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Voice of Kerala Engineers

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Happy Onam

CHAIRMAN'S MESSAGE

Er. N. Rajkumar FIE

Dear Fellow Engineers,

This year we are having a very heavy monsoon. Too much rains have caused flood in many parts of the State. Our power production in hydel projects are reported to be at maximum level. Even though heavy rains have affected our agricultural crops, let us hope to have a better crops in the next season; as water scarcity may not be there. I appeal all our fellow Engineers to put in their best efforts in tackling flood situations in the State. Our election process for sessions 2018-19 & 2019-20 has already started and I once again request all our esteemed Corporate Members to exercise their voting rights.

HONORARY SECRETARY'S DESK

Er. K. S. Udaya Kumar MIE

01-08-2018 Talk on 'The Art of Traveling Across Cultures' by Mr. Jinu Jayapalan, Freelance Trainer & Management Consultant, Thiruvananthapuram.

08-08-2018 Talk on 'Information Security' by Ms. Jyothi Ramaswamy, Information Security Manager, Tata Consultancy Services, Technopark, Thiruvananthapuram.

15-08-2017 72nd Independence Day Celebration. Hoisting of National Flag at IEI Kerala State Centre at 9 a.m.

29-08-2017 will be announced later

Examination Announcement

Winter 2018 Examination will be held during December 01-07, 2018 as per the following programme.

Section A (Diploma)	: December 1-4. 2018
Section A (Non-diploma)	: December 1-7, 2018
Section B	: December 1-7, 2018

Paper from Two Day All India Seminar on 'Strategic Innovation & Problem Solving for Engineers & Entrepreneurs' held on 21st and 22nd April 2018

Relevance of Strategic Innovation and problem Solving for Engineers and Entrepreneurs

Er.Francis E J, *Group Director (Retired), CCQG, VSSC, ISRO*

Trainer, Mentor, Consultant on: Strategic Innovation & Problem Solving, Strategic Planning

Strategic planning involves setting SMART goals, based on analysis of the environments, SWOT analysis, and the long-term future vision. Strategic Innovation planning process aims to set the vision and goals much beyond the best performing organization in the world.

Innovation

Innovation process cycle starts with creativity and ends with benefits to the individuals, family, community, the organization or the nation. Strategic planning, and ethics based implementation are the other important steps in the successful innovation cycle. The benefits derived from the innovation process include tangible and intangible elements like products, processes, profit, wealth, quality of life and happiness. Ethics is critical in balancing the benefits and minimizing the adverse effects to all the stakeholders, the nation and the environment.

The creative ideas generated during the innovation process are to be assessed using multidimensional feasibility studies. Factors considered during this assessment process include technical, economic, industrial and legal aspects.

Types of innovation include Revolutionary, evolutionary, and continual. The innovation domains can be based on product, process, service, engineering, or entrepreneur. Social and cultural aspects of innovation are the most difficult domains to understand and implement effectively.

Creativity

Creativity is the process of interpreting the environment and the data in a different way so as to generate new ideas for solving a problem or make an improvement in a given situation. This quality was traditionally thought as an inborn talent. But the recent research findings indicate that almost all normal persons, except the mentally

retarded, are endowed with this skill by birth. But the environments in family, community, education system, and the work places gradually reduce these skills in many persons. These individuals can be retrained to be highly creative, innovative and effective in any career of their choice.

Innovative Problem Solving & Decision Making (IPSDM)

IPSDM is the systematic process for achieving high performance, leadership and success of an individual manager, leader, and an organization. The method uses the key skills like creativity, innovation, problem solving, ethics, and decision making processes and works based on the following process model steps. Finding problems, selecting / understanding / defining a problem, finding the root causes, generating ideas for solution, selecting the best solution, and implementing the solution through effective communication and collaboration.

The successful implementation of the methodology needs awareness of the above skills / techniques, careful training, and systematic practice in the work environment. The methodology helps an individual to develop important qualities like leadership, emotional intelligence, and stress management leading to high performance, productivity, career growth, success, and sustained happiness. Training a critical minimum number of personnel in an organization helps an organization to achieve sustained high performance and success.

Innovation for Engineers and Entrepreneurs

Innovation is an important element for the high performance and success of an engineer and entrepreneur. Performance and quality level of an individual, organization, society, or the nation depends heavily on their innovation level.

A typical engineering related innovation process uses the following steps: identifying the problem / unmet need, selecting wisely, making challenging opportunity, creating ideas, collaborating, being adaptive / flexible, and understanding the barriers. Technological innovation process includes activities like basic research, applied research, development & engineering activities, manufacturing, marketing, promotion and continual improvement. Business and entrepreneur innovation process include strategic thinking, portfolio management, research & insight, innovation development, Marketing & selling, and balancing cost / revenue.

Basic innovative business plan for entrepreneur consists of two domains viz: invention Domain and commerce domains. Invention domain covers defining needs and problems, creating ideas & solutions, planning & designing, proto building & testing, reviewing & improving. Commerce domain considers and manages aspects like supply chain, processes, systems, cost structure, and revenue streams.

Further Reading:

1. Strategic Management – Richard Lynch
2. Strategic Planning for Results – Sandra Nelson
3. Strategic Innovation – Nancy Tennant, et al
4. Strategic Innovation – Lisa Valikangas, et al
5. Innovation, communication and Engineering – Ed: Tee-Hang Meen
6. Innovation, Product Development and Commercialization – Dariush Rafinejad, Ph.D.
7. Engineer to Entrepreneur – Rick De La Guardia
8. Technology Entrepreneurship – Natasha Evers, et al
9. Innovation and Entrepreneurship – Peter F Drucker
10. Social Entrepreneurship and Innovation – Ed: Ken Banks

Papers from All India Seminar on 'Innovative Mechanisation for Small and Marginal Farmers Under Rainfed Areas' held on 25th & 26th May 2018 orgnized by Agricultural Engineering Division, IEI Kerala State Centre

Quantity and Quality Management of Water Resources in Hilly Agro-Eco Systems of India

Manoj P.Samuel, *Principal Scientist & Head, Engineering Division, ICAR-Central Institute of Fisheries Technology, Kochi*

The mountainous regions of India are different from the rest of the nation due to its unique ecology, topography, climate, culture and people. The traditional hill agro-ecosystems in the country are endowed with a bounty of water resources and they are considered to be more sustainable from an ecological point of view. These regions are in the highest rainfall zones the country and enjoy typical monsoon climate, with conditions ranging from tropical to temperate. But over the past several years there has been tremendous pressure upon these natural resources due to several forces including industrialization, urbanization, and unprecedented human habitation. The effect of climate change and the resulting drought or flash floods are also to be taken care of. All these only underscore the need for a scientific and technical approach towards water management in mountain areas, with focus on harvesting and multiple uses of water. The efficient utilization and management of available

rainwater is the core issue if the cropping intensity and production is to be enhanced and therefore dealt in detail. Rainwater harvesting has been construed as the most sustainable method for managing water scarcity situations, incorporating all type of water demands. However, it is observed that no hydraulically efficient, environmentally compatible and cost effective filtration mechanisms are available for quality enrichment of rainwater.

In this context, three filter devices, viz., storm water horizontal filter, roof water vertical filter and recharge dual flow filter were designed. Subsequently, lab models which had dimensional similitude with the designed filters were fabricated and tested for hydraulic efficiency and pollutant removal efficiency. Suitability of different environmental friendly natural fibres such as jute, sisal, hemp, coir, oil palm etc. were studied as water harvesting filter media. Furthermore, the efficacy of different fabric filter screens made up of both woven and non-woven textiles were also assessed. Full scale version of the models were further fabricated/constructed and evaluated in the field. Hydraulic efficiency of all filter combinations, both in laboratory and in-situ were evaluated.

All three types of filters performed well in terms of hydraulic efficiency. The storm water filter found very effective in reducing sediment load and moderately good in removing NO3-, SO4-, Mg, Na, total alkalinity and total hardness. It showed less efficiency in removing Ca and Cl- and reducing EC. Based on matrix ranking method, the gravel-coir fibre-sand filter in 1:1:1 proportion separated by woven sisal-hemp screen (P1M5S3) was emerged as the best filter combination.

By comparing mean of UPI values for roof water filters, the proportion 1:2:3, anthracite media and aluminum screen were found to be the best and P1M3S2 (gravel-anthracite-sand in 1:1:1 proportion separated by aluminum meshes) emerged the best filter combination. The filter was found very well in removing TS, PO4, Fe, K and reducing EC. But removal efficiency of Ca and Na were too less, while that of Mg negative.

Universal performance indices of dual flow recharge filter combinations suggested typha plant as the best live medium followed by vetiver and St. Augustine grass. The ratio 1:1-1:2 (plant: fibre- pebble: sand) showed much superior performance compared to all other proportions. The chemical removal efficiency of recharge filter was found very high in case of K (81.6 %) and Na (77.55%). pH normalizing efficiency and EC reduction efficiency were also recorded high. Average removal percentage of Ca was moderate, while that of Mg was very low. Iron concentration was found increasing after filtration. Based on the estimated annual costs and returns, all the financial viability criteria (IRR, NPV and BCR) are found favourable and affordable by farmers for investment on developing rainwater filtration systems. The costs of filtration per cubic meter of water for storm water, roofwater and recharge filters were 0.76, 17.75 and 0.89 respectively. The natural fibre filter media and screens used in this study are cheap, environmentally compatible and biodegradable.

Keywords: Rainwater harvesting, Stormwater filter, fibre media, fabric screens, water quality parameters, hydraulic efficiency, pollutant removal

Energy from Biomass: A Clean Energy Option for Developing Countries

Dr. Shaji James P., *Professor Kelappaji College of Agricultural Engineering and Technology, Kerala Agricultural University, Tavanur*

Solar energy is captured by plants and stored as chemical energy in biomass. 'Bioenergy', that derived from biomass has a major role in the current clean energy development strategies and has the potential for decentralized energy generation in a developing country like India. Wastes and residues currently constitute a large source of biomass which has different characteristics and hence different processes are to be employed for their efficient energy conversion. The processes are generally classified as Thermo-chemical and Bio-chemical processes. In thermo-chemical processes the application of temperature and sometimes other process parameters results in the production of energy or a readily usable fuel. In biochemical processes, living organisms (microbes) are involved. The organic materials are converted into a readily usable liquid or gaseous fuel through biochemical transformations. Among different biomass conversion processes, methane and ethanol production from various wastes is considered to be

economically feasible. Biogas technology is widely used for simultaneous production of energy along with waste management. Apart from the conventional biogas systems, there have been significant technological advancements in anaerobic systems. Although biological processes for the production of gaseous and liquid fuels have been well demonstrated in developed as well as developing countries, research has to be intensified in several areas to make the technology adaptable in Indian situations. An integrated approach is the need of the hour where these processes are integrated into a system capable of meeting overall efficiency requirements in converting solar energy into bio-fuels.

Key word: Bioenergy, Biomass, Thermo-chemical process, Anaerobic digestion, Biodiesel, Bioethanol

Kerala State Centre- WEDNESDAY TALKS - Glimpses

04-07-2018 Talk on 'Failure Analysis and Problem Solving in Construction Field' by Er.P.A.Prabhakaran, Retired Chief Engineer, Department of Space.

11-07-2018 Talk on 'Tremendous Opportunities in e-teaching & e-learning-an awareness Campaign' by Mr.Sebastian Panakal, Chairman, Social Networking Homes, India.

18-07-2018 Talk on 'Green Productivity by Conserving Nature's Resources' by Mr.Fabian Prince, Chief Operating Officer, Mercy Hospital and Nursing College, Kottarakkara.

25-07-2018 Talk on 'Converting nature's weeds at Akkulam Lake to value added materials through Engineering Students' by Er. A. Rajagopalan Achari, Energy Consultant & Dy. Electrical Inspector (Retd.), Electrical Inspectorate - Kerala.

OBITUARY

Er.K.Govindan Nair

Er.K.Govindan Nair, MIE passed away on 27th July 2018 at Thiruvananthapuram. He was Retired Chief Engineer, PHED. The Institution of Engineers (India), Kerala State Centre pays homage to the departed soul.

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