successful operation.

Environmental Engineering and Management / 124

Synthesis and Characterization of Silver Nano Particle and their application for removal of E-Coli from waste water.

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Synthesis and Characterization of Silver Nano Particle and their application for removal of *E-Coli* from waste water.

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Abstract
Silver nanoparticles are used as an excellent antimicrobial agent. It is used extensively in many consumer products, because of its effective antimicrobial properties and low production cost. For the water purification, nanotechnology offers the possibility of an effective removal of all pollutants and germs. The objective of this study was to assess how silver nanoparticles would affect waste water treatment system for E.coli removal. For this purpose nano silver solution will be created by adding 125mg of Nano silver powder to 250ml of deionized water by means of magnetic stirring and mechanical agitation. In order to obtain a homogeneous sample of n-Ag, the quantities will be taken as the solution on magnetically stirring. Three dilutions of n-Ag concentrations will be prepared and mixed with waste water which collected from different sources. Potential use of silver nanoparticles

for water purification and its relative bacterial filtration effectiveness is discussed in this work.it is suggested that silver nanoparticles may be use in future at large scale for water purification.

Interdisciplinary / 125

Power Production Dynamics of China Pakistan Economic Corridor in Pakistan

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The major projects of the China Pakistan Economic Corridor CPEC are Energy focus based projects, approximately $ 33 Billion are expected to be invested in this sector. As per China Pakistan Economic Corridor (CPEC) Early Harvest scheme 10,400MW of the electricity will be added to National Grid of Pakistan by March 2018.Power production projects under CPEC power production dynamic cover both renewable and nonrenewable realm. The renewable power production projects under CPEC are Qaid-e-Azam solar park (1000MW), UEP100MW wind Farm(Jhimpir,Thatta), Sachal wind Farm 50 MW,Dawood Wind Farm 50MW,Suki Kinary Hydropower station (870MW), Kohat Hydro power project(720MW) and Three Gorges second and third wind power project of the 100MW. Besides renewable energy projects the nonrenewable projects under CPEC in the country are Port Qasim coal-Fired power station(1320MW),Sahiwal coal-Fired power plant(1320MW), CPHGC Coal-Fired power plant(1320MW) and Thar First and Thar second each of the capacity of 1320MW. The current transmission lines capacity of the Pakistan is 15500MW to extend its capacity HVDC transmission lines of 660Kv from Matiari to Lahore and Matiari to Fasialabad is the part of Energy projects under CPEC in Pakistan.

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STRENGTH ANALYSIS OF CONCRETE BY USING HYBRID WASTE MATERIALS

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ABSTRACT
Environmental contamination is the major issues associated with rapid increase in the by product and waste generated from industries, domestic and other daily life activities. Solutions to reuse and incorporate waste (electronic waste, ceramic waste, and lathe machine scrape waste) can be rewarding for many reasons, specifically for environmental, economic and technical aspects. In this study experimental investigation was done on M-15 grade concrete mix by replacement of coarse aggregates with hybrid waste materials in the range of (0%, 5%, 10%, and 15% by weight of the coarse aggregate) with constant water cement ratio as 0.4. Tests were carried out to examine the workability using the slump cone test, compressive strength and flexural strength of the concrete mix specimens. The specimens were in the form of cubes and beam obtained from the addition of hybrid waste materials and compared with control concrete mix out as per recommended procedures by relevant codes and standards. The test results showed that addition of hybrid waste in to plain cement concrete mixture significantly enhanced its compressive strength and flexural strength while it decreased the workability of the fresh concrete as compare to conventional concrete.

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Engineered Silica Nanoparticles and SiNps containing Controlled Release Fertilizer for drought and saline areas

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Silicon supplementation has been used in the beginning of this cenutury, to increase salinity tolerance in plants, therefore Silica nanoparticles (SiNps) can also be used as a trial to improve salinity tolerance in plants that are grown in drought and salt effected areas. In this study Silica Nps have been synthesyzied by some modification in the conventional method of Stober by thermal hydrolysis of Tetraethylorthosilicate. A compound Controlled Release Fertilizer (CRF) was synthesized that carried NPK and silica Nps inside the core and Chitosan as the first semi-permeable coating and Sodium Alginate and Kaolin as an outer most superabsorbent coating. The synthesized SiNps were characterized by TEM, SEM and XRD while the CRF was characterized by FTIR. The water absorbency of CRF beads showed that they can absorb large amounts of water and double their weight. The Nutrient released rate from CRF beads was very slow and sustained for six months at room temperature. The SiNps containing superabsorbent CRF was capable of releasing the nutrients slowly, withhold large amounts of water therefore can help plants control the salinity and survive better in drought and saline conditions without harming the environment. The synthesized compound fertilizer is biocompatible, biodegradable and nontoxic so helpful in growing plants in drought and salt effected areas.

Environmental Engineering and Management / 128

DOMESTIC THREE STAGE TREATMENT OPTION FOR WATER STRESSED COMMUNITIES

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Assalam-o-alaikum!

Please find the attached file of Paper Abstract and acknowledge the receipt of Abstract.

Thank you so much...

Interdisciplinary / 129

Synchrotron radiation for research in Engineering Sciences : Prospects at SESAME

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During the last couple of decades the use of synchrotron radiation (SR) has increased considerably for investigations in biosciences.

SESAME (Synchrotron-light for Experimental Science & Applications in the Middle East) is an international research center in Jordan jointly pursued by the European Union and numerous developing countries (including Pakistan). It will facilitate world-class research by scientists (in subjects ranging from biology and medical sciences through materials science, environmental science, physics, to archaeology).

With the development of SESAME there is a need to setup a network consisting of scientists, engineers and academicians; and to expand it in order to have an active users'community of synchrotron radiation in Pakistan. Being motivated by a relatively easy availability of such an expensive and high-valued facility for the scientific community in Pakistan, the present paper not only introduces the basic ideas regarding the synchrotron light but also gives a brief overview of the use of Synchrotron Radiation for research in Engineering Sciences. Some thoughts for building up a more lively users community of synchrotron radiation consisting of students and faculty members of universities in Pakistan have been highlighted.

Mechanical and Material Engineering / **130**

In-plane shear strength analysis of Basalt Fiber-Reinforced Epoxy Laminates with Biowaste Catalyst Free Carbon

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This study aims to analyze the effects of carbon nanospheres (CNSs) on the in-plane shear strength of basalt fiber-reinforced composite laminate (BFR). The CNSs were obtained from an economical fibrous residue attained from the sago palm tree, which is known as biowaste sago bark. Hand lay-up method was used to fabricate the unidirectional basalt fiber-reinforced epoxy composite laminates. The epoxy resin was mixed with carbon nanosphere particles (i.e., 0.6 wt% - 1 wt%). In-plane shear tests have been conducted as per ASTM standards. In addition, Scanning Electron Microscope (SEM) analysis was conducted, in order to study the fracture surfaces of the composite laminates. The results demonstrated significant improvement in in-plane shear strength when carbon nanosphere particles were included in the basalt fiber-reinforced epoxy composite laminate. The best result was obtained at 1.0 wt% CNSs. It displayed an increment of 37.1% in in-plane shear strength, and 36.4% increment in modulus of rigidity, respectively, in comparison to neat basalt fiber-reinforced epoxy composite laminate. The improved accomplishment of CNSs/ basalt fiber-reinforced epoxy composite laminate is due to good distribution of CNSs particles in the epoxy matrix.

Textile Engineering and Technology / **132**

EFFECT OF MATERIAL AND STITCHING ON TENSILE PROPERTIES OF WOVEN FABRICS

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Recent years have seen a considerable spread in polymer composite structural materials, which allows the development of alternatives that fulfill technical requirements and methods for improving their mechanical performance. Glass and carbon fibers are being widely used for making composites used in conditions of high loads. While basalt fibers have recently gained attention due to their advantages in terms of cost, physical and chemical characteristics and for the reinforcements of thermosetting polymers as compared to the conventional glass or carbon fibers. Yao and Zhu investigated the strain-rate effect on the tensile behaviors of unidirectional glass,basalt, carbon and plain-woven aramid fabrics. While Liu et al investigated the mechanical properties of basalt and glass fiber composite. Similarly Lopresto et al compared the E-glass and basalt fiber reinforced plastic laminates and shows the high performance of basalt materials.
Most of the work has been done on composites while it is necessary to understand and evaluate the mechanical properties of woven structure before being used in composites. In this research work, the possibility of basalt material in comparison with E-glass as reinforcement material has been analyzed. For this, the effect of material, stitch distance and stitching in between has been analyzed on tensile strength and toughness of woven fabric. The significance of these parameters has been evaluated to optimize woven structures for future use.

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Electrical conductivity and EMI shielding application of high loft non- woven web from acrylic fibrous waste

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In recent years, research on electromagnetic interference (EMI) shielding materials has attracted significant attention due to increase in electromagnetic population from widespread applications of computer and telecommunication technologies [1, 2].For eco-friendly advancements in EMI shielding effectiveness,the development of new light weight shielding materials havingstrong absorption and weak secondary reflection is necessary. This can be achieved by porous morphology, large specific surface area and higher electrical conductivity of shielding materials [3,4].Although number of research studies focused on developmentof porous carbon based EMI shielding materials, the construction oflightweight structures with excellent EMI shielding properties bysimple and affordable method is still a big challenge. This workpresented the simple and novel method for preparation of porousand electrically conductive activated carbon nonwoven web fromacrylic fibrous wastes. The prepared activated carbon is advantageous over carbon made from other materials because of low cost,high density, better purity, and virtually dust-free nature of acrylicfibers [5].
The activated carbon web was prepared by sequentialaction of carding, thermal bonding with bicomponent fibers and physical activation of acrylicfibrous web in presence of air. The carbonization was performedunder the layer of charcoal at 800 oC, 1000 oC and 1200 oC with theheating rate of 300 oC h-1 and without any holding time. Further,electrical conductivity, EDX, X-ray diffraction, SEM, X-ray tomography and BET analysis was carried out to study the effect ofcarbonization temperature on physical and morphological properties of activated carbon web. At the end, the electromagnetic-shielding ability of the produced three webs was investigated with
respect to change in carbonization temperature and thickness ofmaterial using two different measurement approaches (i.e. waveguide method and coaxial transmission line method).

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Effective modeling of Information Technology (IT) practices towards Business Environment Competitiveness in Small and Medium Enterprises (SMEs)

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Abstract

For business expansion and globalization, most of the organizations and enterprises are relying on information technology. The entrepreneurship concepts led to many startups in our country which are developing because of their positive impact on economy. There is no satisfactory research on use of IT for business environment competitiveness of SMEs in Pakistan. The objectives of this research were to determine the level of IT usage that effect business environment competitiveness, the factors effecting IT usage in SMEs, which factor effect business environment competitiveness and its divisions the most and to develop a model for affective use of IT to enhance business environment competitiveness.

The review of available literature provided the grounds for this research. Current business environment is driven by globalization and competition (Savrul, M.et al., 2014). Information technology is the only thing that is binding the global market (Krotov, V., 2017). SMEs strengthen infrastructure for better economy and its development (Sarter, Fuchs & Sack, 2014). The adoption of IT has a positive effect on SMEs as well as on the economy of the country (Ghobakhloo, M., 2012). SMEs lack necessary ICT knowledge, skills and mechanism to receive advice and support. Information technology has a positive impact on the business of an SME and the overall economy of that country (Ashrafi, Murtaza - 2008). Pakistan is said to be the fastest growing internet marketplace in Asia. (Pakistan Economic Survey 2016-17 Ministry of Finance)

SMEs from manufacturing and services sector were taken as target population for the study. The data was collected from 181 managers serving in different SMEs of Islamabad and surrounding. Stratified random sampling was done to select participating organizations. SPSS 23 and AMOS 22 were used to do data analysis. Descriptive analysis, ANOVA, Correlation, Regression and Structural equation modeling were used to analyze data. The results revealed that IT usage has a positive relationship with business environment competitiveness. The major factors of IT usage effecting business environment competitiveness of SMEs are the drivers of current IT investment and competitive strategy. Despite the current study disclosed some important results, it has a few limitations. It was not extensive, was conducted in a single region of country and covered single aspect of business (business environment competitiveness). The study can be used to predict the current usage of IT and what level of upgradation must be done to gain competitive edge over others. The findings provide a precise general model that will help future researchers to develop models for other aspects of business in SMEs.

Keywords:

Information technology, Small and medium enterprises, use of IT, IT implementation, Business Competitiveness, Model for IT usage

Mechanical and Material Engineering / 135

Modeling and Simulation of a 100 MW Concentrated Solar Thermal Power Plant Using Parabolic Trough Collectors in Pakistan

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The increasing energy demands of the modern era has created a critical situation. The world is now moving towards renewable and sustainable methods of producing energy, among them the most abundant renewable energy resource is solar energy. As the lifetime and efficiency of Concentrated Solar Power (CSP) is more as compared to photovoltaic (PV) and considering the solar potential of Pakistan, design of a 100 MW Concentrated Solar thermal power plant using Parabolic Trough Collectors and a 6-hour thermal energy storage is proposed. The CSP plant is modeled and simulated using System Advisor Model (SAM). Based on certain parameters, a location receiving an annual Direct normal irradience (DNI) of 1955 $KWh/m^2/year$ near Nawabshah is selected for the hypothetical solar thermal power plant. The plant consists of 189 solar collector loops with 8 parabolic trough collectors in each loop and HITEC solar salt as HTF. The simulation results, show that the plant can generate 245,688,560 kWh (245.68 GWh) of electricity annually with a capacity factor of 28.1% and 93.8% gross to net conversion. The results of PTC Power plant encourage further investigation and development of CSP technologies for electricity generation in Pakistan.

Geological Engineering and Geosciences / **136**

Comparison of Flooding Irrigation System and Raised Bed Irrigation System for Wheat Crop at Samoo District Jaffarabad Balochistan

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Wheat is an important cereal crop of Pakistan. However, its production is less by limited farm resources, unavailability of fertilizers at proper time, costly inputs, waterlogging, salinity, the shortage of irrigation water and its inefficiently usage. Mismanagement of irrigation water through traditional irrigation method has further constrained the cropping intensities and crop yields. Thus, without judicious use of irrigation water and other farm resources, the yield potential of wheat crop cannot be obtained. To improve water use efficiency (WUE) on the basis of increasing crop yields there must be a proper irrigation scheduling strategy. Different techniques of irrigation for water saving are used worldwide in agriculture sector now a days to minimize the water losses. In Jaffarabad district different types of irrigation systems are being adopted but mostly farmers are using flooding irrigation system for wheat crop which can lead to waterlogging and salinity in the area. Therefore this research work was conducted to compare flooding irrigation system and raised bed irrigation system for wheat crop in terms of water use efficiency and crop yield in district Jaffarabad, because water is the most important factor and critical input for successful crop production. Water should be utilized for optimum and economic yield. Modern high yielding crop practice methods can be sustained only with good water control and management at the farm level. In flooding irrigation system over-irrigation occurs which leads to a rapid degradation of soils. This is when much more water is needed for the raising of a crop, than the crop actually needs. Aim of this research work is to determine water saving and optimum crop yield by comparison of flooding irrigation system and raised bed irrigation system in district Jaffarabad.

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Investigation of optimum fluidization velocity of CaCO3 and Coal mixture using fluidized bed

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This paper investigates the experimental study to develop fluidizing behavior of CaCO3 and coal micro size particles in a fluidized bed. The tests were carried out at natural conditions. The grain size distributions of the materials were conducted with the help of sieve shaker.The objective of the study to analyze the optimum superficial velocity versus pressure drop and bed height using air flow in a fluidized bed. The minimum fluidization velocity was obtained at pressure drop of 38 mmH2O, at 50:50 of Coal and CaCO3 that was 0.0576 m/sec compared to 0.0767m/sec at pressure drop of 30 mmH2O, 25:75 of coal and CaCO3. Hence, different ratios of the material influenced over the fluidization velocity, pressure drop and bed height. It was observed that investigation of well mixing can be helpful in gasification of CaCO3 and coal.

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Effect on strength of concrete by partial replacement of cement with class F fly ash

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Fly ash is an industrial waste which contributes to environmental pollution. However, it can be neutralized by using it as a cementitious raw material in the making of ordinary Portland cement concrete. In this paper, we have assessed the strength of concrete made by partially replacing cement with class F fly ash. Concrete cube samples with incrementally increasing class F fly ash supplements were tested at the 7th and 14th day with UTM machine. Results revealed that with the increase in quantity of class F fly ash, compressive strength of concrete decreased. The drop in compressive strength was found to be more rapid on 7th day samples than 14th day samples. Interestingly, 14th day specimen of 15 percent class F fly ash composition in concrete cubes yielded optimum values of compressive strength. Findings of this study comprehensively confirmed the kind of impact class F fly ash should have on concrete's compressive strength theoretically. To further substantiate the plausibility of using class F fly ash as a raw material in concrete, this study recommends the use of lime and binding agents along with fly ash, which should be tested for longer periods of time

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Strength Analysis of Using Marble Powder and Stone Dust as Partial Replacements of Cement and Aggregate in Concrete .

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Leaving waste materials to the environment can cause environmental problems. Sustainability in concrete production can be achieved by innovations in substitution of materials used, which are much needed to meet the increasing demand for new and quality materials. To that end, this study is aimed at utilizing Waste marble powder and Stone dust as partial replacement of cement and fine aggregate in concrete respectively and comparing its workability and compressive strength with the conventional concrete mix M15. In this study, ten mixes with different combinations of waste marble powder (0%, 5%, 10%, 15%, 20%) and stone Dust (0%, 15%, 30%, 45%, 60%) were prepared. It is found that there is an increase in the Compressive strength of the concrete produced from waste marble powder as partial replacement of cement up to 10% and Stone Dust as partial replacement of fine aggregate up to 45%. Therefore, it is recommended that waste marble powder and stone Dust should be used in construction works, so that the cost of construction is saved significantly and optimum strength is obtained ensuring efficient use of raw materials all the while reducing the toll taken by the environment

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Effect of Silica fume and Granite on Physical and Mechanical Properties of Concrete

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Concrete, a major part of construction is extensively used nowadays in the field of engineering. Due to its usage in simple construction projects to skyscrapers, it is classified into a wide variety of types. The most advanced type known as high performance concrete which is mostly adopted for high rise buildings or areas where strength is the utmost priority.
Such type of concrete can be produced by adding different cementatious materials such as silica fume, fly ash, and limestone powder in cement which significantly increases the strength and durability of concrete as compared to normal concrete.
Silica fume being a reactive pozzolon, increases the overall properties of concrete due to its binding and micro filling properties. On the other hand, granite can also be used as a supplementary material to increase the crushing strength of concrete as it is a plutonic igneous rock. Granite offers high durability, strength, excellent resilience to acid attacks than other types of rocks.
In this research study, the effect of silica fume and granite on physical and mechanical properties were investigated. Various specimens were produced in several mix proportions in which cement was replaced by silica fume in 5,7,10,12% by weight whereas coarse aggregate was replaced by granite in 5,10,15,20 % by weight. Elastic modulus,volumetric water absorption and Mercury Intrusion Posimetry of silica fume concrete were also determined. Polycarboxylate HRWR Super plasticizer was used to reduce the water binder ratio.
The slump cone test was performed on concrete to determine the workablity and loss of slump. The optimum quantities of both silica fume and granite were found out that results in the highest strength by performing a wide variety of tests such as compressive, split tensile and flextural strength tests at 28 days. Test results indicate that by replacing cement to silica fume at 12% and coarse aggregate to granite at 20% by weight significantly increases the compressive, tensile and flexural strength of concrete.

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Hydrothermal Alteration in Porphyry Cu-Mo-Au Mineralizations of the Chagai Arc, Balochistan, Pakistan

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Abstract
Subduction related east-west trending Chagai Arc, located in the western part of Pakistan. This arc is the western extension of Tethyan Magmatic Belt which is about 5000 km long that extends from central Europe, Turkey, Iran and Pakistan. During the last four decades, several porphyry copper settings were reported from the Chagai Arc. Seven more famous occurrences are selected for the present study owing to more detailed work carried out on them. From west to east these deposits include Saindak, Reko Diq (formerly known as Koh-e-Dalil), Humai, Durbanchah, Missi, Ziarat Pir Sultan and Dasht-e-Kain. Hydrothermal alterations in the porphyry copper occurrences of Chagai arc are mainly associated with tonalite porphyry stocks, except Durbanchah and Humai prospects which are hosted in dacite porphyry stocks, whereas Missi Prospect occurs in a granodiorite batholith. Alteration is generally developed in a concentric zonal pattern as observed in majority of the world deposits, except that absence of a regular argillic and peripheral zone. In most of the occurrences the potassium silicate altera¬tion zone (K-alteration zone) occurs usually within the intrusive porphyry stock, but in Saindak and Reko Diq deposit, some of the adjacent wall rock sediments, and in Durbanchah setting the microdioritic country rock, has also undergone the K-alteration. Quartz sericitic or phyllic alterations zones are developed in all the occurrences as continuous or dis¬continuous haloes around the K-alteration zone except in Durbanchah prospect. In Humai prospect an advanced argillic alteration zone is developed around the K-alteration zone. Propylitic alteration has also developed in all the occurrences and generally encircles the quartz sericitic alteration.
The oxide mineralization is generally represented by goethitic jarositic, hematitic limonites and malachite, with minor pitch limonite, chrysochola, neotocite, brochanthite and molybdite. Hypogene mineralization is represented by pyrite, chalcopyrite and minor bornite. A regular supergene sulfide enrichment is only reported from the Reko Dik deposit and represented by chalcosite and covellite in other deposits restricted incipient type supergene sulfide enrichment is encountered. In terms of ore reserves the Riko Dik deposit is on the top with 2,200 million tons of copper followed by Saindak with 412 million tons and Dasht-e-Kain 350 million tons. Grade wise Reko Diq Deposit is again on the top with 0.53% Cu, 0.01% Mo and 0.3g/t Au, followed by Saindak with 0.4% Cu, 0.015% Mo and 0.35 g/t Au. Dasht-e-Kain deposit contains 0.35% Cu and 0.015% Mo. Gold has not been reported from Dasht-e-Kain deposit. From other deposits of the Chagai Arc ore reserves and grade are not reported so far.

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EFFICIENCY AND COST ANALYSIS OF POWER SOURCES IN IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM FOR CORROSION PREVENTION IN BURIED PIPELINES

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Abstract
Corrosion is the physical deterioration of metals, including buried metal structures and gas pipelines, resulting from chemical reactions between metals and the surrounding environment. Cathodic protection of these underground metals structures & pipelines can be achieved either by Impressed

Current method or by sacrificial anodes method. This research paper focuses on the corrosion prevention of buried metal structures in general and gas pipelines in particular, by the novel method of Impressed Current Cathodic Protection (ICCP) which uses electrical current by an external DC power source for its operation. Three major DC power sources that is, Transformer Rectifier, Thermoelectric Generator and the Solar System are selected for this purpose and are projected over a period of time in a pre-designed ICCP for high transmission underground gas pipeline in Baluchistan, a province of Pakistan. The efficiencies of these three power sources are then analyzed and compared according to the climate effects, the versatility effects, the intensity of power output, their operational limitations and also their initial, running and maintenance costs. The measured results will aid the selection of efficient and robust DC power source for ICCP design and will contribute in mitigating and controlling the corrosion rate in underground pipelines. On the basis of analysis of the measured results for the three available DC sources, the Solar System was found as the most efficient DC power source for Impressed Current Cathodic Protection of buried gas pipelines. The selection of efficient corrosion protection system will result in a smooth flow of oil and gas products through these buried pipelines which may otherwise leads to huge monitory and accidental losses when get corroded.

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EVALUATION OF THE PERFORMANCE OF UNBOUND AND BOUND GRANULAR MATERIALS UNDER REPEATED TRIAXIAL LOAD TEST

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Unbound Granular Materials (UGMs) are extensively used as sub-base course materials around the world as they are capable to bear high traffic loads and are more economical as compared to bound materials. This research presents the relationship between resilient modulus and physical properties of NHA class A1-a and A1-b materials obtained from different parts of Khyber Pakhtunkhwa, province of Pakistan. This research investigates the effect of percentage of fines, moisture changes, stress level, source effect and change in gradation on the resilient modulus of Unbound Granular Materials (UGMs) and BGMs(cement treated) of flexible pavement. The water can intrude into the unbound base course layers and in the worst state can saturate the layers leading to premature pavement failures. An investigation is required to find the performance of different sub-base courses materials at optimum moisture, optimum towards dry condition and optimum towards saturated conditions. To investigate the physical properties of aggregates, conventional tests for aggregates (i.e. Los Angeles abrasion test, specific gravity, CBR) have been conducted, the results show that the aggregate used in this study falls well within the allowable limits. Performance test (resilient modulus test) (Mr) of selected materials were carried out using Repeated Load Triaxial (RLT) test in Taxila Institute of Transportation Engineering (TITE), UET Taxila. The results indicate that aggregates type, gradation of the materials, percentages fine and percentages moisture considerably affect the resilient modulus of UGMs and compare it with the result of BGMs. Moisture content has adversely affect on unbound sub-base course material especially when water increase from optimum to wet conditions. The results shows that materials which have lesser clayey particles (low P.I value) are more sensitive towards treating than those which have more clayey Particles (High P.I value).

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EFFECT OF RANDOMLY ORIENTED HAIR FIBER ON MECHANICAL PROPERTIES OF FLY-ASH BASED HOLLOW BLOCKs.

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The main aim of the work is to investigate the effect of mixing of hair fiber on mechanical properties of fly ash. The hair fiber were mixed in ratios of 0.00, 1.00, 1.50, 2.00 & 2.50% respectively. As the production of 1 Ton of Portland cement produces 1 Ton of carbon dioxide thus causing environmental threat to atmosphere. This is causing depletion of ozone layer situated at a height of 25 kilo meter from surface of earth. Therefore the production of cement is under critical review. The scientists and civil engineers are playing their role to contribute their efforts in solving this problem by reducing the effects of negative consequences of cement production on atmosphere. A number of studies have been carried out to determine the effect on the physical properties of soil and fly ash with and without Lime. However, very few studies have been done to investigate the effect of randomly oriented hair fiber on fly ash based Hollow block. In this paper, results of an experimental study have been presented to determine the effect of randomly oriented hair fiber on mechanical properties of fly ash based hollow blocks.
The hollow blocks were tested in compression testing machine at 28 days. The loads and Corresponding deformations were measure during the test. It was concluded that at 0 % of hair fibers, the compressive strength was found 21.33 Kg/cm2. The strain for 0 % was 0.00160000 while the poison ratio was 0.159. As the percentage of hair fiber was increased up to 0.50 %, the compressive strength values were found enhanced. The compressive strength was increased to 27.58 Kg/cm2. Similarly the strain values increased from 0.00160000 to 0.00253333 and the poison ratio to 0.161. Similar results were obtained as the content of hair was increased. The strain values were found increased with an increase content of hair in blocks. Similarly values of compressive strength and poison ratio also increased. The compressive strength of blocks with 1.00 %, 1.50%, 2.00 % and 2.50 % were observed as 36.33 Kg/cm2 ,52.50 Kg/cm2 ,75.56 Kg/cm2, and 21.50 Kg/cm2 respectively. Similarly the strain values constantly increased with increasing content of hair in moulds. It was observed that increasing hair content beyond 1.50 %, the compressive strength values decreased at higher rate, while the strain values and poison ratio were also found to reduce. The blocks with 2.00 % content of hair showed less compressive strength values of 21.50 Kg/cm2, lowest strain values of 0.00197798 while value of poison ratio reduced to 0.164 compared to standard blocks.

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Stability Analysis of flood bunds, A study on Geotechnical Health evaluation of embankments

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Flood constitutes one of the world's most serious environmental hazards. Flood bunds are the earthen hydraulic structures which are constructed along the River to control the Flood water to avoid damages to the infrastructure, crops, livestock and also loss of human lives. Pakistan which lies in the Indus Basin has been facing severe threats and losses from the floods since histories. About 6807km length of flood embankment has been constructed to safeguard against the floods in the country. Punjab has been worst hit province by heavy floods and rains causing heavy loss.

Geotechnical Evaluation is vital for proper functioning of such structures. For the study purpose four bunds have been selected along River Chenab in D G Khan Irrigation Zone, having potential for embankment breaching. In-Situ tests are performed on the selected flood bunds to collect soil samples for laboratory testing and to measure the in-situ soil permeability. Based on field investigation and lab testing various parameters were selected for modeling the bund structure in the limit equilibrium based software Geo Studio (2012). The model is analyzed considering four different critical scenarios, (1) steady state at highest Flood level (2) Rapid drawdown from highest Flood level (3) steady state at extreme condition with 3 feet free board (4) Rapid drawdown from extreme condition with 3 feet free board. The safety of the flood bunds is evaluated in terms of safe exit gradient, factor of safety and river embankment breaching. Guide lines to avoid breaching of flood bunds are also discussed.

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Effect of the confining method on the cyclic undrained behaviors of sand

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Cyclic Simple Shear (CSS) test is widely considered to best simulate vertically propagating shear waves and in-situ stress conditions. CSS test is always performed to generate reliable laboratory data for development and calibration of models in Geotechnical Earthquake Engineering design. Soil sample is laterally confined to simulate in-situ stress condition (k0). Stacked rings (SR) and Wire-reinforced membranes (WR) are the two widely used confining methods. Studies have been conducted on the effect of the two confinement methods on the static behavior of soil. In this paper, the effect of the SR and WR confinement methods on the dynamic soil behavior is studied. The comparison of the undrained stress controlled cyclic CSS tests results indicated that the dynamic behavior of the two confinement methods is mostly similar.

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Safety and Environnemental impact of Replacing Traffic Signal by U-Turn- Case Study of Khanapul Islamabad Expressway

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This paper analyzed the widely-used access management treatment in Rawalpindi/Islamabad, Pakistan: using U-turn instead of traffic signal or direct right turn. Data was collected from a very congested traffic signal at Khanapul traffic signal, Islamabad Expressway. The traffic signal was recently closed and traffic was diverted to U-turns placed at downstream. No of accident and their severity as well as VOC, CO, NOx, Fuel consumption etc were computed for both scenarios. It was found that the provision of downstream U-turn was very effective in reducing conflict zones and reducing accidents as well as reducing emissions for environmental preservation.

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River flow dynamics with non-linear shallow-water equations

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This research proposes a model that is able to approximate unsteady flows in rivers and simulate the associated riverine processes to gain an understanding and insight into open-channel flow dynamics. The governing equations include Saint-Venant equations. Second-order temporal and spatial accuracy is obtained by TVD Runge-Kutta method and high resolution reconstruction techniques, respectively. The equations are solved by Godunov-type finite volume method which is preferred because of its conservation preserving characteristics. Approximate Riemann solver technique of Harten-Lax-van Leer (HLL) is used to compute flux components associated with hydrodynamics. A modified method for approximating flow features along shear wave is introduced. The proposed scheme is used to model an idealized dam-break case, and a case of dam-break in a channel with a 90o bend which results in bore formation and complex two-dimensional flow; the predictions show excellent agreement with available experimental results and analytical solutions.

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Potential Effect of Sugar Mill Waste Water as Substrate for Bio-Electricity Generation using Laboratory Scale Double Chamber Microbial Fuel Cell

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Potential Effect of Sugar Mill Waste Water as Substrate for Bio-Electricity Generation using Laboratory Scale Double Chamber Microbial Fuel Cell
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ABSTRACT
Bio-electrochemical system for power generation getting attention due to utilization of waste material. Based on that study was made to convert sugar industry waste water for bio-electricity generation using double chamber microbial fuel cell. Different organic load in form of substrate concentration and parametric effect were tested to optimize the best condition for electricity generation. From 100g/l to 300g/l with step size 100g/l, for aeration rate from 100-250ml/min with step size 50ml/min, and for as pH from 4.5 to 6.5 with step size 0.5pH. the maximum power generation were observed at pH 6, aeration rate 200ml/min and organic load 200g/l about 820mA. Regarding above results that found favorable condition on environment as well as waste reduction.

Key words Biotreatment, Electricity Generation, Sugar Mill Waste Water, MFC

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Synthesis And Characterization Of Gold Nanoparticles And Their Application For Removal Of E.coli From Waste Water

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Abstract:Spherical gold (Au) nanoparticles are prepared by hydrothermal method and are characterized by ultra violet visible spectroscopy is revealed the size of chemically synthesized gold nanoparticles as 5_10nm and X_ray diffactromtery(XRD) analysis determine the polycrystalline nature of gold nanoparticals and scanning electron microscopy.For antimicrobial activity and high surface area,long term stability nanoparticales are now in high demand for treating waste water.Hence an attempt is planned to kill the microbes (E.coli) present in the waste water by way of gold nanoparticles.

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EFFECTIVE USE OF ENZYME ZYMASE FOR ENHANCEMENT OF ETHANOL PRODUCTION COUPLE WITH PARAMETRIC EFFECT

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ABSTRACT
Pakistan has large sources of sugarcane crops coupled with significant amounts of molasses generated. Based on this a study is conducted to investigate optimal ethanol production focusing the effect of different operational and nutritional parameters. The parameters investigated are temperature, aeration rate, agitation and pH coupled with different doses of enzyme. This study focused to investigate the optimized dose of enzyme with different parametric effects. 2-10 g/l were utilized having a step size of 2. Other parameters ranged as follows; aeration rate 0.1vvm/l to 0.2vvm/l, 200-350rpm agitation, 30-45 degree centigrade and 5-6.5pH ranges were utilized with different enzyme dosage.. Saccharomyces servisae was used as a biocatalyst for ethanol production. The maximum ethanol production obtained at 0.2vvm/l, pH 5.5, agitation speed 300rpm and 35oC at 4g/l of enzyme was about 82g/l. This study found a novel method for utilizing the enzyme separately for enhanced ethanol production.
Key words: enzyme, industrial alcohol, molasses, operation condition

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Solar Based Smart Irrigation System Using PID Controller

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A smart approach to minimize the human sources in field of agriculture using proportional integral and derivative (PID) Controller by implementing on Microcontroller environment of Arduino. This project includes four sensors; namely as, Moisture-level, Wind speed, Ambient humidity and Radiation sensors while taking moisture of soil as setting point. Moreover, A DC motor is used for water pumping to soil with the help of control algorithm of Pulse Width Modulation (PWM) which provide precise amount of water to soil and ensure the speed of water before the motor needed to be stopped. This Project is Energy self-sustainable by the used of solar panel for battery charging which makes this project green and permits a farmer to grow crops in distant area with no time and again to check the appropriate conditions of the field. The distant communication between device in the field (transmitter) and the monitoring device in the hand of farmer (receiver) is performed by radio frequency communication (NRF module), and parameters are measured with the help of (4) four designated sensors so farmer can water crop from a distant place and monitor it by the signal display on LCD. These four sensors work together at different participation ratios on the basis of PID controller programming using Radio Frequency Communication using NRF Module and takes smart decision for irrigation.
Key Words: Irrigation system, PID Controllers, Arduino, PWM, PV Panel, Lead Acid Battery, Moisture level Sensor, Humidity Sensor, wind-speed Sensor, radiation sensors.

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Estimating the vehicle damage cost due to Road Traffic Accidents in Lahore, Pakistan

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Road Traffic accidents and their worst effects are increasing exponentially worldwide and in Pakistan as well. According to World Health Organization (WHO) it is one of the leading causes of deaths in developing countries. But unfortunately it is a neglected problem in Pakistan and no deliberate efforts have been made to assess the socio economic losses (tangible or intangible) due to road traffic accidents in Pakistan. This study was conducted in second largest city of Pakistan to highlight one of the economic losses that occur in result of road traffic accidents that is Vehicle damage cost. Lahore is the second highest populated city of Pakistan and more than 30000 thousand accidents occur in Lahore every year. This study reveals that average vehicle damage cost in fatal, major, minor and property damage only (PDO) is 243,336, 116,127, 12,841 and 13,632 respectively. This study also reveals that than losses of 1.5 billion Rs occurred in Lahore in 2016 in terms of vehicle damage cost due to road traffic accidents.

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USAGE OF PRELIMINARY TREATED SEWAGE WATER IN THE MAKING OF CONCRETE

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As concrete is one the construction material extensively used throughout the world so it also makes water to be one of the material widely used in the concrete industry. With the current water crises situation in Pakistan specifically in Balochistan, there is a need to look for alternative sources of water for concrete making, as potable water is not completely available even for drinking purposes.

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Strength Comparison between ECC (Engineered Cementitious Composite) & RCC (Reinforced Cement Concrete).

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The durability of concrete one of the most significant problems within the civil engineering community. Through careful design and the durability and long term performance of many concrete structures enhance by the use of Engineered Cementitious Composite (ECC) also known as High Performance Fiber Reinforced Cementitious Composite (HP-FRCC) or Benable Concrete. However, before implementing these new materials into construction applications, their durability performance must be shown equal or superior to concrete over long duration in harsh service environments. Reinforced concrete is widely used for construction on a large scale due to its desirable mechanical properties. Concrete has relatively low tensile strength and ductility, the tensile strength and durability are to be increased by the inclusion of reinforcement. This research shows guideline on how Engineered Cement Concrete used in construction works as a replacement of reinforced cement concrete (RCC). The result shows that at 7th day of curing, the compressive strength of ECC cylinder found to be 15.12% higher as compared to the strength of RCC. Similarly, the split tensile strength of ECC specimen is comparatively lesser than RCC to about 27.03%. Moreover, the flexural strength of ECC beam found to be relatively higher than RCC beam to about 2.75%. Whereas, compressive strength at 14th day of curing of RCC specimen is 13.87 % higher than the ECC, the split tensile strength of RCC cylinder is 14.83% higher compared with the ECC cylinder, and flexural strength of ECC beam is higher than the RCC beam to about 4.52%. Similarly, the strength at 28th day of curing at ECC cylinder is 9.22% greater compared with RCC. The strength of RCC in tension is 52.74% higher than ECC. And the flexural strength of ECC beam is more than 63.22% of RCC beam. This research particularly focuses on the strength comparison of ECC and RCC. Although further research is required in this field to understand the effects of ECC in future.

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Human Machine Interface Glove Using Piezoresistive Textile Based Sensors

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Human machine interface technology is focused upon new ways of interaction between human beings and machines. Gesture recognition gloves are getting increasingly popular as human-machine interface devices. Conventionally, these gloves use electronic sensors to sense different hand gestures. As electronic sensors are bulky and uncomfortable, we propose a glove with textile-based piezoresistive sensors. This glove is flexible, more comfortable and cheap as compared to the conventional human machine interface gloves. We have examined that this glove can effectively sense our gestures and can be used for teleoperations, sign language to speech conversion systems and gaming.

Textile Engineering and Technology / 159

An Overview of Different Microencapsulation Techniques for Smart Textiles

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This article is a review which covers the spectacular technology of microencapsulation; it's method of preparation, selection of polymeric core shell materials and their uses in broad scale of applications. The methodology of microencapsulation adopted depends on the selection of core and shell ingredients which further depends on the application area. The encapsulation is categorized into three main methods of preparation such as Chemical method, Physic-o-chemical and Physical method. Microencapsulation technology occupies a wide range of applications by encapsulating drugs, fragrances, catalyst, vitamins, adhesives, cosmetics, enzymes, healing agents and various other active materials which employed in agriculture, textiles, and for clinical purposes. Microcapsulation of phase change material revolutionized smart textiles by making them permanent thermoregulatory as well as a slow release encapsulation mechanism for different innovative functional textiles.

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Contractor Selection and Bid Evaluation in Construction Industry of Pakistan

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Construction industry associates have started ascertaining that bid with smallest value does not declare maximum worth. Attaining a worth based procurement method is a challenge, mainly for the Pakistani public sector clients, who are still practicing the lowest bid award system. This research

was to pursue construction specialists sentiments about the old-style bidding process and other systems for evaluation of bids and awarding contracts. The main objective of this research study was to evaluate the relative importance of different criteria that are kept in view while contract awarding process. A wide research work was approved out to recognize different practices and a questionnaire survey was conducted between the different groups that make up the construction industry in Pakistan. The survey was conducted through visits to contractors, clients and consultants. The data was collected and results were analyzed using severity index analysis. The study concluded that 70% of the respondents consider the multi parameter bidding process (time, cost, & quality) is more effective than the lowest bidding method and graded as best between all six designated methods. Experience and finacial condition of contractor is the most important criteria for selecting the contractor award process.

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Trend analysis in precipitation and accessing the influence of climate indices in Baluchistan

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Abstract: Pakistan's largest province, by area, Baluchistan hosts deep sea Gawadar port, and is playing a vital role in one belt one road (OBOR) plan. CPEC, a Regional route comes under OBOR which connect Pakistan's Gawadar port to Chinese Xinjiang Province. CPEC Corridor upon construction is expected to revolutionize the infra-structure, economy, trade, finance, demography, environment, culture, socio- economic conditions, of Pakistan. Much of western and central CPEC routes pass through it. However, Baluchistan, due to its topography and rugged terrain, is under constant risk of rainfall driven flash floods. Flash floods are responsible for colossal damages to the infra-structure, especially roads, bridges, trade, communication that ultimately badly affects the humans, economy and the environment. The intensity and frequency of rainfall are increasing due to climate change and flash floods put everything at high risk. In this view, the assessment of changes in rainfall has got significant importance. More or less no appreciable studies have been conducted on the precipitation trend analysis and influence of climate indices in Baluchistan.
This research is focused on assessment of trend analysis in precipitation of Baluchistan using 40 years (1977-2017) data of 14 stations in Baluchistan. The data has been obtained from Pakistan Meteorological Department (PMD). Statistical tests, being the most direct methods of detecting changes in extreme rainfall intensities were adopted. Two nonparametric tests Mann-Kendall (MK) and Spearman's rho (SR) have been used to find the trends in annual and seasonal precipitations. Nonparametric methods are selected as they are less sensitive to data gaps, if it exists. The regional MK test has been applied to test the regional trends and the partial Mann-Kendall (PMK) test has also been employed to evaluate the variation of trends due to the influence of climate indices data.

Keywords. Trend Analysis, Rainfall driven flash floods, Mann-Kendall, Climate Indices

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Future Climatological Drought Projections Over Quetta Valley, Balochistan, Pakistan

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FUTURE CLIMATOLOGICAL DROUGHT PROJECTIONS OVER QUETTA VALLEY, BALOCHISTAN, PAKISTA

The historical climatological records provide eminent evidence that drought is a permanent disastrous natural phenomenon of Balochistan. The precipitation data from 1872 to 1960 characterized that 25 drought events flashed with an interval of 7 to 14 years when average precipitation deficiency ranges from 20 to >40%. The eleven years longest historical drought span over 1945 to 1955 and the most recent recorded dry-spell extended from 1997 to 2003. During the last recorded dry spell, the average precipitation values decreased from 0-21% in Balochistan, while in Quetta Valley from 40-70%. The variability in precipitation and temperature has an enormous social and economic impact on the residents of Quetta Valley. The climatological variability devastated the ecosystem, depleted the groundwater resources and an exhausted environment. The precipitation and mean temperature data have been downscaled for mid (2040-2069) and far future (2071-2100) using different regional climate model (RegCM3) namely ERA40, ECHAM5 and FVGCM to identify its association with the observational data of Quetta valley. The observational data of mean temperature and precipitation shows a strong correlation to the downscaled data of ERA40 as R2=0.97 and R2=0.47 respectively. Furthermore, the ERA40 shows somewhat underestimate the mean temperature and overestimate the precipitation data. The observational data used to calibrate the downscaled data. The Representative Concentration Pathways RCP45 and RCP85 have been used for future behavior of these meteorological parameters. The both RCPs show positive increasing trend for mean temperature and negative trend for precipitation for the 21st century. The Mann Kendall and Sen's Slope Methods are used to identify the trend and its magnitude at 95% significance level respectively. The historical record from 1951-2010 depicts that drought frequency has increased and continuously increasing thereafter, that increase pressure on the moisture regime for Quetta valley. The study also identifies the historical and future drought frequency and drought years along with return period over the time. The strong relationship has been identified between the soil moisture and standardized precipitation index (SPI) which ultimately helps to identify the spatial behavior of droughts. The study outcome may assist different stakeholders to predict and device immediate, short and long-term strategies to combat the droughts. The water resource Managers and surface and groundwater Planners may develop preeminent future drought contingency plans in the light of climate change over the Quetta valley.

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9-Level Cascaded H-bridge Multilevel Inverter

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Use of Marble Dust/Sludge as Partial Replacement Material of Cement/Sand in Concrete & Mortar

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Marble powder/sludge is an industrial waste resulting from cutting, shaping and polishing of Marble. Industrial waste management is one of the major environmental problems, therefore, recycling and reuse of industrial wastes will play vital role both in resolving industrial waste problem and in getting benefit from it. Utilization of marble dust/sludge in the production of new building materials can conserve the limited natural sources and will also help protect environment. In this experimental study, the usability of marble dust as partial replacement of cement in mortar and concrete and also as complete replacement of sand both in mortar and concrete has been investigated; their compressive strength and modulus of rupture determined and so is the cost. It was confirmed through XRD & SEM analysis that Marble Dust/sludge has no Pozzolanic properties, but through experimentation it was observed that it shows good workability as slum is comparable to control cement samples but it shows slight increase with increase in marble content. The study reveals that marble dust/sludge up-to 15% can be replaced in mortar whereas in concrete cement can be replaced up-to 10% without compromising the strength. The study also reveals that sand replacement up to 80% increases the compression strength of both mortar & concrete. It was also observed that there is an increase in compressive strength for both cement & sand replacement with the passage of time, probably due to the development less shrinkage cracks during setting, or may be due to the filler effect of marble powder attributed to the fact that the lower fineness modulus enhances the cohesiveness.

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Comparative Analysis of Nawabshah and Quetta Weather Conditions for Possible Applications of Solar Systems

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The purpose of this study was to compare the weather conditions of Nawabshah and Quetta cities for possible applications of solar systems. For that, twenty two years monthly average data of insolation on horizontal surface, at various slopes on titled surface, air temperature, and earth skin temperature was acquired from National Aeronautics and Space Administration. The data was evaluated through MATLAB software. It was found from comparative analysis that Quetta city receives 6% more insolation on horizontal surface, 9% more insolation at optimum slope on tilted surface than Nawabshah city. Quetta also gets 6 % more minimum radiation at the slope of 0°, and 9% more maximum radiation at the optimum slope than Nawabshah. Moreover, Quetta has 72 % less minimum temperature and 36% less maximum temperature than Nawabshah. In addition, Quetta has 46% less average temperature and 38% less earth skin temperature than Nawabshah. It is discovered from the study that Quetta is more promising place for installation of solar systems as compared to Nawabshah city as it receives more solar radiations and less air temperature.

Keywords: Air temperature, Insolation, Solar systems, Weather conditions

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Effect of Temperature on Power Output of Photovoltaic Modules in Outdoor Conditions at Nawabshah

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The purpose of this study was to analyze the performance of crystalline and non-crystalline photovoltaic modules at Nawabshah. The climatic conditions of site were recorded with HP-2000, performance of photovoltaic modules with Prova-210, and module temperatures with Prova-830. The maximum global solar radiation was recorded at noon and ambient temperature in the evening and relative humidity in the morning hours. It was found that amorphous attained more average temperature than polycrystalline, thin film and monocrystalline modules. The maximum average power output was produced by thin film with 54 percent and minimum by amorphous with 44 percent of their respective rated values. As far as crystalline and non-crystalline modules are concerned, the mean average maximum power output was given by polycrystalline and minimum by amorphous from their rated values. It was revealed from the study that crystalline photovoltaic modules perform better than non-crystalline modules at the study area.

Keywords: Climatic conditions, Fill factor, Module temperature, Photovoltaic, Power output

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Design optimization of Base-Frame structure of Portable-Cabin using Structural Analysis

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Portable-Cabins are widely used in remote engineering fields for multiple purpose such as accommodation with different layout, Kitchen, offices, mess etc. Manufacturing of Portable-Cabins is very demanding in Pakistan as there are many engineering fields that operate remotely in rural areas which lack in proper accommodations. The base frame structure of the portable-cabin is the most critical part as it bears the major portion of the load. For this study, we have considered a two room and two bath (2R/2B) Portable-Cabin. The load calculation was performed and structural analysis was carried out on current design of the 2R/2B to have the benchmark strength, safety factor and material cost associated with it. The purpose of this study was to reduce fabrication cost being in safety limits by trying cheaper and available cross-sections in local market. By doing so, we have proposed five new possible layouts of base frame with lower material cost and higher strength. Furthermore, gage analysis for proposed layouts is also performed to see if it can further reduce cost of fabrication without having a major effect. The results shows that using different available cross sections cost can be reduced to a great extent. These structures can be useful for settlement after a disaster like earth quake or flood in form of schools and accommodation, development of a green city, economical house/hotels, portable-toilets, and portable-offices for remote sites.

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Impact & Ratio of Lead in Ambient Air from Vehicular Emission in Quetta Valley (Pakistan)

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Air pollution is the fourth leading fatal health risk factor consider worldwide, resulting in 4.8 million premature deaths in 2013. Lead in Ambient Air remains a serious problem in many developing and industrializing countries, as well as in some developed countries. Toxic effects of lead is affecting many people especially in motorized, urban environments. Pakistan is the most urbanized country in South Asia, and deteriorating Ambient Air conditions particularly in large urban cities are damaging the people's health and quality of life, and contributes to environmental degradation. Monitoring of Air Pollution was conducted in Quetta Valley. The seasonal Annual average concentration of Lead in Ambient Air was calculated. The ratio of vehicular emission from exhaust pipe of vehicles was also calculated in Ambient Air. The results were compare with the WHO standards and found four times higher than WHO Standard i.e. 0.5-1 µg. The concentration was found higher in spring and found lower in summer. The results were compare with the major cities of world and within Pakistan. The paper also highlighted the impacts of Lead pollution in Quetta Valley.

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Upscale fermentation of Bacillus licheniformis to produce probiotic for poultry, using cheap media (molasses)

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The main objective of this study was to use Bacillus licheniformis as probiotic to get the beneficial effects on poultry birds for the organic chicken, for this purpose Bacillus licheniformis KT443923 which has high antimicrobial activity, large zone of inhibition and CFU/g was cultured in molasses which is a cheap media. After optimization of shake flask parameters like pH, temperature, NaCl concentration, time, inoculums size, LB media and molasses upscale batch fermentation process was carried out in 7 liter Bioflo fermenter with 3 liters working volume and 6ml/100 ml of clarified molasses were used as medium at 37℃ for 24 hrs on 200 rpm/min for bacterial growth. For the fermentation of aerobic bacteria 2.5 vvm of dissolve oxygen/min was selected. The cell mass was centrifuged at 60,000 rpm for 15 minutes, pellet was lyophilized finally 4 gm (CFU 5.1×10 10) product was obtained. It was observed that cell mass production was maximum in fermenter (4 g/L) as compared to the shake flask which was (1g/L).

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ASSESSMENT ON QUANTITY MEASUREMENTS OF HEALTHCARE WASTE AND IT'S MANAGEMENT APPROACHES IN BOLAN MEDICAL COMPLEX QUETTA

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This study was conducted to assess Healthcare Waste Management practices at Bolan Medical Complex Hospital (BMC) Quetta, Balochistan Pakistan. This Research adopted descriptive cross-sectional design on the period of June 1 to December 30, 2016. Research instrument were a survey, interviewed, questionnaires and response rate is 90%. The Quantitative data were examined by Statistical Package for the Social Sciences (SPSS). The Quantity of Healthcare Waste in Bolan Medical Complex resulted as total number of Out-patients is 2000/Day, in-patients are 870/Day, deliveries are 5000/Year. Total Quantity of waste generated in BMC is 100 kg/Day and general waste 5kg/Day, hospitalization Waste 80kg/Day, Out-Patient rooms and Emergency waste 10kg/Day, Dressing rooms waste 5kg/Day, Laboratory Waste 5kg/Day, Food points waste 1-5kg/ Day, Waste from Ware houses 1-5 kg/Day. Low level of Radioactive waste is generated 77.3%. This research assesses the existing healthcare solid waste management approaches and suggests potential options for enhancement. Recommendations are respect to developments in the overall infrastructure, formation of strategic firms within in-site and off-sites. Healthcare Waste Should management with the aspect of sustainable approaches with resource use, minimization of waste at initial stages and recycling. There is a need for proper awareness training programs and reliable strategies.

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Fabrication of Organic Nanofibers via Electrospinning

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10,12-Pentacosadiynoic acid (PCDA) monomers were successfully embedded in poly(Ɛ-caprolactone) (PCL) polymer matrix via electrospinning for the first time. The resulting EFM was UV-irradiated to form Polydiacetylene (PDA) polymer within the mat. The PCL/PDA EFM enables colorimetric identification of fake and polluted gasoline in comparison to the pure gasoline. It develops a red color mat in fake and polluted gasoline samples within 5 s. In comparison to the PCL/PDA EFM, PCL/PDA spin coated film failed to detect fake gasoline.

Similarly, a photochromic spiropyran dye [1'-3'- Dihydro-1',3',3'- trimethyl-6-nitrospiro[2H-1- benzopyran-2,2'- (2H)-Indole] (Indole) was successfully embedded as a guest into a host PCL polymer matrix via electrospinning for the first time. The resulting PCL/Indole EFM have good photo-switching properties upon alternating ultraviolet and visible light irradiations. We found that patterned color image can be recorded on the photochromic PCL/Indole EFM using photomasked UV irradiation. The subsequent visible light irradiation of the mat completely erased the recorded patterned color image. Series of novel PCL/Cellulose Acetate (CA) ENMs were prepared via electrospinning. PCL/CA ENMs were further treated in an aqueous alkaline solution to convert CA into Cellulose (CEL). The novel PCL/CEL EFMs showed improved wetting properties. The PCL/CEL, (1:4) blend exhibited the most uniform and fast wicking rate demonstrating that they can be used in applications including liquid biofilter and biosensor strip. Also, a series of novel Zein/CA EFMs was electrospun and their properties were characterized. Significantly, improved thermal

properties including higher glass transition temperature (Tg) and higher degradation temperature (T D) were revealed for Zein/CA EFMs in comparison to the pure Zein EFM. Furthermore, Zein/CA EFMs showed hydrophilic surface characteristics with very low water contact angle (WCA) values suggesting that they can also be used as a scaffold in tissue engineering and as a liquid biofilter and/or biosensor
strip.

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Making City Planning Regional in 21st Century Pakistan: Towards a National Charter for Climate Change Survival

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Germanwatch's Global Climate Risk Index 2017 rated Pakistan as the seventh most affected country by climate change in the world after taking into consideration human and material losses, impact on the economy and number of climate events. The country geographically is defined by the approximate territory of the Indus River Basin, which is extremely affected by global warming in all of its eco-regions by changes in temperature, glacial melting, monsoon rain pattern shifts, drought, heatwaves and other extreme weather events. Pakistan also happens to be the sixth most populous country, with an alarming urbanization rate, with cities becoming natural receptacles of its many internal climate refugees.This paper provides a vision for Pakistani city planning in the context of the challenges of climate change facing the country according to scientific projections. It provides an overview of the steps the state is taking towards Climate Change Adaptation (CCA), including the signing of international charters (the UNFCC's Paris Agreement), establishment of a Ministry of Climate Change, enacting of relevant laws and action plans, identifying gaps and weaknesses of these measures which are created as conventional tools for conventional situations.
The paper argues that a true, practical response to the alarming situation of CC can only come through creating a radical action plan - a 'Pakistan National Charter for Climate Change Survival'. A technical blueprint for this multi-sectoral Charter is spelt out in the paper, entailing most importantly a national level Strategic Impact Assessment (SIA) for the era of Climate Change. The SIA as a technical tool will link major cities with each other as well as with their regional hinterlands, and evaluate the Significance and Vulnerabilities of Natural Resources, and in this perspective create a roadmap for Inter-Regional Resource-Sharing, Water Management, Food Security, Disaster Preparedness, Urban Bye-Laws Revisions etc. Each of the Sustainable Development Goals (SDG's) are also re-evaluated according to priority in the schema of this Charter.

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Reorientation of Pakistan's Energy policy

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Historically overall objective of Pakistan's Energy policy has been to develop this sector to support an expanding economy. 1994 energy policy brought a decisive shift in Pakistan's diverse energy sources to promote private sector participation in the power sector of Pakistan. Power generation policy 2015 recognized the need to transform power sector of the country into a modern, efficient and resilient system to enhance energy security. Literature on energy policy suggest that given the multiple policymakers at all levels, energy policy is complicated and interconnected and in case of Pakistan, disconnect vision enslaved in country's energy policies and what is actually occurring in the energy sector can be attributed in part to persistent shortfalls in implementation performance. This study reviews significant constraints of Pakistan's current energy system and paradigms of energy policies in Pakistan. Article also analyses the energy policy of leading developed and developing countries. Study also reviews government level energy modelling efforts made by Pakistan alongside review of the modelling work done by the researchers on Pakistan's energy system. It is important to view energy options through the lens of trade-offs. Each energy option is not all good or bad; rather, it is some combination of both. Managing the upsides and downsides becomes the central challenge for energy decisions.

Keywords: Energy crisis; energy planning; energy policy; Pakistan

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Development of a Geotechnical Information Database.

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Fibrous Structure for EMI shielding

Author: Jiri Militky[1]

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Renewable Energy Resources in Pakistan

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Thermal Processing of Biosources and Biodiesel Using Microwave Heating

Energy uncertainty that fluctuates the cost of petroleum has move the attention of researchers toward renewable energy and sustainable materials sources. Bioresources and crop oils are available in abundantly and cheap sources that are environment friendly in tropical countries. It has been identified as one of the main sources of the sustainable and renewable energy and materials in Malaysia. Malaysian experience on oil palm cultivation could open the needs for food, bio-chemicals, energy and material supplies for the other countries using suitable crops plantation. An example of utilization of biomass is in the processing of palm oil industries. The presentation describes several possible routes to provide energy as well as potential value-added products from bioresources. The trend in thermo-conversion processing of the biomass is the application of microwave energy into renewable biofuels, materials and chemicals. The potential uses of agro-products and agro-solid wastes for biofuels, materials and chemicals are highlighted. The applications of these biofuels, materials and chemicals have been applied in some countries around the world. The implementation and utilization of this technology will be feasible when the technology is developed, fabricated and commission locally with locally produced biomass. With advanced research and development efforts, together with local expertises, indigenous technologies could be developed and produced, thus reducing the high cost of import technologies.

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Photocatalytical Degradation of Congo Red dye by Nano Titanium Dioxide coated glass Bead under UV light

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Simulation of PEMFC by Using ANSYS Fluent for Isothermal and Non-isothermal Models

Proton exchange membrane fuel cells (PEMFC) are attractive alternative source of electricity. The current study involves the computational fluid dynamics simulations of PEMFC under isothermal and non-isothermal conditions to investigate the performance of fuel cell. Effect of pressure and temperature on fuel cell performance has been studied under non-isothermal conditions. PEMFC has been modeled at 323 K and 1 atm under isothermal conditions whereas under non-isothermal conditions, the simulation has been run on 353 K and 3 atm. The results show that the current density increases with increase in operating pressure of PEMFC whereas the current density decreases with operating temperature.

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Simulation of PEMFC by Using ANSYS Fluent for Isothermal and

Non-isothermal Models

Author: Mehmood Saleem[1]

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Proton exchange membrane fuel cells (PEMFC) are attractive alternative source of electricity. The current study involves the computational fluid dynamics simulations of PEMFC under isothermal and non-isothermal conditions to investigate the performance of fuel cell. Effect of pressure and temperature on fuel cell performance has been studied under non-isothermal conditions. PEMFC has been modeled at 323 K and 1 atm under isothermal conditions whereas under non-isothermal conditions, the simulation has been run on 353 K and 3 atm. The results show that the current density increases with increase in operating pressure of PEMFC whereas the current density decreases with operating temperature.

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MICROWAVE INDUCED THERMAL PROCESSING OF BIORESOURCES AND BIODIESEL FROM OIL PALM PLANTATION

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Energy uncertainty that fluctuates the cost of petroleum has move the attention of researchers toward renewable energy and sustainable materials sources. Bioresources and crop oils are available in abundantly and cheap sources that are environment friendly in tropical countries. It has been identified as one of the main sources of the sustainable and renewable energy and materials in Malaysia. Malaysian experience on oil palm cultivation could open the needs for food, bio-chemicals, energy and material supplies for the other countries using suitable crops plantation. An example of utilization of biomass is in the processing of palm oil industries. The presentation describes several possible routes to provide energy as well as potential value-added products from bioresources. The trend in thermo-conversion processing of the biomass is the application of microwave energy into renewable biofuels, materials and chemicals. The potential uses of agro-products and agro-solid wastes for biofuels, materials and chemicals are highlighted. The applications of these biofuels, materials and chemicals have been applied in some countries around the world. The implementation and utilization of this technology will be feasible when the technology is developed, fabricated and commission locally with locally produced biomass. With advanced research and development efforts, together with local expertises, indigenous technologies could be developed and produced, thus reducing the high cost of import technologies.

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China-Pakistan Economic Corridor; Prospects and Challenges for Balochistan, Pakistan

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China-Pakistan Economic Corridor; Prospects and Challenges for Balochistan, Pakistan

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ABSTRACT
Balochistan is rich in natural resource but due to the extremely harsh geographical environment and under-developed civil infrastructure (including roads, energy and water supplies), these natural resources could not have been tapped adequately in the past. With the launch of China-Pakistan Economic Corridor (C-PEC), there are ample opportunities for the exploitation of these resources that are expected to pave the way for unprecedented economic activities in Balochistan. From the perspective of natural resources these activities include, but not limited to, development and management of water resource, mining of coal and minerals, exploration of unexplored hydrocarbons, exploitation of dimension stones and construction material, and the establishment of related and subsidiary industries. All these activities require human resource development, better health, and educational facilities especially institution for technical and skill development of masses and most importantly the sustainable development of water resources and reservoirs for drinking, municipal and industrial purposes. In this paper key natural resources of Balochistan are identified in the context of their sustainable use under the C-PEC induced development projects. These include water, minerals, hydrocarbons, shale-gas, and coal. Suggestions are presented for a way forward to take maximum advantage of these resources for revenue generation and for the ultimate benefit to the local communities in Balochistan. A large number of mega projects including development of deep-sea Gwadar port, power generation plants, highway construction, and the establishment of special economic zones have been part of the C-PEC and are already being undertaken. However, it appears that small and medium-sized local industries and production units have not been given due attention. It is proposed here that the local people through local bodies may be identified and matched with relevant Chinese counterparts to develop joint ventures. Most of the areas of production and development identified in this paper are those whose products are already being exported to China through Karachi port. Hence the demand for these products in China is already established and need not any further survey. The products proposed in this paper are considered viable as all kinds of transport for C-PEC shall be passing through a large part of Balochistan where these resources occur naturally.
Keywords. China-Pakistan Economic Corridor, natural resources, local communities, Balochistan.