SANITATION CAPACITY BUILDING PLATFORM

Activity Report

"Overview of Course under SCBP Engagement"

Two Weeks Certificate Course on Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions

26th November to 8th December, 2018

Department of Environmental Engineering

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur, Maharashtra, INDIA

Supported by

National Institute of Urban Affairs (NIUA), New Delhi

Name of the Institute:

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur 416234, Maharashtra, INDIA

Name of the Department:

Department of Environmental Engineering

Details of the Nodal Faculty:

Name	Dr. Akshay R. Thorvat
Designation	Head and Associate Professor
Department	Department of Environmental Engineering
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Details of Activity:

Two Weeks Certificate Course on Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions

Details of Activities:

1. Expert Lectures and Invited Talks by representatives from Government and Non-Governmental Organizations, Academic and Research Institutions, Consultants and Experts in the field of Sustainable Sanitation etc.
2. Site Visits and
3. Demonstration Sessions / Case Studies / Laboratory Sessions

Course Conducted Dates:

26th November to 8th December, 2018

Objectives of the Course:

1. To undertake the planning and programming of investments in basic environmental sanitation based on socioeconomic, technical and financial criteria;
2. To strengthen the technical, financial, administrative and operating capacity of the

institutions in the basic environmental sanitation sector;

3. To encourage environmentally sustainable sanitation promotion activities, which are basic to the success of water supply and sewerage programs, especially in rural areas and marginal urban areas; and
4. To strengthen systems that improves the identification, selection, preparation and evaluation of projects, in accordance with generally accepted standards.

Outcomes of the Course:

At the end of this certificate course the participants will be able to,

1. Understand global and national challenges in the field of sustainable sanitation.
2. Discuss technological advancements in the traditional sanitation practices by appropriate technology interventions.
3. Assess the resources, town's sanitation needs; priorities interventions, investments, cleanliness, socio-economic aspects and behavior change in sustainable sanitation.
4. Facilitate production of a Sanitation Development Plan and adopt appropriate and consistent standards and policies.
5. Develop approaches for sustainable sanitation in large scale models especially in rural and urban areas.

Participants / Target Audience:

1. National, Regional and Local Government Representatives.
2. Academic Leaders, Faculties, UG and PG Students and Research Scholars.
3. Small Scale Entrepreneurs, Consultants, Architects, Engineers, Practitioners, Designers and Representatives from Industries.
4. Representatives from Non Government Organizations and Environmentalists.
5. Village Nominated Representatives, Women Self Help Groups, Policy Makers and Private Organizations.

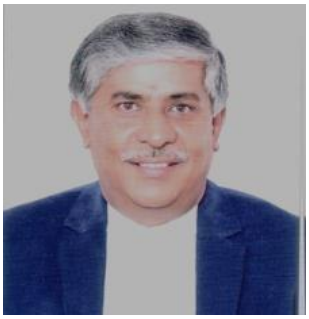
Total No. of Participants Expected:

- Total 30 No.s of Participants from all sectors mentioned above.

Total Amount Sanctioned:

- Rs. 11,40,000/-

Details of Resource Persons:

Name and Photograph of the Resource Person	Profile of the Resource Person
 **Dr. K. S. Lokesh** Professor and Registrar, JSS Science and Technology University, Mysuru	Dr. K. S. Lokesh, Professor in the Department of Environmental Engineering and Registrar at JSS Science and Technology University, Mysuru, received his Bachelor of Engineering (1982) in Civil Engineering from Bangalore University, M.Tech (1987) from IIT, Kanpur in Environmental Engineering and Ph.D. (1996) from IIT, Roorkee. His areas of specialization are Advanced Water and Wastewater Treatment, WATSAN Management, Water Quality Modelling, Environmental Economics, Ecological Sanitation and Environmental Biotechnology. He is having 35 years of vast experience in Teaching, Research and Consultancy. He has published around 126 research papers and technical reports in various national and international journals and conferences. He has successfully completed 09 research projects sponsored by Ministry of Environment and Forest (MoEF), Department of Science and Technology (DST), AICTE, NCRI etc. Till Date total 06 students have completed their Ph.D. and 09 students are pursuing Ph.D. under his guidance.
 **Mr. Ashish M. Deosthali** Sr. Deputy Director General, All India Institute of Local Self Government, Mumbai	Mr. Ashish M. Deosthali, Senior Deputy Director General at the All India Institute of Local Self Government, Mumbai, received his Bachelor of Engineering (2001) in Civil Engineering from Walchand Institute of Technology, Solapur, M.E. (2004) in Environmental Engineering from Walchand College of Engineering, Sangli and M.B.A. (2013) in Finance from Karnataka State Open University, Karnataka. He has also worked as Senior Executive (Tech and IPR) in the Confederation of Indian Industry, Andhra Pradesh Technology Development and Promotion Centre, Hyderabad (2005-06). He has worked on Projects related to Solid Waste Management, Capacity Building for Urban Environment Management, Preparation of City Development Plans, City Development Strategies and Detailed Project Reports on Urban

	Infrastructure Development for various cities, Formulation of State and Regional Master Plans for various components of Good Governance etc for the national and international clients like UNDP, UNHABITAT. He has worked on all subtleties and integrities of the Project management from Initiation to Closing and has knowledge of overall project management system. He has delivered more than 500 lectures on various aspects of Environmental Management and Engineering.
 **Mr. Sanjay J. Nandre** Founder Member and Partner, Enprotech Solutions, Pune	Mr. Sanjay J. Nandre, Founder Member and Partner at the Enprotech Solutions, Pune, received his Bachelor of Engineering (1988) in Environmental Engineering from Shivaji University, Kolhapur and PG Diploma (2001) in Information Technology and Management from Indian Institute of Public Administration (IIPA), New Delhi. He has worked as Project Executive in the Maharashtra Energy Development Agency (MEDA) for 5 years. He has also worked as Senior Scientific Officer I and II in the Ministry of New and Renewable Energy Sources, Govt. of India, New Delhi for a period of 10 years (1993 to 2003). Since January, 2004, he is working as Founder and Partner in the Enprotech Solutions, Pune for Developing and Setting up Turnkey Projects on 'Waste-to-Energy' to Treatany Organic Biodegradable Wastes. This includes form conceptualization, Designing, Turnkey Execution, Testing and Commissioning and carrying out post-commissioning Operation and Maintenance etc. His key areas of expertise are, Industrial Solid and Liquid Waste Management and Treatment, Renewable Energy (Waste-to-Energy and Biomass-to-Power), Rural Energy and Sanitation and Environmental Impact Assessment and Management. During last 15 years, he has successfully completed various consultancy Assignments. He has worked as a 'Short Term Consultant' with World Bank, Nepal for Review and Analysis of 'Waste-to-Energy' Projects under SREP. He has worked with National Skill Development Corporation (NSDC), Skill Council for Green Jobs, Govt. of India and currently associated with NSDC for

	development of Skill Jobs in Biogas Sector in India. Currently he is associated with Vinyas Society, New Delhi as Domain Expert on Public Health and Environmental Engineering Services and systems for Developing WASH Facilities in Primary Health Centres of Maharashtra.
 **Mr. Rohit M. Walvekar** Project Manager, PriMove Infrastructure Development Consultants Pvt. Ltd, Pune	Mr. Rohit Mahendra Walvekar, the Project Manager at PriMove Infrastructure Development Consultants Pvt. Ltd, Pune received his Bachelor of Engineering (2012) in Environmental Engineering from Shivaji University, Kolhapur and M.Tech (2016) in Environmental Engineering from Veermata Jijabai Technological Institute (VJTI), Mumbai. He has worked as Design Engineer to Project Manager with the technical services division of the company for Wastewater and storm water projects. He has gained detailed knowledge and experience in Project Planning, Project Budgeting, Resource Mobilization Modelling, Designing and Project Execution work. Also he has worked on projects related to review of process analysis and design of sewage treatment plants, Preparation of Life Cycle Analysis for Various Technologies, Modelling of sewage collection and conveyance systems in SewerGEMS etc. He has actively participated in research work for vermifiltration based Sewage Treatment Technology. This includes installation of setups, analyzing the results and providing intermediate research reports. On successful completion of research the Patent “Tiger Bio Filter (Vermifiltration)” was filled and granted to the company. Some of the major projects he has shouldered are “Preparation of Drainage Master Plan for Pune City”, “Pilot Grey Water Treatment Plant at Sahakar Nagar, Pune”, “Pollution Abatement of Mula-Mutha River at Pune, “Strom Water Management for Pune city under JNNURM - Phase II”, “Liquid and Solid Waste Management in the Panchganga River basin”.

 **Mr. Dhawal Patil** General Manager (Operations) Ecosan Services Foundation (ESF), Pune	Mr. Dhawal Patil, General Manager (Operations) at Ecosan Services Foundation (ESF), Pune received his Bachelor of Technology (2011) in Civil Engineering from, College of Engineering Pune, India and Master of Science (2015) in Hydro Science and Engineering, TU Dresden, Germany. He joined ESF as a project manager in 2011 and has stepped up the ladder to become General Manager - Operation. His responsibilities include standardising and strategizing the projects and guiding the project managers to efficiently and successfully execute the projects. His forte is conceptualization, proposal writing, documentation and financial management of the project. He has worked as a Junior National Expert- Liquid Waste Management in SNUSP II for GOPA and assisted in preparation of feasibility and detailed project report and drafting of policy and guideline documents for Integrated Water Recycle and Reuse. He is also working a lead trainer for Integrated Wastewater and Septage Management in Sanitation Capacity Building Program (SCBP) funded by NIUA, Government of India. He is currently the Program Director of Innovation in Sanitation Service Delivery funded under Innovation- Science and Technology Entrepreneurship Development (i-STED) Program by NSTEDB, Government of India.
 **Mr. Saurabh Kale** Senior Project Manager, Ecosan Services Foundation (ESF), Pune	Mr. Saurabh Kale, the Senior Project Manager at Ecosan Services Foundation (ESF), Pune since December, 2014 received his Bachelor of Engineering (2011) in Environmental Engineering from Shivaji University, Kolhapur and M.Tech. (2014) in Environmental Engineering from MIT, Manipal Univerisity. His responsibilities are project planning and implementation. H e has worked on the projects which includes preparation of City Sanitation Plan (CSP), Eco-village Development Plan (EDP), Natural Water Technology System (NaWaTech). He was working on SNUSP II Project as a Jr. National Expert - Solid Waste Management (SWM) for providing the technical support in the preparation of DPR and its implementation, advisory on compost policy, rollout of Municipal

	Solid Waste Management Manual 2016, National Advisory on Compost Policy etc. He is also working on Entrepreneurship Development cewas South Asia Program - Innovation in Sanitation Service Delivery funded under Innovation- Science and Technology Entrepreneurship Development (i-STED) Program by NSTEDB, Government of India. Currently, he is working as a lead trainer and expert in the field of Integrated Wastewater Management and Faecal Sludge and Septage Management for National Institute of Urban Affairs and supporting in trainings, capacity building, Detailed Project Report Preparation etc.
 **Dr. M. R. Patil** Associate Professor, Department of Civil Engineering, B.V.B. College of Engineering and Technology (Autonomous), Hubli	Dr. Mallikarjun Rudragouda Patil, Associate Professor in the Department of Civil Engineering at B.V.B. College of Engineering and Technology, Hubli received his Bachelor of Engineering (1988) in Civil Engineering from Karnataka University, Dharwad, M.E. (1995) from Bangalore University, Bangalore in Environmental Engineering and Ph.D. (2014) from Visveswaraya Technological University, Belgaum. His areas of specialization are Integrated Solid Waste Management, Environmental Geotechnology, Integrated Rain Water Harvesting, Vermicomposting and Landfill and Liner Systems. He is having 29 years of vast experience in Teaching, Research and Consultancy. He has published around 12 research papers in various national and international journals and conferences. He has successfully completed 04 research projects entitled, “Potability of Natural Tank Waters in Dharwad District” (1999-2000), “Low cost Treatment for Fluoride Removal” (2001-02), “Domestic Water Treatment Plant” (2001-02) and “Eco-friendly Campus” (2003-04) sponsored by Karnataka State Council for Science and Technology, Bengaluru. He has carried out field experimentations on “Vermicompost to treat solid waste generated in the campus”, “Design and development of water filters and water softeners for KLE Society’s Institutions” and “Rain Water Harvesting at various buildings to collect roof top harvesting and developing natural tank to collect surface harvested water”.

Dr. G. R. Munavalli
Professor,
Department of Civil Engineering, Walchand College of Engineering (Autonomous), Sangli

Dr. G. R. Munavalli is Professor in the Department of Civil Engineering at Walchand College of Engineering (Autonomous), Sangli, Maharashtra. He received his Bachelor of Engineering (1988) from BVB College of Engineering, Hubli Karnataka, M.E. (1991) in Environmental Engineering from Walchand College of Engineering, Sangli, Maharashtra and Ph.D. (2003) from Indian Institute of Science, Bangalore. He has 27 years of vast experience in Teaching, Research and Consultancy. He is a member of the Indian Water Works Association and the Indian Society for Technical Education. He has conducted research work in the areas of water quality variation in water distribution system, groundwater quality and treatment, greywater treatment, water treatment and on-site wastewater treatment. Some of his research works include, "Design of rural and urban water supply schemes", "Industrial and municipal waste treatment, "Surveying works for bridge alignment, line outs for industrial buildings, alignment of transmission lines and contour survey in hilly areas". He has guided 22 Master's dissertation, and 05 candidates are working for doctoral research under him. He has published 25 research papers in national and international journals and 32 research papers in national and international conferences. He has delivered expert lectures on various themes in more than 15 training programmes / seminars / workshops / conferences. Research projects funded by Department of Science and Technology (DST) and AICTE, New Delhi were successfully completed by him. He has been awarded with best teacher twice in his college. He is the reviewer of 05 international referred journals.

Mr. Vijay Gawade
Freelance International Consultant,
Water and Environmental Sanitation, Pune

Mr. Vijay Gawade, Consultant in Water and Environemntal Sanitation received his Bachelor of Engineering (1987) in Environmental Engineering from Shivaji University, Kolhapur and Masters in Business Administration (MBA), (2014-15) from University of Pune. He is an international Consultant and Water and Sanitation Specialist with over 25 years of experience in South and West Asia region and in the Middle East with proven experience of Programme Management and Implementation across a wide range of activities and stakeholders in Urban and Rural Water and Sanitation Sector. Brings diverse and significant managerial and consulting work experience with multilateral, bilateral agencies (Asian Development Bank, World Bank, DFID India, WSP-South Asia, UNICEF (India, Afghanistan, Bangladesh), Water and Sanitation Collaborative Council (WSSCC-Geneva), International NGOs (Save the Children, WASH UNITED-Germany), National and International consulting firms (TATA Consulting Engineers, KMPG-Saudi Arabia, Adivo Consulting-Bahrain) and Local governments and Utilities in India and in other countries. His specific skills and experiences in Urban and Rural Water and Sanitation sector include engineering designs and project development, sector Studies/policy Reviews, Institutional reviews for projects and programme implementation, Operation and Maintenance related policy development, sustainability assessments, performance and benchmarking studies, community participation, sanitation and behavioral change communication, capacity building, monitoring and evaluation, and management of multi-stakeholders' consultations and advocacy events. He has over 23 years of experience on pro-poor and inclusive development work on donor funded Programs in Water supply and Sanitation in South Asia.

 **Mr. Indra Kant Jha** Technical Head, SINE, IITB, Mumbai	Mr. Indra Kant Jha, Technical Head at Society for Innovation and Entrepreneurship (SINE), IIT Bombay, Mumbai. He did his Masters (2013) from IIT Bombay, Mumbai in Environmental Engineering. His area of expertise is Environmental Impact Assessment, Environmental Management Systems, and Wastewater Treatment etc. Currently he is working on a project entitled, "Nallah Rejuvenation" at SINE, IITB, Mumbai. He is also closely associated with number of projects handled by Maharashtra Pollution control Board, Mumbai.
 **Mr. S. S. Shaha** Associate Professor, Department of Environmental Engineering, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	Mr. S. S. Shaha, Associate Professor in the Department of Environmental Engineering at Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur received his Bachelor of Engineering (1987) in Environmental Engineering from Shivaji University, Kolhapur and M.Tech (1989) in Environmental Engineering from Walchand College of Engineering, Sangli. Currently he is pursuing his Ph.D. from Visveswaraya Technological University, Belgaum. His areas of expertise are Water Supply Engineering, Water and Wastewater Engineering, Municipal and Industrial Waste Management and Environmental Sanitation. He is having 28 years of vast experience in Teaching, Research and Consultancy. He has successfully completed several consultancy projects viz. Preparation of DPR under National Lake Conservation Plan (NLCP) sponsored by Ministry of Environment and Forest (MoEF) for Rankala Lake in Kolhapur (2006), Mansi Ganga Lake, Gorakhpur, Mathura (2007), Ramgarh Lake, Gorakhpur, UP (2009) and Laxmi Lake, Jhansi, UP (2014), Development of Closed Water Loop for Recycling of Wastewater in Ichalkaranji funded by International Council for Local Environmental Initiatives (ICLEI), South Asia (2016-17) and Feasibility Study of ETP and STP of 13 plants of Cummins India Ltd. (2017-18) etc. He has received Appreciation Award for his contribution in the Consultancy Activities (2016-17). He is working

	as Environmental Consultant for Kolhapur Municipal Corporation. He has been approved as a Functional Area Expert in Water Pollution and Municipal Solid Waste Management by Quality Council of India (QCI) since 2012.
 **Mr. R. A. Nikam** Associate Professor, Department of Environmental Engineering, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	Mr. Ravindra A. Nikam, Associate Professor in Department of Environmental Engineering at Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur received his Bachelor of Engineering in Environmetnal Engineering from Shivaji University, Kolhapur and M.E. in Civil Engineering from Walchand College of Engineering, Sangli, Maharashtra. He is having total 32 years of experience in Teaching. Currently he is pursuing Ph.D. from Vishweshvaraiyya Technological University, Karnataka. His area of expertise is Soil Mechanics, Geotechnical Engineering, Environmental Geotechnology, Solid and Hazardous Waste Management, Environmental Sanitation. He has worked as Chairman and Member of Board of Studies in Shivaji University, Kolhapur.
 **Mr. A. A. Katkar** Assistant Professor, Department of Environmental Engineering, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	Mr. A. A. Katkar, Assistant Professor in the Department of Environmental Engineering at Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur received his Bachelor of Engineering (2003) in Civil Engineering from Shivaji University, Kolhapur and M.Tech (2009) in Environmental Science and Technology from Shivaji University, Kolhapur. He is having total 11 years of experience in Teaching and 04 years of experience in Industry. His area of expertise is Solid and Hazardous Waste Management, Environmental Management, EIA and Environmental Legislation, Environmental Sanitation, Project Management and Remote Sensing - GIS. He has published 04 research papers in national and international journals and conferences. He has worked as Investigator for the Preparation of City Sanitation Plan for Kolhapur City sponsored by Kolhapur Municipal Corporation (2012-13), Co-Investigator for Treatability Study of ETP at

	Kirloskar Oil Engines Ltd., Kolhapur (2015-16) and Co-Investigator for the Development of Closed Water Loop for Recycling of Wastewater in Ichalkaranji funded by International Council for Local Environmental Initiatives (ICLEI), South Asia (2016-17).
 **Mr. B. C. Ingavale** Assistant Professor, Department of Environmental Engineering, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	Mr. B. C. Ingavale, Assistant Professor in the Department of Environmental Engineering at Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur received his Bachelor of Engineering (2007) in Environmental Engineering from Shivaji University, Kolhapur and M.Tech (2010) in Environmental Engineering from Veermata Jijabai Technological Institute (VJTI), Mumbai. He is having 08 years of experience in Teaching and 03 years of experience in Industry. His areas of expertise are Water Supply Engineering, Low Cost Water and Wastewater Treatments, Operation and Maintenance of Environmental Systems, Environmental Sanitation, Environmental Management System, Municipal and Industrial Waste Management and Project Management. He has worked as Co-Investigator for the Preparation of City Sanitation Plan for Kolhapur City sponsored by Kolhapur Municipal Corporation (2012-13), Co-Investigator for the Development of Closed Water Loop for Recycling of Wastewater in Ichalkaranji funded by International Council for Local Environmental Initiatives (ICLEI), South Asia (2016-17), Co-Investigator for the Feasibility Study of ETP and STP of 13 plants of Cummins India Ltd., Treatability Study of Industrial Wastewater and Low Cost Wastewater Treatment for Primove Infra, Pune etc. (2017-18).

Schedule of the Program:

Day – 01: 26th November, 2018

Time	Session Title	Resource Person
09:30 – 10:00	**Registration and Tea - Breakfast**	
10:00 – 10:45	Inauguration Function	**Dr. K. S. Lokesh** Professor and Registrar, JSS Science and Technology University, Mysuru
10:45 – 11:00	**Tea and Coffee**	
11:00 – 13:00	Key Note Address: Environmental Sanitation through Eco Toilet	**Dr. K. S. Lokesh** Professor and Registrar, JSS Science and Technology University, Mysuru
13:00 – 13:45	**Lunch Break**	
13:45 – 15:15	Social Mobilization for Sustainable Rural Sanitation	**Mr. Vijay Gawade** Freelance International Consultant, Water and Environmental Sanitation, Pune
15:15 – 15:30	**Tea and Coffee**	
15:30 – 17:00	Water Audits for Urban Areas	**Mr. Vijay Gawade** Freelance International Consultant, Water and Environmental Sanitation, Pune

Day – 02: 27th November, 2018

Time	Session Title	Resource Person
09:30 – 10:00	**Tea - Breakfast**	
10:00 – 12:00	Waste to Wealth	**Mr. Sanjay Nandre** Founder Member and Partner, Enprotech Solutions, Pune
12:00 – 12:15	**Tea and Coffee**	
12:15 – 14:15	Low Cost Treatments of Solid Wastes	**Mr. Sanjay Nandre** Founder Member and Partner, Enprotech Solutions, Pune
14:15 – 15:00	**Lunch Break**	
15:00 – 17:00	Tiger Bio Filter: Sustainable Sewage Treatment Technology	**Mr. Rohit Walvekar** Project Manager, Primove Infrastructure Development Consultants Pvt.Ltd., Pune

Day – 03: 28th November, 2018

Time	Session Title	Resource Person
09:30 – 10:00	**Tea - Breakfast**	
	SITE EXPOSURE VISIT - I	
10:00 – 13:00	Site Exposure Visit to Waste to Energy Plant of Enprotech Solutions at Kolhapur	**Mr. A. A. Katkar** and **Mr. B. C. Ingavale** Assistant Professor, Department of Environmental Engineering, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur
13:00 – 14:00	**Lunch Break**	
	SITE EXPOSURE VISIT - II	
14:00 – 17:00	Site Exposure Visit to Sewage Treatment Plant of Kolhapur Municipal Corporation at Kolhapur	**Mr. S. S. Shaha** Associate Professor, Department of Environmental Engineering, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Day – 04: 29th November, 2018

Time	Session Title	Resource Person
09:30 – 10:00	**Tea - Breakfast**	
	SITE EXPOSURE VISIT - III	
10:00 – 13:00	One Day Site Exposure Visit to Faecal Sludge Treatment Plant at Wai, Maharashtra	**Wai Municipal Corporation,** Wai, Maharashtra and **Mr. Dhawal Patil** General Manager - Operations, ECOSAN Services Foundation
13:00 – 14:00	**Lunch Break**	
14:00 – 17:00	Interaction with ULB Officials and Demonstration of Scheduled Desludging Operation at Wai, Maharashtra	**Wai Municipal Corporation,** Wai, Maharashtra and **Mr. Dhawal Patil** General Manager - Operations, ECOSAN Services Foundation

Day – 05: 30th November, 2018

Time	Session Title	Resource Person
09:30 – 10:00	**Tea - Breakfast**	
10:00 – 10:45	Introduction about training, Setting Ground Rules, Expectations	**Mr. Saurabh Kale** Sr. Project Manager, ECOSAN Services Foundation
10:45 – 11:00	**Tea and Coffee**	
11:00 – 12:00	Need of Faecal Sludge and Septage Management (FSSM) National Faecal Sludge and Septage Management (FSSM) Policy	**Mr. Dhawal Patil** General Manager - Operations, ECOSAN Services Foundation
12:00 – 13:00	Assessment of Initial Situation	**Mr. Saurabh Kale** Sr. Project Manager, ECOSAN Services Foundation
13:00 – 13:45	**Lunch Break**	
13:45 – 14:45	Faecal Sludge Quantification and Characterisation	**Mr. Dhawal Patil** General Manager - Operations, ECOSAN Services Foundation
14:45 – 15:30	Methods and Means for Collection and Transport of Faecal Sludge	**Mr. Saurabh Kale** Sr. Project Manager, ECOSAN Services Foundation
15:30 – 17:00	Group Work – Collection and Transportation	**Mr. Dhawal Patil** General Manager - Operations, ECOSAN Services Foundation and **Mr. Saurabh Kale** Sr. Project Manager, ECOSAN Services Foundation

Day – 06: 01st December, 2018

Time	Session Title	Resource Person
9:30 to 10:00	**Tea and Breakfast**	
10:00 – 11:00	Faecal Sludge Treatment - I	**Mr. Dhawal Patil** General Manager - Operations, ECOSAN Services Foundation
11:00 – 11:15	**Tea and Coffee**	
11:15 – 13:00	Faecal Sludge Treatment – II	**Mr. Dhawal Patil** General Manager - Operations, ECOSAN Services Foundation
13:00 – 13:45	**Lunch**	
13:45 – 15:00	Group Work - Designing of FSTP Components	**Mr. Dhawal Patil** General Manager - Operations, ECOSAN Services Foundation and **Mr. Saurabh Kale** Sr. Project Manager, ECOSAN Services Foundation
15:00 – 17:00	Group Work – Designing of FSTP Components	**Mr. Dhawal Patil** General Manager - Operations, ECOSAN Services Foundation and **Mr. Saurabh Kale** Sr. Project Manager, ECOSAN Services Foundation

Day – 07: 03rd December, 2018

Time	Session Title	Resource Person
09:30 – 10:00	**Tea - Breakfast**	
10:00 – 12:00	Integrated Rain Water Harvesting	**Dr. M. R. Patil** Associate Professor, Department of Civil Engineering, B.V.B. College of Engineering and Technology (Autonomous), Hubli
12:00 – 12:15	**Tea and Coffee**	
12:15 – 14:15	Integrated Solid Waste Management	**Dr. M. R. Patil** Associate Professor, Department of Civil Engineering, B.V.B. College of Engineering and Technology (Autonomous), Hubli
14:15 – 15:00	**Lunch Break**	
15:00 – 17:00	Sewage Collection and Treatment	**Mr. Rohit Walvekar** Project Manager, Primove Infrastructure Development Consultants Pvt. Ltd.

Day – 08: 04th December, 2018

Time	Session Title	Resource Person
09:30 – 10:00	**Tea - Breakfast**	
10:00 – 12:00	Low Cost Water Treatment	**Dr. G. R. Munavalli** Associate Professor, Department of Civil Engineering, Walchand College of Engineering (Autonomous), Sangli
12:00 – 12:15	**Tea and Coffee**	
12:15 – 14:15	Decentralized Sewage Treatment	**Dr. G. R. Munavalli** Associate Professor, Department of Civil Engineering, Walchand College of Engineering (Sutonomous), Sangli
14:15 – 15:00	**Lunch Break**	
15:00 – 17:00	**Demonstration Session – I:** City Sanitation Plan of Kolhapur City: A Case Study	**Mr. A. A. Katkar** Assistant Professor, Department of Environmental Engineering and **Mr. B. C. Ingavale** Assistant Professor, Department of Environmental Engineering Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Day – 09: 05th December, 2018

Time	Session Title	Resource Person
09:30 – 10:00	**Tea - Breakfast**	
10:00 – 12:00	Environmentally Sustainable Development of Villages	**Mr. Ashish Deosthali** Sr. Deputy Director General, All India Institute of Local Self Government, Mumbai
12:00 – 12:15	**Tea and Coffee**	
12:15 – 14:15	National Urban Sanitation Policy for City Sanitation Plan	**Mr. Ashish Deosthali** Sr. Deputy Director General, All India Institute of Local Self Government, Mumbai
14:15 – 15:00	**Lunch Break**	
15:00 – 17:00	**Demonstration Session – II:** Development of Closed Water Loop by Recycling Wastewater, Ichalkaranji: A Case Study	**Mr. S. S. Shaha** Associate Professor, Department of Environmental Engineering Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Day – 10: 06th December, 2018

Time	Session Title	Resource Person
09:30 – 10:00	**Tea - Breakfast**	
	SITE EXPOSURE VISIT - IV	
10:00 – 13:00	Site Exposure Visit to Common Effluent Treatment Plant (CETP) at Five Star MIDC, Kagal	**Mr. R. A. Nikam** Associate Professor, Department of Environmental Engineering Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur
13:00 – 14:00	**Lunch Break**	
	SITE EXPOSURE VISIT - V	
14:00 – 17:00	Site Exposure Visit to Kirloskar Oil Engines Ltd., Five Star MIDC, Kagal	**Mr. R. A. Nikam** Associate Professor, Department of Environmental Engineering, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Day – 11: 07th December, 2018

Time	Session Title	Resource Person
09:30 – 10:00	**Tea - Breakfast**	
10:00 – 12:00	Fundamentals of Sanitation and Plumbing	**Mr. R. A. Nikam** Associate Professor, Department of Environmental Engineering Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur
12:00 – 12:15	**Tea and Coffee**	
12:15 – 14:15	**Demonstration Session – III:** Laboratory Work: Water Quality Monitoring	**Mr. B. C. Ingavale** Assistant Professor, Department of Environmental Engineering Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur
14:15 – 15:00	**Lunch Break**	
15:00 – 17:00	**Demonstration Session – IV:** Laboratory Work: Wastewater Analysis	**Mr. S. S. Shaha** Associate Professor, Department of Environmental Engineering Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Day – 12: 08th December, 2018

Time	Session Title	Resource Person
09:30 – 10:00	**Tea - Breakfast**	
10:00 – 12:00	Solid Waste Management in Urban India	**Mr. Indra Kant Jha** Technical Head, SINE, IITB, Mumbai
12:00 – 12:15	**Tea and Coffee**	
12:15 – 14:15	Nallah Rejuvenation	**Mr. Indra Kant Jha** Technical Head, SINE, IITB, Mumbai
14:15 – 15:00	**Lunch Break**	
15:00 – 16:00	Group Activity: Discussion	**Dr. Akshay R. Thorvat** Associate Professor, Department of Environmental Engineering Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur
16:00 – 17:00	Valedictory Function	**Mr. Ajay Deshpande,** College of Agriculture, Kolhapur (Chief Guest)

List of Participants:

Sr. No.	Name of Participant	Name of Institute/Organization	Contact No.	Designation
1	Ms Amruta Patil	Dr. D.Y.Patil's Pratisthan's College of Engineering, Salokhenagar, Kolhapur	7588256519	Assistant Professor
2	Mr. Keshav P. Bagla	Kolhapur Institute of Technology's College of Engineering, Kolhapur	9168248239	UG Student
3	Mr. M. V. Kanthi	Angadi Institute of Technology and Management, Belgavi	9343487323	Assistant Professor
4	Ms Maheshwari Sawant	Sinhgad College of Engineering, Vadgaon (BK), Pune	9960123985	Assistant Professor
5	Mr. Mandar Pawari	VPM's Maharshi Parshuram College of Engineering, Velneshwar	9689073633	Assistant Professor
6	S. Santhosh Reddy	Navsahyadri College of Engineering, Pune	9763606805	Assistant Professor
7	Supriya S Rajaram	Sant Gajanan Maharaj College of Engineering, Mahagaon	9421751386	Assistant Professor
8	Ar. Vandana Pusalkar	SPSMBH's College of Architecture, Kolhapur	9923385001	Architect and Assistant Professor
9	Mr. Amol Kulkarni	Department of Technology, Shivaji University, Kolhapur	9421122662	Assistant Professor
10	Ms Gayatri Karajgar	Kolhapur Institute of Technology's College of Engineering, Kolhapur	8087366003	PG Student
11	Mr. Sanket Topale	Kolhapur Institute of Technology's College of Engineering, Kolhapur	7350758090	PG Student
12	Mr. Shyam Desai	Kolhapur Institute of Technology's College of Engineering, Kolhapur	8408823705	PG Student
13	Mr. Buddham Kamble	Kolhapur Institute of Technology's College of Engineering, Kolhapur	9923686755	PG Student
14	Mr. Nikhil Patil	Kolhapur Institute of Technology's College of Engineering, Kolhapur	9552952394	PG Student
15	Mr. Shriraj Naik	Kolhapur Institute of Technology's College of Engineering, Kolhapur	7507799531	PG Student
16	Mr. Laxman Kawathe	Kolhapur Institute of Technology's College of Engineering, Kolhapur	9823593727	PG Student

Sr. No.	Name of Participant	Name of Institute/Organization	Contact No.	Designation
17	Mr. Sujit Kamble	Kolhapur Institute of Technology's College of Engineering, Kolhapur	7040749199	PG Student
18	Mr. Siddharth Kudale	Kolhapur Institute of Technology's College of Engineering, Kolhapur	7741055969	PG Student
19	Mr. Shreerang Mane	Kolhapur Institute of Technology's College of Engineering, Kolhapur	7768897688	PG Student
20	Ms Girija Mali	Kolhapur Institute of Technology's College of Engineering, Kolhapur	8623873767	PG Student
21	Ms Sakshi Thorat	Kolhapur Institute of Technology's College of Engineering, Kolhapur	9049065527	PG Student
22	Ms Harshada Vibhute	Kolhapur Institute of Technology's College of Engineering, Kolhapur	9922675608	PG Student
23	Ms Nandini Kad	Kolhapur Institute of Technology's College of Engineering, Kolhapur	8788266927	PG Student
24	Mr. Vivek Raut	Kalptaru Group of Services, Private Ltd., Kolhapur	9637424802	Consultant
25	Ms Aarti Patil	Kolhapur Institute of Technology's College of Engineering, Kolhapur	8149639482	PG Student
26	Mr. Ajim S. Sutar	Dr. D.Y.Patil College of Engineering and Technology, Kasaba Bawada, Kolhapur	9834294437	Assistant Professor
27	Mr. Dhiraj K Pawar-Medhe	Self Employed, Kolhapur	9175336803	Practitioner
28	Mr. Shrikant Jadhav	Kolhapur Institute of Technology's College of Engineering, Kolhapur	9604444403	PG Student
29	Mr. Viraj Ghantani	Kolhapur Institute of Technology's College of Engineering, Kolhapur	9021202077	PG Student
30	Mr. Kunal Jagdale	Kolhapur Institute of Technology's College of Engineering, Kolhapur	9834297292	PG Student

List of Organizing Committee Members:

Sr. No.	Name of Participant	Designation and Name of Institute/Organization	Contact No.	Responsibility
1	Dr. V. V. Karjinni	Director, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	9049495699	Convenor and Organizer
2	Dr. Akshay R. Thorvat	Associate Professor and Head, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	9175886755	Convener and Coordinator (Nodal Faculty)
3	Dr. M. M. Mujumdar	Professor and Registrar, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	7378631199	Member, Accommodation Committee
4	Mr. R. A. Nikam	Associate Professor, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	9765992223	Member, Accommodation Committee
5	Mr. S. S. Shaha	Associate Professor, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	7798307000	Member, Session Management Committee
6	Mr. S. S. Varur	Assistant Professor, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	9225815108	Member, Registration Committee
7	Mrs. P. S. Saler	Assistant Professor, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	9420678695	Member, Session Management Committee
8	Mr. P. K. Jadhav	Assistant Professor, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	9028800388	Member, Transportation Committee
9	Mr. A. A. Katkar	Assistant Professor, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	9673027676	Member, Session Management Committee
10	Mr. B. C. Ingavale	Assistant Professor, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	9823644466	Member, Registration Committee
11	Mr. K. M. Kangle	Assistant Professor, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	9423842385	Member, Food Committee
12	Mr. S. S. Joshi	Assistant Professor, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	9028486124	Member, Food Committee
13	Ms. N. B. Chougule	Assistant Professor, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	9637972952	Member, Inauguration and Valedictory Function

Sr. No.	Name of Participant	Designation and Name of Institute/Organization	Contact No.	Responsibility
14	Ms. T. R. Patil	Assistant Professor, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	9028076646	Member, Registration Committee
15	Mr. S. M. Patil	Assistant Professor, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	9762957897	Member, Transportation Committee
16	Ms. K. Y. Kedge	Assistant Professor, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	9049426191	Member, Inauguration and Valedictory Function
17	Mr. S. M. Sathe	Assistant Professor, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	9619719550	Member, Accommodation Committee

PREFACE:

National Institute of Urban Affairs (NIUA), New Delhi and Department of Environmental Engineering of Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur had organized Two Week Certificate Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions" under Sanitation Capacity Building Platform, a Project Supported by The Bill and Melinda Gates Foundation.

NIUA is a premier National Institute for research, capacity building and dissemination of knowledge in the urban sector, including sanitation. Established in 1976, it is the apex research body for the Ministry of Housing and Urban Affairs, Government of India.

Sanitation Capacity Building Platform (SCBP) is an initiative of the NIUA, New Delhi for addressing sanitation challenges in India. This program is supported by The Bill and Melinda Gates Foundation grant. It is aimed at promoting decentralized sanitation solutions for septage and waste water management. The platform is an organic and growing collaboration of universities, training centers, resource centers, non-governmental organizations, consultants and experts. The platform lends support to the Ministry of Housing and Urban Affairs, Government of India, by focusing on sanitation and supporting National urban sanitation missions, states, cities and towns by developing and sourcing the best capacity building, policy guidance, technological, institutional, financial and behavior change advise in favour of decentralized sanitation solutions.

Since 1983, Department of Environmental Engineering has been imparting education and training in all aspects of sustainable environment. Department has sound standing of 35 years in terms of excellence in academics. Environmental Engineering program has been accredited by National Board of Accreditation, New Delhi three times for its excellence in academics.

Department of Environmental Engineering had submitted a proposal in the month of May - June, 2018 to NIUA, New Delhi under Sanitation Capacity Building Platform for organizing Two Week Certificate Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions". The objectives of this course were to strengthen the technical, financial, administrative and operating capacity of the institutions in the basic environmental sanitation; to encourage environmentally sustainable sanitation promotion activities; to reinforce systems that improves the identification, selection, preparation and evaluation of projects in accordance with generally accepted standards; and to discuss technological advancements in the traditional sanitation practices by appropriate technology

interventions. After evaluation process the proposal was approved and NIUA provided support in the form of creating learning materials, providing expert trainers and resource persons, support to plan field visits, demonstrations and case studies and most important financial assistance to organize this certificate course for the duration of two weeks.

NIUA had selected total 09 Institutions and Universities from all over India of which only 02 institutions, College of Engineering, Pune and KITCoE, Kolhapur, had been selected from Maharashtra for Academia Engagement on Decentralized Sanitation under Sanitation Capacity Building Platform. KIT had signed Memorandum of Understanding (MoU) with NIUA, New Delhi for Academia Engagement. The key highlights of the Two Week Certificate Course were, Enlightening Sessions by representatives from Government and Non-Governmental Organizations, Academic and Research Institutions, Consultants and Experts in the field of Sustainable Sanitation, Fruitful Interactions, Site Exposure Visits, Laboratory Demonstrations, Discussions on Case Studies and Group Activities -Discussions.

The course was designed for the participants such as National, Regional and Local Government Representatives; Academic Leaders, Faculties, UG and PG Students and Research Scholars; Consultants, Architects, Engineers, Representatives from Industries.

I take this opportunity to thank those people who really supported and encouraged us for this activity. I thank Prof. Jagan Shah, Director NIUA, New Delhi, Mr. Depinder Kapur, Mr. Mohit Kapoor, Mr. Rahul Sachdeva, Ms. Jyoti Dash and other Team Members of NIUA, New Delhi, Shri. Bharat Patil, Chairman, Shri. Sunil Kulkarni, Vice Chairman, Shri. Dipak Chougule, Secretary, Dr. V. V. Karjinni, Director, my Colleagues, Teaching and Non Teaching Staff Members, Friends, Students and Participants for all the support, help and encouragement. I express my sincere thanks to all the Resource Persons for accepting our invitation and spending their valuable time with us. I also would like to thank all the concerned authorities who had given us permission for Site Exposure Visits and provided their support.

Dr. Akshay R. Thorvat
Nodal Faculty
Associate Professor and Head
Department of Environmental Engineering
KITCoE, Kolhapur

SESSION REPORT:

Day – 1: 26th November, 2018

The Two Week Certificate Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions" commenced on 26th November, 2018 at Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur. The program started with the Inauguration Function for which Dr. K. S. Lokesh, Professor and Registrar in JSS University, Mysuru was invited as a Chief Guest. Mr. Sunil Kulkarni, Vice Chairman of KITCoE, Kolhapur was the President of the function. Ms. Kiran Kedge, Assistant Professor in the Department of Environmental Engineering hosted the function. Dr. V. V. Karjinni, Director of KITCoE, Kolhapur had given welcome speech and introduced all to the Journey of KIT towards Academic Excellence. Dr. Akshay R. Thorvat, Associate Professor and Head, Department of Environmental Engineering had introduced all to the details and objectives of the Two Week Certificate Course. Mrs. P. S. Saler, Assistant Professor in the Department of Environmental Engineering had introduced to the Chief Guest, Dr. K. S. Lokesh. Mr. Sunil Kulkarni shared his views about Sanitation and its Importance during his Presidential Speech.

After Inauguration Function, Dr. K. S. Lokesh had given a Key Note Address on the theme, "Environmental Sanitation through Eco Toilet". He discussed about the Ecological and Environmental Foot Prints, Indian Water, Domestic Wastewater and Eco-San Scenario, Problems in Conventional Sanitation System, Concept and Advantages of Eco-San, Engineering Studies on Eco-Sanitation. During his presentation he also presented different case studies carried out by him and his students at different places. He discussed about Urban Eco-Sanitation, Salient Features of Erdos Eco-Town Project, China Eco-San Research at JSS Science and Technology University, Mysore. He also emphasized on Stages of Eco-Toilet construction, Societal Reach of Eco-Toilet, Field studies on application of urine, Humanureas Fertilizer on Soya bean and Green Gram, Hybrid reactor versus activated sludge process.

The next sessions were conducted by Mr. Vijay Gawade who is working as Freelance International Consultant for Water and Sanitation. He delivered talks on, "Social Mobilization for Sustainable Rural Sanitation" and "Water Audits for Urban Areas".

During his talk on "Social Mobilization for Sustainable Rural Sanitation", he presented that, Community Mobilisation process refers to the process of building social relationships in pursuit of common community interests. Community Mobilisation is seen as being the foundation of the community development process. Community development seeks to empower individuals and groups of people by providing these groups with the skills they need to affect change in their own communities. He presented a community action cycle and Steps involved in Community Mobilisation. As per his opinion regarding triggering approach for behavioural change he mentioned that, approach

has power to trigger transformative emotions such as shame, pride, disgust, anger and fear. Understanding of individuals social networks, socio-cultural and physical environments at various levels – from household to community to State and civil society institutions and resource support. Changing thoughts, feelings, beliefs, attitudes can be easier when everyone is past of the solution. Social mobilisation does exactly the same to change individuals behaviours at various levels. He also mentioned about a concept of Spheres of Influence for Equity ' siEQ', Key Stakeholders and Institutions that influence Sanitation behaviour and Typical Activities of Social Mobilisation for Sanitation. After his session he conducted an exercise to (i) List the stakeholders who participated in social mobilisation (Community Level, Government and Others), (ii) List the activities that were undertaken (Household level, Community level, Institutional level and Government level) and (iii) List the key triggers that changed the sanitation behaviour.

During his presentation on, "Water Audits for Urban Areas", he covered points such as what is water audit in urban areas, what are the objectives of water audit and steps for water audit. He explained the points such as Preparatory Work such as System Component Details, Consumer connections, expenditures, revenue collection, Updating Maps, Locations of facilities, details of Pipe Networks, Calibration of existing water meters, Installation of New Water Meters, Set a study Period and Develop Plan for flow measurements. He also covered points such as, Measurement of Water Produced and Used, Analysis – Water Audit Report, Leak Detection and Control and Remedial Measures. He mentioned about, two types of measurements in distribution system (Consumption) viz., Measure consumption by various users and Measure water losses in the distribution system. He shared few case studies related to water audits, metered and unmetered measurements and other issues with the participants.

Day – 2: 27th November, 2018

Mr. Sanjay Nandre who is woking as Founder Member and Partner, Enprotech Solutions Pvt. Ltd., Pune, delivered a talk on, "Waste to Wealth" and "Low Cost Treatments of Solid Wastes".

The learning objectives of his session on, "Waste to Wealth" are (i) to understand the science and art of waste management and product development and (ii) to trace the life cycle of various forms of waste, starting from its generation to diverse forms of disposal, process for management and mechanisms for conversion to usable products. He started his presentation with Introduction to Municipal Solid Waste Management, Indian Scenario, Solid Waste Management (SWM) Rules after 16 years, New rules announced on 5th April, 2016 and Some of the salient features of SWM Rules, 2016. Further he discussed about which Business Model will work in India. He mentioned that, for DBOs to be successful it is essential to: (i) scope the project well, provide extensive and up to date technical and financial information to the bidders; (ii) have a clear bid selection parameter; (iii) provide OandM/Management Fee guarantees to the operator and (iv) finance in the form of grants and

term loans by Government of India and multi-lateral and bi-lateral donor agencies assures timely and full payment of capital expenditure dues of the private contractor as per the payment schedule. He also highlighted that, India BOT End-User PPP are successful because there is: (i) strong ownership of the project by the end-user as well as the ULB (which earns royalty revenue on recycled sewage and sometimes savings in OandM expenditure on its secondary treatment STPs); and (ii) the project is driven by end-user needs underpinned by economic factors such as cost of procuring water from alternative sources as determined by the end-user itself. The consequent high level of commitment as well as an intimate understanding of user requirements ensures that the project is designed according to the specifications of the end-user and is able to withstand the delays and increases in cost caused by, among others, land acquisition problems, change in scope due to inadequate project preparation and contract limitations.

He elaborated that, the technology options available for processing the Municipal Solid Waste (MSW) are based on either bio conversion or thermal conversion. The bio- conversion process is applicable to the organic fraction of wastes, to form compost or to generate biogas such as methane (waste to energy) and residual sludge (manure). Various technologies are available for composting such as aerobic, anaerobic and vermi-composting. The thermal conversion technologies are incineration with or with out heat recovery, pyrolysis and gasification, plasma pyrolysis and pelletization or production of Refuse Derived Fuel (RDF).

Further he presented a case study of 1X5 TPD Decentralised Biomethanation-cum-Power Generation Plant at Model Colony (Word No. 34), Shivajinagar, Pune. The basic of setting up this plant is to treat the wet organic wastes in a decentralized manner at source point itself in a most environmental friendly manner. This helps PMC directly in saving on transportation of such wastes to the landfill site which is @ 22 Kms. Away from the model colony area. He explained that, the major portion of MSW is the organic fraction (40-60%) which can be easily treated by anaerobic digestion. Apart from this, the solid wastes generated in urban areas from vegetable markets, hotels, hostels, kitchen wastes etc. are best suited for this process due to the presence of high moisture and organic fractions (up to 90%). The total solids in the organic waste decompose rapidly (i.e. is highly putrescible) and therefore these wastes can be treated by biomethanation process (more commonly called Anaerobic Digestion, AD) in more effective manner.

The biomethanation plant at Model Colony is based on the Two-stage Anaerobic Process. The sizes of the digesters for the first stage and the second stage are decided on the basis of the suspended organic contents of the slurry to be treated. This first stage fermentation is hydrolysis stage and the second methanation and polishing stage. The first stage is designed to give maximum solid retention time for the hydrolysis and the second stage is for acidification and biomethanation process, operate in the Mesophillic range.

In this process, the wet wastes generated within model colony area (from house hold kitchens, commercial complexes, Hotels/Restaurants, Fruit and Vegetable markets wet wastes etc.) is being

collected and bring it to the plant site by PMC. Though, it's a segregated wet wastes, but still it contains 2-5% non-biodegradable material, such as plastics, glass, metal etc.. All such material at its first stage being removed manually, which is being called as 'Fine Segregation'. Thereafter, the segregated wet wastes get mixed with water in 1:1 proportion and then crushed in the shredder to convert it in to the paste like slurry before being fed to the primary digester. The slurry is then treated in closed vessels called as anaerobic digesters (Primary and Secondary Digesters) where, in the absence of oxygen, microorganisms break down the organic matter into a stable residue, and generate a methane-rich biogas in the process. The generated biogas is being cleaned with the help of Scrubbers. In this scrubbing process, the moisture and H_2S contents and to certain extent CO_2 gets removed to the acceptable level and then the purified biogas is stored in a biogas balloon, which is made up of Neoprene rubber. The purified biogas is then supplied to the 40 KVA Indigenized biogas engine (run on 100% biogas) to generate electricity. The solid residue which remains after biomethanation process comprises solid / fibrous material and liquid, which can be separated through the Slurry Drying Beds. About 50% of the liquid manure is then re-circulated in to the system, as it contains nitrogen and some active anaerobic microorganisms. The fiber represents an effective organic material, which is being used as manure for PMC's public garden.

The project includes the following sections: (i) Waste Reception and Fine Segregation Section, (ii) Mechanical Crushers – 2 Nos. 5 HP, (iii) Two Stage Anaerobic Reactors - 200 Cum. In BBM (With Aeration, Biogas and Leachate Recirculation facility), (iv) Manure Handling Section – 35 Sqmtr. In BBM, (v) Biogas Collection Section – 2 Nos. 75 Cum. each in Neoprene Rubber with enclosure, (vi) Biogas Cleaning System – CO_2 and H_2S Scrubbers, Pressure Vessel and Vacuum Pump, (vii) Power Generation – 40 KVA 100% Biogas based Indian Engine, (viii) Leachate Recirculation System, (ix) Solar Water Heating System – 500 Liters./day.

In his next session on, "Low Cost Treatments of Solid Wastes" he presented a case study on Setting up of 1X 450 TPD An Integrated Municipal Solid Waste Processing Plant for Guwahati Municipal Corporation. This is devided into number of phases viz., 200 TPD Bio-methanation-cum-Bio-CNG Plant, 1X100 TPD RDF Plant, 100 TPD Recycling Plant and 50 TPD - Will go to the Sanitary Landfilling for final disposal. He explained all the aspects of this project. He elaborated the procedures followed, Technology adopted, Amount of biogas generated and revenues associated with this generation. Also he explained the pelletization process and its characteristics. He aso presented the techno – commercial viability of the project.

In afternoon session, Mr. Rohit Walvekar who is a Project Manager at Primove Infrastructure Development Consultants Pvt.Ltd., Pune presented a topic on, "Tiger Bio Filter: Sustainable Sewage Treatment Technology". He also covered the theme, "Vermifilteration based Onsite/Offsite waste management system" during his presentation. While explaining a vermifiltration based Sewage Treatment Technology (Tiger Technology) he explained Vermifiltration as a superior form of sanitation compared to septic tanks and pit latrines. As earthworms are well known to promote

digestion of organic waste, which results in the production of vermicompost. Tiger Technology finds its basis on the phenomenon of vermifiltration. Technology consists of using a combination of worms, microorganisms, and natural filtration materials to treat waste. This combination of filtration media enables highly efficient, natural, low cost human excreta disposal, which can be suitably harnessed to treat waste on-site. Earthworms are known to promote digestion of organic waste, which results in the production of vermicompost. In vermifilters, this behavior is combined with filtration to digest organic matter present in sewage.The earthworms used in the bio media filter unit are a special species of worms called Tiger worms (*Eiseniafetida)*, which are capable of compositing faecal waste. Trapped organic matter is consumed by earth worms as an energy source for metabolism and reproduction. The worms require only air, water and food to form a sustainable population in the vermifilter. Vermifiltration is a form of sanitation that is superior to both septic tanks and pit latrines (for fecal waste) and active aerobic sewage treatment (for wastewater).

The technology is adequately studied and researched and has been referenced in the Manual on Sewerage and Sewage Treatment (Second Edition) by CPHEEO and the Ministry of Urban Development. Vermifiltrationtechnology was adapted to be used for the Tiger Toilet and the Tiger Biofilter,starting in 2012. The Technology breaks down all fecal matter into liquid and gas (which are safely dispelled into the surroundings), and usable manure (which gathers on the top of the Biodigester) Results obtained during the research and development phase of the Tiger Technology indicate that almost 95% of the solid fecal matter is treated within 24 hours of use. Most of the fecal matter is consumed by the Tiger worms for their functioning and reproduction. The system is passively aerobic, as the burrowing action of the worms constantly introduces oxygen into the Biodigester. This makes the system odour-free and allows for liquid effluent and gases to safely dispelled into the ground.

The adaptation of the Tiger Technology to provide safe, effective, and cost-efficient sanitation gave rise to the development of the Tiger Toilet. The Tiger Toilet consists of a superstructure (the toilet room) attached to a unique underground biodigester which is loaded with the Tiger Technology. The fecal waste from the toilet roomis flushed into the Tiger Biodigester, which contains the bio media and drainage layers. The presence of the Biodigester makes the Tiger Toilet compact and particularly suitable to any area. The Tiger Toilet is linked to a normal pour flush system, which ensures a flush-and-forget experience to users. When the fecal matter is flushed into the Tiger Biodigester, the solids are trapped at the top of the system where the worms and microorganisms consume it, while the liquid is filtered and expelled through the drainage layer. The solid fecal matter is treated to produce NPK-rich vermi-compost. The Biodigester tank does not need to be emptied for up to 10 years.

After explaining the functioning of this technology, he mentioned that, Tiger Toilet creates a complete ecosystem in the pit allowing extremely rapid waste digestion (usually within 24 hrs). It uses natures bio-degradation system by providing a complete soil food chain, maintains completely aerobic environment - no odour and worms system operates on self regulating basis – population increases

and decreases on the basis of resources. While explaining Urban Tiger Toilet (UTT) he mentioned that, urban and peri-urban areas are economic hubs and sophisticated land markets. They comprise dense property relationships and accommodate a wide range of socio-economic groups, including ownership rights, tenancy rights, occupancy rights (lease arrangements, rights given under public schemes to residents of informal settlements). Because of the congested area there is no sewer network and not sufficient area for Septic tank built up. UTT is a unique solution for those congested areas where other options are not suitable. Tenant are prefer house with Toilet , Toilet is a value addition for owner of the house , it increases the house rent.

Day – 3: 28th November, 2018

Site Exposure Visit to Waste to Energy Plant of Enprotech Solutions at Kolhapur

Introduction: Kolhapur the pearl of south and India's most preferred holiday destination is blessed with natural beauty that grows thousands of visitors to this tiny city every single day. But beyond the beauty, glamour and excitement lies a deadly means. 'Garbage' that threaten to destroy Kolhapur forever.

Processes:

1. **Processing Room:**
   a) **Segregation:** Here,municipal corporation brings mixed solid waste every day. The composition include organic material, plastic, shells, metals, clothes etc. Then segregation is done by manually.only organic solid waste is used for further process.
   b) **Mixing/shredding:** Segregated organic waste is put down in mixer along with waste water from outlet chamber and converted it into slurry which is further transferred to inlet chamber.
2. **Pre-Digester:** Slurry from mixer is brought to pre-digester through PVC pipe. It is stored in digester. further it is passed to main digester through connecting pipe. Sludge settles down here and forced further to connecting chamber by air compressor. Warm water is supplied in digester to control temperature inside pH is to be maintained between 7.5-8
3. **Connecting Chamber:** It is used to maintain flow between pre-digester and main digester.
4. **Main Digester:** Anaerobic digester is a series of biological processes in which micro-organisms break down biodegradable material in the absence of oxygen. Anaerobes access oxygen from sources other than the surrounding air. The oxygen source for these micro-organisms can be the organic material itself or alternative may be supplied by input material. It's then fed into digester tank. This is where anaerobic digester takes place. This process produces two main products firstly the Biogas, which is collected and stored in balloon. And the other product is called Digest which is rich in nutrient and nitrogen and can be used as a soil fertilizer.
5. **Process Stages:** The overall process can be described by the chemical reaction, where organic material such as glucose is biochemically digested into carbon dioxide (CO2) and methane (CH4) by the anaerobic

$$C_6H_{12}O_6 \rightarrow 3CO_2 + 3CH_4$$

The four key stages of anaerobic digestion involve hydrolysis, acidogenesis, acetogenesis and methanogenesis.

Conclsion: After this visit participants have understood the importance of segregation at source of solid waste, process involved in solid waste biomethenation project. Various components of the process and its working with significance.

Site Exposure Visit to Sewage Treatment Plant of Kolhapur Municipal Corporation at Kolhapur

Kolhapur Municipal Corporation has commissioned a 76 MLD capacity STP (Sewage Treatment Plant) as per funds received from The National River Conservation Directorate (NRCD) in the MoEFCC (Ministry of Environment, Forests and Climate Change). The Ministry is implementing the Centrally Sponsored Schemes of NRCP (National River Conservation Plan) and NPCA (National Plan for Conservation of Aquatic Eco-systems) for conservation of rivers, lakes and wetlands in the country. This STP is operational since April 2015 and is based on the SBR (Sequence Batch reactor) technology.

Basic Treatment Process:

The operation of an SBR is based on a fill-and-draw principle, which consists of five steps—fills, react, settle, decant, and idle. These steps can be altered for different operational applications.

1. **Fill:** During the fill phase, the basin receives influent wastewater. The influent brings food to the microbes in the activated sludge, creating an environment for biochemical reactions to take place. Mixing and aeration can be varied during the fill phase to create the following three different scenarios:
   a) **Static Fill:** Under a static-fill scenario, there is no mixing or aeration while the influent wastewater is entering the tank. Static fill is used during the initial start-up phase of a facility, at plants that do not need to nitrify or denitrify, and during low flow periods to save power. Because the mixers and aerators remain off, this scenario has an energy-savings component.
   b) **Mixed Fill:** Under a mixed-fill scenario, mechanical mixers are active, but the aerators remain off. The mixing action produces a uniform blend of influent.
   c) **Aerated Fill:** Under an aerated-fill scenario, both the aerators and the mechanicalmixing unit are activated. The contents of the basin are aerated to convert the anoxic or anaerobic zone over to an aerobic zone. No adjustments to the aerated-fill cycle are needed to reduce organics and achieve nitrification. However, to achieve de-nitrification, it is necessary to switch the oxygen off to promote anoxic conditions for de-nitrification. By switching the oxygen on and off during this phase with the blowers, oxic and anoxic conditions are created, allowing for nitrification and de-nitrification. Dissolved oxygen (DO) should be monitored during this phase so it does not go over 0.2 mg/L. This ensures that an anoxic condition will occur during

the idle phase.

2. **React:** This phase allows for further reduction or "polishing" of wastewater parameters. During this phase, no wastewater enters the basin and the mechanical mixing and aeration units are on. Because there are no additional volume and organic loadings, the rate of organic removal increases dramatically. Most of the carbonaceous BOD removal occurs in the react phase. Further nitrification occurs by allowing the mixing and aeration to continue—the majority of de-nitrification takes place in the mixed-fill phase. The phosphorus released during mixed fill, plus some additional phosphorus is taken up during the react phase.
3. **Settle:** During this phase, activated sludge is allowed to settle under quiescent conditions—no flow enters the basin and no aeration and mixing takes place. The activated sludge tends to settle as a flocculent mass, forming a distinctive interface with the clear supernatant. The sludge mass is called the sludge blanket. This phase is a critical part of the cycle, because if the solids do not settle rapidly, some sludge can be drawn off during the subsequent decant phase and thereby degrade effluent quality.
4. **Decant:** During this phase, a decanter is used to remove the clear supernatant effluent. Once the settle phase is complete, a signal is sent to the decanter to initiate the opening of an effluent-discharge valve. There are floating and fixed-arm decanters. Floating decanters maintain the inlet orifice slightly below the water surface to minimize the removal of solids in the effluent removed during the decant phase. Floating decanters offer the operator flexibility to vary fill and draw volumes. Fixed-arm decanters are less expensive and can be designed to allow the operator to lower or raise the level of the decanter. It is optimal that the decanted volume is the same as the volume that enters the basin during the fill phase. It is also important that no surface foam or scum is decanted. The vertical distance from the decanter to the bottom of the tank should be maximized to avoid disturbing the settled biomass.
5. **Idle:** This step occurs between the decant and the fill phases. The time varies, based on the influent flow rate and the operating strategy. During this phase, a small amount of activated sludge at the bottom of the SBR basin is pumped out—a process called wasting.

SCADA System:

The SCADA (Supervisory Control and Data Acquisition) system for the STP was started in May 2015 and since then daily load has been calculated and recorded by Kolhapur Municipal Corporation. The current operational load on the plant is estimated to be around 52 MLD. Given the fact that the STP has been designed to treat 76 MLD of waste water and the existing load is mere 52 MLD this indicates that the STP currently runs at an efficiency of about 68%.

The water quality for the inlet and the outlet is monitored everyday by the laboratory established at the STP. The daily monitored parameters include pH, DO (Dissolved Oxygen), BOD (Biological Oxygen Demand), COD (Chemical Oxygen Demand), Phosphorus, oil and grease, Alkalinity, Total

Hardness and conductivity. An inventory of the information is maintained at the laboratory. Random samples are collected per month and tested by MPCB (Maharashtra Pollution Control Board), at their regional laboratory at Chiplun. These samples are tested for pH, DO (Dissolved Oxygen), BOD (Biological Oxygen Demand), COD (Chemical Oxygen Demand), SS (Suspended Solids), Chloride, Sulphate, Phosphate, TDS (Total Dissolved Solids), oil and grease, TRC (Total Residual Chlorine) and so on.

Conclsion: After this visit participants have understood the Sewage Treatment Plant Details and Processes involved, Sequesncing Batch Reactor Details, Factors affecting SBR Process, SCADA System, Various components of the process and its working with significance.

Day – 4: 29th November, 2018

One Day Site Exposure Visit to Faecal Sludge Treatment Plant at Wai, Maharashtra

Introduction:

On 29th November, 2018 (Thursday) at 12:00 p.m. participants reached at Wai. The visit started from Community septic tank at Wai where Faecal sludge is collected in collection vehicle and further transported to Faecal Sludge Treatment Plant (FSTP). At FSTP, Mr. Dhawal Patil, General Manager, Ecosan Services Foundation, Pune guided all the participants regarding entire process of Faecal Sludge treatment plant. He initially introduced all participants to the concept of scheduled desludging and explained the procedure and frequency. Further he explained the entire process, limitations, merits and demerits of FSTP. He told that, Faecal Sludge is a raw or partially digested sludge in slurry or semisolid form. The capacity of the FSTP is 70 KLD. FSTP consists following stages of treatment units, which are-

a) **Stage 1-** Consists of receipt, screening and grit removal chamber along with storage of sludge. The screen removes coarse particles which can interfere in further treatment of sludge. The grit chamber removes the inert particles (1-5% solids removal). Storage of sludge is prolonged along with ozone treatment in sludge drying bed partially.

b) **Stage-2:** Dewatering- The sludge and wastewater are separated for further treatment.

c) **Stage-3:** The wastewater separated from 2nd stage is further treated with Pasteurization where the thermal destruction of Pathogens and Helminth eggs is carried out along with chemical dosing. And the separated sludge is mixed with additives for further treatment.

d) **Stage-4:** After the Pasteurization the wastewater is discharged to Phyto-remediation process. (Phytorid technology provided by IIT Bombay). And the sludge is Pyrolized at high temperature which produces the Biochar as a byproduct.

Finally the treated wastewater is used for gardening and the Biochar is used to produce the thermal energy.

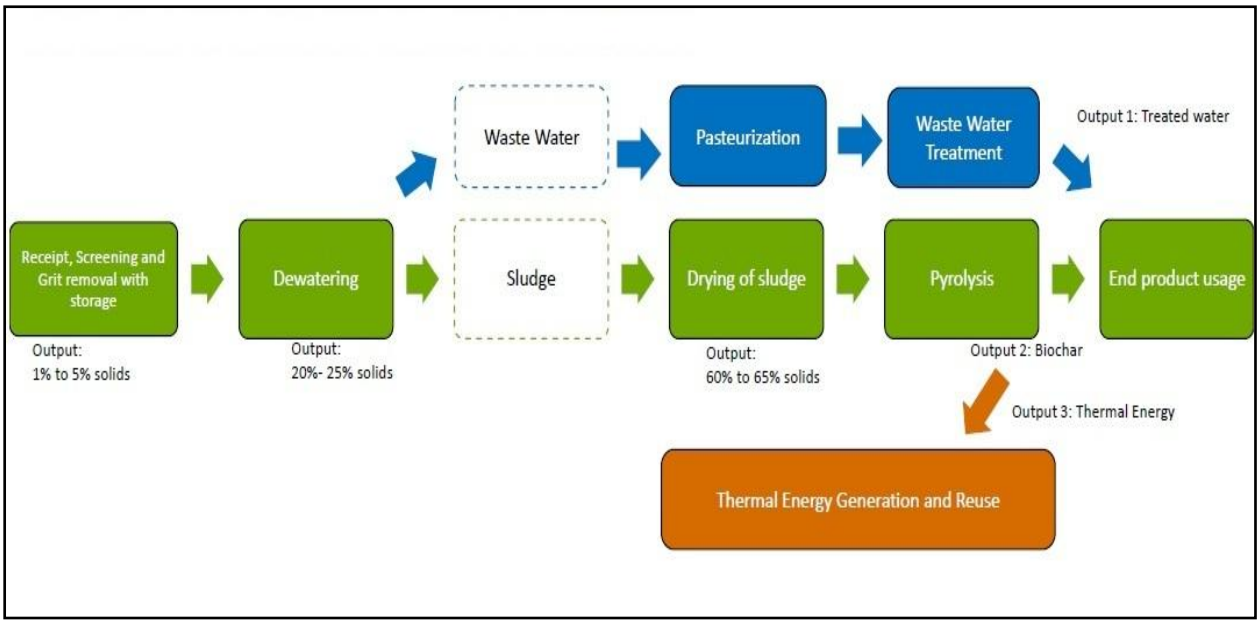


Figure: Process Flow Diagram of FSTP

Day – 5: 30th November, 2018 and Day – 6: 1st December, 2018

Mr. Saurabh Kale, Sr. Project Manager and Mr. Dhawal Patil, General Manager – Operations at Ecosan Services Foundation, Pune were the resource persons for day 5 and day 6. They had covered topics related to Faecal sludge and Septage Management as well as Treatment Technologies.

On 30th Novembr, 2018, Mr. Kale and Mr. Patil started their session with Introduction about training, setting ground rules and expectations. Further they discussed the need of faecal sludge and septage management (FSSM) and national faecal sludge and septage management policy. Also they emphasized on assessment of initial situation. They mentioned that, the main goals of the assessment of initial situation are to set the scene, understand the context, get to know the stakeholders and provide enough information to start elaborating the FSM scenarios. Elaborating faecal sludge management scenario through the data collection step by step during exploratory investigations, preliminary studies and feasibility study. Further they informed about the methods and means for collection and transport of faecal sludge. They mentioned that, collecting good quality, useful data is often not an easy process, especially in contexts where data is scarce, not collected or analyzed properly, hidden or manipulated for political or personal reasons. Different tools and methods for data collection elaborated are, a) Literature review, b) Household level surveys, c) Semi Structured Interviews, d) Qualitative field observations, e) Mapping, f) Laboratory analyses. They also elaborated the difference between scheduled desludging and on demand desludging. In afternoon session they had conducted a group work related to collection and transportation of faecal sludge.

On 1st December, 2018, Mr. Kaleand Mr. Patil started their session with Faecal sludge Treatment,

where they mainly focused on the characteristics of faecal sludge. They mentioned that, The quantities of FS generated and the typical FS characteristics are difficult to determine due the variety of onsite sanitation technologies in use, such as pit latrines, public ablution blocks, septic tanks, aqua privies, and dry toilets. The quantity and characteristics of FS also depends on the design and construction of the sanitation technology, how the technology is used, how the FS is collected, and the frequency of collection. They explained the methods of quantification of faecal sludge and physical, chemical and biological mechanisms. Also they presented the different approaches for the treatment of faecal sludge. In the afternoon session they carried out a group activity where they shared different case studies with the participants. Participants were guided to design the components of faecal sludge treatment plant.

Day – 7: 3rd December, 2018

Dr. M. R. Patil, Associate Professor at B.V.B.College of engineering and Technology (Autonomous), Hubli conducted two sessions on, "Integrated Rain Water Harvesting" and "Integrated Solid Waste Management".

The objectives of Integrated Rain Water Harvesting topic are, (i) to study the current Rainwater Harvesting System and integrated initiative taken by Government of India and (ii) to provide suggestions and recommendations for betterment of Rain Water Harvesting Technologies / Practices in India. During his presentation he elaborated that, almost all urban areas, consisting of large and medium sized cities, face the twin problems of floods during monsoon and shortage of fresh water during non monsoon months. Unlike in the past, present day urbanization has resulted both in shrinking of open spaces and very minimal area remaining unpaved. This has ultimately resulted not only in flooding of cities but has also caused water scarcity due to groundwater depletion in general and saline intrusion in coastal cities. Urban rainwater harvesting, due to lack of open space for capturing the runoff, is mostly in sub-soil storage as groundwater by injecting large amounts of rainwater into the soil during rains. Rain water harvesting in urban areas also consists in reviving whatever water bodies that are left behind without allowing any further construction in them in future. In every premises, whether it be a house, multi-storeyed residential and/or commercial complex, office, factory etc., rainwater falls only on two places: 1) rooftop 2) all around the built up area, which could be a driveway, garden etc. Rooftop rainwater is of a good quality as it falls on clean terraces and is brought down by the drainpipes called rooftop pipes. Any overflow from the sump can be led into an open/dug well, if any, within the premises.

He mentioned that, rooftop rainwater harvesting is the most common technique of rainwater harvesting for domestic consumption. It can be done easily, doesn't cost much ant is applicable at small-scale with a minimum of specific expertise or knowledge; or in more sophisticated systems at large-scale (e.g. a whole housing area). Rainwater is collected on the roof and transported with gutters

to a storage reservoir, where it is either used for groundwater recharge or provides water at the point of consumption. Rainwater harvesting can supplement water sources when they become scarce or are of low quality like brackish groundwater or polluted surface water in the rainy season. However, rainwater quality may be affected by air pollution, animal or bird droppings, insects, dirt and organic matter. Therefore regular maintenance (cleaning, repairs, etc.) as well as a treatment before water consumption (e.g. filtration or/and disinfection) are very important. He discussed case studies of design of rain water harvesting system for M/s Shilpa Medicare Pvt. Ltd.,Belur, Industrial Area, Dharwad and design of rainwater harvesting pond BVBCET, Hubli.

During his presentation on Integrated Solid Waste Management, he discussed about types of solid waste, problem associated with improper management of MSW, challenges in managing the MSW. He also discussed about the quantification and composition of MSW. He elaborated various eco-friendly practices to manage MSW for sustainable sanitation. Further his presentation highlighted the treatment and disposal technologies for MSW. He described indoor method, Bangalore method, NADEP method and Coimbatore method for composting. Further he presented two case studies related to vermicomposting at BVBCET, Hubli and vermicomposting at KLE, Hubali. He mentioned the process of selection of earth worm species for vermicomposting. Also he elaborated the step by step procedure of preparation of vermiculture bed. The advantages he mentioned about vermicompost are, (i) vermicompost is an eco-friendly natural fertilizer prepared from biodegradable organic wastes and is free from chemical inputs, (ii) it does not have any adverse effect on soil, plant and environment, (iii) it improves soil aeration, texture and tilt thereby reducing soil compaction, (iv) it improves water retention capacity of soil because of its high organic matter content, (v) it promotes better root growth and nutrient absorption and (vi) it improves nutrient status of soil-both macronutrients and micro-nutrients. The precautions that are required to be taken are (i) moisture level in the bed should not exceed 40-50%, (ii) water logging in the bed leads to anaerobic condition and change in the pH of medium, (iii) this hampers normal activities of worms leading to weight loss and decline in worm biomass and population, (iv) temperature of bed should be within the range of 20^{o}-30^{o}, (v) worms should not be injured during handling, (vi) bed should be protected from predators like red ants, white ants, centipedes and others like toads, rats, cats, poultry birds and even dogs, (vii) frequent observation of culture bed is essential as accumulation of casts retards growth of worms, (viii) space is the criterion for growth and establishment of culture and (ix) Minimum space required is 2 m^2 per 2000 worms with 30-45 cm thick bed. Finally he concluded that, there is an increasing demand for compost and other traditional products in the agriculture and horticulture. Hence by adopting eco-friendly practices, we can lead to sustainable sanitation.

In the afternoon session, Mr. Rohit Walvekar, Project Manager at Primove Infrastructure Development consultants Pvt. Ltd., Pune presented a topic on, “Sewage Collection and Treatment”. In his presentation he discussed the sewer system and types of sewer system that exist. He explained

various types of sewer and design principles,cost, applicability and pros-cons of conventional sewers, separate sewers, solids-free sewers, pressurized sewers, vacuum sewers, sewer pumping stations. He also elaborated different material used for sewers and its design. He briefed about the factors influencing the selection of materials for sewers are flow characteristics, availability in the sizes required including fittings and ease of handling and installation, water tightness and simplicity of assembly, physical strength, resistance to acids, alkalies, gases, solvents, etc., resistance to scour, durability and cost including handling and installation. No single material will meet all the conditions that may be encountered in sewer design. Selection should be made for the particular application and different materials may be selected for parts of a single project. The determination of the suitability in all respects of the pipes and specials for any work is a matter of decision by the engineer concerned on the basis of requirements for the scheme. As far as the sewage treatment technologies are concerned, Mr. Walvekar presented technologies such as, Activated sludge process / Extended Aeration, Moving bed bioreactor / Fixed aerated bioreactor, Sequential batch reactor, Membrane bioreactor, Upflow anaerobic sludge blanket Reactor and Tricking filter. He explained flow diagram to describe the step by step procedure and presented operational characteristics associated with each process.

Day – 8: 4th December, 2018

Dr. G. R. Munavalli, Professor at Walchand College of Engineering (Autonomous), Sangli presented two topics namely, "Low Cost Water Treatment" and "Decentralized Sewage Treatment".

During his presentation on "Low Cost Water Treatment", some of the key issues / critical issues he mentioned are that, the demand of water is increasing day by day due to growing population and industrial developments. Every country has to take preventive measures to avoid carelessly growing contamination of the available water resources. River is dominating source of drinking water. It is however essential to have physically or chemically pure water which will be used for drinking purpose. It will be difficult, time consuming and costly to completely purify the water. Hence it is thought that, the impurities in water are to be removed to a certain extent only so that it does not prove harmful to the public health. It has been witnessed that many water borne diseases like diarrhea, cholera etc are caused due to contaminated water. There are many water purifiers available in market, although they are available in plenty and with the latest technology to provide microbiologically free potable water they are not affordable by the rural population due to the higher costs. Technologies commonly employed in the developing world are typically too expensive, too complex to be locally maintained and repaired, and incompatible with local customs and beliefs. In rural areas, there are various Indian government schemes for water treatment like, Rashtriya Peyajal Yojana, Jal Swaraj, Jal Nirmal etc. In these schemes; the water is mainly treated with low cost purifying materials like bleaching powder, alum etc. But still there is some probability of water contamination. So here arises the need for introducing such filter which will be providing potable and microbiologically free water at household level with lowest possible cost. The main advantage of household water treatment is that

it can be adopted immediately in the homes of poor families to improve their drinking water quality. There is a wide range of simple household treatment technologies like boiling, alum treatment, straining, chlorination based on convenience and economy for the household. Some limitations of household water treatment are that it requires the end users to be knowledgeable about its operation and maintenance, and they need to be motivated to ensure that it is being used and maintained correctly. The impurities which are present in the water are harmful for the human health and thus should be removed before consuming; here arise the need of water purifier. These water purifiers remove these impurities and provide water which is within permissible limits.

While explaining low cost water treatment, he mentioned that, the low cost water purifiers should have lesser initial cost and operating cost.Ceramic candle filters, Clay candle/disk/pot filter, Sand filters, Carbon filter, and Solar DISinfection (SODIS) are the options for low cost water treatment. Further, the use of natural coagulants, activated carbon produced from fibrous organic material, and use of hydraulic devices in mixing will induce low cost into water treatment.

During his presentation on "Decentralized Sewage Treatment", he elaborated that, the wastewater generated from an urban area generally is a result of domestic and industrial activities. Domestic wastewater contains organic and inorganic matter in suspended, colloidal and dissolved form. The concentration in the wastewater depends on the original concentration in the water supply, and the uses to which the water has been put. The characteristics of wastewaters vary widely form time to time. The various pollutants contributed by wastewater may belong to degradable, non-degradable and biologically accumulative. Degradable pollutants are all complex organic substances and sewage organisms that can undergo gradual microbial decomposition. Non-degradable substances are those, which are inert to biological action. Biologically accumulative substances are those, which tend to accumulate in the environment. Pollutants entering the environment may degrade with time or remain inert and thus undiminished with time. Planning of wastewater collection, treatment and disposal are essential to avoid the damaging effects on the environment. Control of pollutants is not just a matter of waste treatment. If the municipal wastewater is not properly collected, treated and disposed, the related effects pose serious threat to the environment. Most of the urban cities in India do not have sewerage systems and sewage treatment is non existent or partial or inefficient. A typical centralized conventional treatment system consists of physical, chemical and biological processes designed to remove organic matter and solids from the wastewater. The limitations of centralized treatment are high cost of collection, energy intensive pumping requirements, focus on highly engineered wastewater management technologies requiring electro-mechanical solution, low return on investment, huge capital investments, and sludge disposal problems. In view of these limitations improved or alternative treatment methods will be needed to provide higher levels of treatment not only for routine wastewater constituents but also for the removal of specific compounds. Also the emerging alternative and naturally-based technologies offer opportunities for resource recovery.

He explained that, in the decentralized treatment system, there is a scope for sharing the responsibility

for domestic wastewater treatment at household, colony, or sector levels Decentralized wastewater systems are an economical alternative to centralized systems, particularly in regions with hilly terrain or less dense development. These systems would be based on the topography of the local watershed, and would result in small-scale facilities equally dispersed through environment. This approach would allow for independent, self maintained, and self sustained facilities that are capable of recovering wastewater resources and immediately reusing them in decentralized urban farms.

He also explained that, some low cost technologies that require the less skill and negligible financial support are root zone bed / constructed wetland technologies, anaerobic filter, vermifilter, vermitoilet, and baffled septic tank. Constructed wetland and vermifilter are the most potential methods of treating wastewater. However, these alternative methods need to be tested effectively on pilot scale before field application. For small communities the treatments like constructed wetlands, vermifilter, aquaculture operations can provide effective treatment as a stand-alone system. But generally they are most suited for providing advanced secondary or tertiary treatment after waste stabilization ponds, package treatment plants etc. These treatments do not require skilled labours like conventional treatments. Also these treatments are easy to operate, low maintenance required, negligible sludge production and economical to implement.

Mr. A. A. Katkar and Mr. B. C. Ingavale, Assistant Professors at KITCoE, Kolhapur presented a Demonstration Session on, "City Sanitation Plan of Kolhapur City: A Case Study". They mentioned that, City Sanitation Plans are strategic planning processes for citywide sanitation sector development. Addressing technical and non-technical aspects of sanitation services, city sanitation plans include the vision, missions, and goals of sanitation development as well as strategies to meet these goals. City Sanitation (Master) Plans (CSP), sometimes also referred to as Municipal Sanitation Plans or Water and Sanitation Strategy Plans, are strategic planning processes for citywide sanitation sector development. To manage water resources, water safety plans (WSP) exist. A citywide sanitation strategy includes the vision, missions, and goals of sanitation development as well as strategies to meet these goals. Each strategy is then translated into indicative programmes (and projects). The citywide sanitation strategy covers (WSP 2010) technical aspects, including strategies and programmmes for the development of (a) domestic wastewater services, (b) solid waste management services, and (c) micro drainage services. Non-technical aspects, including strategies for the development of non-physical aspects such as (a) community awareness and participation, (b) policy and regulation, (c) institutional capacity, (d) private sector engagement, (e) NGO engagement, (f) financing and tariffs, and (g) monitoring and evaluation. During their presentation, they covered points such as, Citywide Strategic Sanitation Planning, Stages for preparing City Sanitation Plan which include (i) Stage 1 – Preparing to Plan, (ii) Stage 2 – Understand Current Problems, (iii) Stage 3 – Developing Solutions, (iv) Stage 4 – Develop Citywide Municipal Plan, (v) Stage 5 – Implementing the Plan. Further with reference to the stages mentioned, Mr. Katkar and Mr. Ingavale presented objectives, methodology, existing situation, financial aspects, health related indicators

through a case study of City Sanitation Plan for Kolhapur City.

Day – 9: 5th December, 2018

Mr. Ashish Deosthali, who is working as Sr. Deputy Director General at All India Institute of Local Self Government, Mumbai presented two topics namely, "Environmentally Sustainable Development of Villages" and "National Urban Sanitation Policy for City Sanitation Plan".

Mr. Deosthali mentioned that, urban population in India stands at 31.16% as per the 2011 census. Today In-dia has the world's second largest urban population after China. The urban population is expected to grow by another 400 million by 2050. This would manifest majorly in two ways; Organic growth of megacities and emergence of new urban areas. These mega cities demand huge infrastructural in-vestment on basic services. On the contrary the new growth centers emerge due to various economic, political and institutional incentives. Infrastructure development around these new growth centers remains largely neglected to a point in time where proper planning is very difficult. He highlighted the initiative of the Government of Maharashtra (GoM) to address the issue of disorganized development in potential growth centers and preset the "Vision, Process, Outcomes and the Limitations" of the initiative over the last 5 years. The "Sustainable Village" initiative by the GoM focused on development of a comprehensive "Environmental Development Plan" based on predetermined parameters. The selected villages were categorized as Nodal Villages or Potential Urban centers with population ranging from 5,000 to 35,000 per village. The primary objective of his topic was to address development related issues at micro level, at the stage when it is still manageable. He concluded that, the Eco Village Project Mobilised professional expertise from various government departments such as Agriculture, Health, Public Work Department, Irrigation Department, etc. in the selected villages. This Technical manpower worked with the project implementing agency and the village level committees to prepare a comprehensive development plan for the village. As the plan was prepared through a consultative process there was a sense of ownership among the villagers regarding the various constituents of plan and a need to implement the same in the future. Due to the Eco Village initiatives the GoM has the unique opportunity where it has the database of almost 300 villages across 34 districts in Maharashtra. The Government has a firsthand informational. This database included GIS based land use maps, existing infrastructure status, Gaps and future demand for basic infra-structure, socioeconomic activities, and environmental background and issues of the village. Such a database gives the decision makers an in depth understanding of the scenarios and the issues of villages in various districts. These planned growth centres would grow into These villages which are hence present an opportunity for comprehensive and sustainable planning of these villages as future Eco Cities in a sustainable and phased manner.

During his presentation on "National Urban Sanitation Policy for City Sanitation Plan", he elaborated that, sanitation is the hygienic means of preventing human contact from the hazards of wastes to promote health. Hazards can be either physical, microbiological, biological or chemical agents of

disease. Wastes that can cause health problems are human and animal feces, solid wastes, domestic wastewater (sewage, sullage, and greywater), industrial wastes, and agricultural wastes. The urban management is not being able to cope up with the growing pace of urbanization. In Urban Local bodies, the institutional capability is weak to develop commercially viable infrastructure projects, mobilize resources for the projects and implement them. Systems of management and governance in these bodies discourage people's participation in the planning and management of infrastructure. The financial health of most urban local bodies is extremely weak and their authority to set rates and user charges to recover costs is still non-existent. Moreover the available capacity gets severely reduced due to rampant encroachments. The administration and collection of taxes, fees and user charges is highly inefficient. Legal frameworks relating to urban infrastructure development and land market require amendments to facilitate public private partnership and improve functioning and efficiency of the markets. The Eleventh Plan addresses some of these challenges through a mix of resource allocation, incentives for institutional reform of the delivery system, and public-private partnerships. However, a major task remains is the improvement of service delivery and capacity development at all levels.

He presented a case study on Bidar City Sanitation Plan. Bidar is located on the northern edge of a plateau, overlooking the low-lying area to the north and east. The topography drains into Manjra River, which flows towards the south of Bidar. With the present population of 210,000 as per provisional census of 2011, the estimated solid waste generation for the city of Bidar is about 60 MT3 waste is generated in Bidar city. As estimated the generated waste mainly comprise of Organic matter of about 65% while recyclable materials constitute up to 10%. There are 35 self help groups engaged in the city in primary collection in 21 wards. Other wards are taken care by Bidar Municipal Council. Generally, in 19 wards 100% house to house collection is done and in 16 wards 80-85% house collection is done.

The solid waste transported is dumped into the disposal site located at Sultanpur about 12 kms away from the city. The land is owned by Municipal Council. The site is fenced for protection and has basic functional facilities. Site is well maintained and has not much foul smell and odor. However, this is not an engineering landfill site conforming to the MSW Rules 2000. Aerobic Microbial composting and Bio-methanation are suitable for the treatment of biodegradable waste and recommended here. Both these technologies require less mechanical equipment or maintenance and have potential for generating revenues in the form of compost, nutrient rich manure/electricity (in biomethanation). For disposal of rejects and residues, sanitary landfill is recommended for Bidar. Additional litter bins (250 No.) and containers (32 No. of 4.5 cum capacity) are proposed in the city sanitation plan to strengthen the collection system of solid waste in the city. There are two options recommended for the treatment of biodegradable waste; i) composting and ii) bio-methenation where some revenues could be generated through the sale of decomposed manure and savings could be made through generation of electricity using methane gas produced in bio-methenation plant.

Mr. S. S. Shaha, Associate Professor at KITCoE, Kolhapur presented a Demonstration Session on, "Development of Closed Water Loop by Recycling Wastewater, Ichalkaranji: A Case Study". In his presentation he mentioned that, India's urban population is growing at a fast pace and is expected to be approximately 50% of the total population by the next decade. This may provide economic benefits, but it also puts utilities under pressure to supply potable quality drinking water to the population. This will also impact the ability of utilities to service the demand of commercial and industrial requirements. In addition to the challenges in meeting the demand, this may also lead to further increase in water tariffs in order to subsidise residential water supply. This situation warrants utilities and the government to ensure optimal use of available water resources while duly addressing the social, economic and commercial considerations. Institutionalising the reuse of treated wastewater can help utilities in addressing this challenge in an effective manner.

In this context, Mr. Shaha elaborated his case study initiated and supported by International Council for Local Environmental Initiatives (ICLEI) for integrated urban water management. The main objectives of the project were the need for developing wastewater reuse as a sector, identifying the interventions that could help in the development of this sector and also identifying suitable structures that can help in mainstreaming the implementation of wastewater reuse projects in the country. The project was implemented by considering technical, financial and economic aspects of wastewater treatment, non-potable water usage in the urban scenario, with focus on slum area.

While elaborating the concept of closed water loop, Mr. shaha mentioned that, a closed loop system is designed to treat, filter and reuse the wastewater that is used. Other than water conservation, water recycling is the only significant readily available practice that can help meet the water demands that are increasing on a daily basis.Recycled water reduces existing drinking water supplies for non-potable uses and is available at much lower prices as compared to potable water. Producing water locally helps save energy by reducing pumping of drinking water and the evolution of proper sanitation practices eliminates waterborne disease and contributes to a longer life expectancy.

Day – 10: 6th December, 2018

Site Exposure Visit to Common Effluent Treatment Plant, Kagal

Many of the small scale industries are unable to put up the treatment system individually, the concept of CETP's (Common Effluent Treatment Plant) is envisaged to benefit such industries for treating their effluent before disposal whether it is in stream and sewerage system or in river and seas. CETP is set in the industrial estates where there are clusters of small scale industrial units are located.

The Ministry of Environment and Forest, Government of India has launched the centrally sponsored scheme, namely, "Common Effluent Treatment Plant" (CETP) in order to make a cooperative movement of pollution control especially to treat the effluent, emanating from the clusters of compatible small-scale Industries.

A rapid industrialization has lead to the industrial effluent and sewage. The effluent stream coming

out of the industries is mainly comprised of the hazardous chemical and heavy metal ions. These contents are very toxic in nature and harmful to the environments. Water is normally treated by a combination of physical. chemical and biological operations. For development of any country development of industry is important factor. There are different types of industries according to production such as textile industry, petrochemical industry, foundries etc.

Kagal-Hathkanangale Industrial Area is one of the newly developing five star industrial areas in Kolhapur Region of state of Maharastra. The industrial area houses many large, medium and small scale industries and export oriented units as a part of national environmental policy and to abate industrial pollution, it was proposed to set up common effluent treatment plant (CETP) by Maharashtra Industrial Development Corporation (MIDC) in the year 2007-08. Design, construction, installation, commissioning of CETP was entrusted to SMS Infrastructure Ltd., Nagpur on turn-key basis along with the contractual and operation and maintenance.

The CETP was designed for 10 MLD of waste water with the provision of

20% hydraulic overload for safety and provision was kept in layout so that in future it can be expanded to 15 MLD capacity. This CETP collects the effluent from different industries located in this area which are Indo-Count, Raymond, Sokatas, Oswal, Nagarika And Tirupar Pandit. The total cost of the project is around Rs. 11.07 Crore. The CETP receives the effluent at the rate of 4.5 to 5 MLD on daily basis. The plant has 3 pumps operating at 250 m^3/ hr individually. The operating cost is around Rs. 20/m^3/day.

The CEPT receives effluent from textile industries, which produce premium quality fabrics. They all have their own treatment plant, which cover the mechanism and process used to treat the water that has been contaminated from production unit of these industries. All these industries consist of applying only primary and secondary treatment because it has high inlet values. After treatment, effluent transported to CETP for further purification process. Each industry has a specific effluent capacity received by CETP.

Sr. No.	Name of Industry	Consent Discharge Effluent (MLD)	Actual Discharge (MLD)
1	INDO COUNT textile industry limited.	3	2.37
2	OSWAL textile industry limited.	1.5	0.6
3	SOKTAS textile industry limited.	1.5	0.8
4	RAYMOND textile industry limited.	2.8	2
5	NAGARICA exp limited.	1.4	0.3
6	Metro-Hi tech co op. Ltd.	1.15	0.6

The design of CETP is based on information provided in the tender document, it was decided to design CETP for the following inlet quality of waste water. The parameters considered for determination of quality are pH, COD, BOD (3 days at 27ºC), Oil and Grease, TSS and TDS.

The effluent from industries is carried to the CETP by gravity or at some places by raising main

through a pipeline. The invert level of pipeline has been fixed at RL 576.0 m as per MIDC records.

Sr. No.	Parameter	Unit	Values
1	pH	-	5.5 - 8.5
2	COD	Mg/l	1800
3	BOD (3 days)	Mg/l	800
4	Oil and Grease	Mg/l	20 - 50
5	TSS	Mg/l	100 - 500
6	TDS	Mg/l	2100

Desired Quality of Treated Wastewater:

Sr. No.	Parameter	Unit	Values
1	pH	-	6.5 - 8
2	COD	Mg/l	60 to 80
3	BOD (3 days)	Mg/l	< 30
4	Oil and Grease	Mg/l	< 10
5	TSS	Mg/l	< 100
6	TDS	Mg/l	< 2100
7	Colour	Pt-Co unit	< 100

The treated effluent confirming to above standard is disposed off to HRTS site developed by MIDC. After visit it was concluded that, the CETP is in proper operating condition and maintance is carried out on regular basis. Chemical analysis of inlet sample and outlet sample of CETP is done monthly by approved laboratories. The analysed sample result is compared with MPCB limits.

Site Exposure Visit to Kirloskar Oil Engines Ltd., Five Star MIDC, Kagal

During Site Exposure Visit to Kirloskar Oil Engines Ltd., Kagal, participants got an opportunity to visit Effluent Treatment Plant, Biogas Plant and Solar Power Plant. Also participants visited and studied the hazardous and non-hazardous waste management systems and rain water harvesting system.

(a) Effluent Treatment Plant and Sewage Treatment Plant: There is a combined ETP and STP plant of 360 KLD capacity at KoEL. The treated water is used for gardening and flushing purpose. Industrial effluents are generated from industrial washing of components using different chemicals, use of coolants and oils. Typical activities such as Painting, Engine Testing and also other machining operations generate effluent. Domestic wastewater is mainly generated from toilets, kitchens (Mess and Canteen), dining halls and other sources. The treatment on effluents is in two stages:

1. Industrial wastewater is treated by dosing of chemicals in which improvement in recyclable water quality is done, and
2. Biological treatment in which the portion of organic contaminants is removed.

(b) Biogas Plant: Biogas refers to a mixture of different gases produced by the breakdown of organic matter in the absence of oxygen. Biogas can be produced from raw materials such as organic waste, manure, plant material, green waste or food waste. Kirloskar Oil Engines Ltd. being concerned towards environment have installed biogas plant of 400 to 450 kg/day capacity which not only manages the organic waste but also produces the energy. The waste used in biogas plant is mainly from kitchen and dining areas of mess and canteen. The biogas generated in plant is about 25 - 30 cum/day. Part of the gas is used for thermal application in canteen and remaining gas is fed to biogas generator to generate electricity.

1. Capacity of generator – 12.5KVA
2. All street lights of EP 1 and Genset plant are powered by biogas generator.
3. Daily electricity generation – 25 to 30kWh/day.

(c) Hazardous Waste Management: Proper disposal of non-hazardous and hazardous waste is very important for the protection of public health, safety, and environmental quality. Kirloskar Oil Engines Ltd. have developed a proper management system which follows the waste management principles of handling, sorting, collection, transportation and disposal. A system is setup for receiving, storing and disposal of Non-hazardous and hazardous waste.

1. Disposal of non-hazardous material – Auctioned or sold to authorize vendor.
2. Disposal of hazardous waste – CHWTSDF Sold to reprocessor or CPCB authorized recycler.

(d) Solar Power Plant: Solar power is the conversion of into electricity, either directly using photovoltaics, or indirectly using concentrated solar power. KOEL have installed a solar power plant of 5.50 MWp total capacity which works on the principle of photovoltaics. This is an on grid system. The electricity generated by this solar plant is half of the total demand of the plant.The solar power plant consists of-

1. **Ground mounted fixed axis system:**
   - Totalcapacity=3.88MWp
   - Thereare11760fixedaxissystempanelsmountedongroundfacingsouthmakinganangle of13degree withhorizontal.
2. **Single axis tracking system:**
   - Total capacity = 0.96 MW
   - There are1680 single axis tracking system panels.
   - The tracking system totates the panel according to the position of the sun to get maximum radiations. Tracker consists of a DCU console unit which checks the tracker angle, voltage and wind speed.

- Solar panel rotates between the angle of 30 to 150 degrees with horizontal with the change in position of sun.
- Tracking system can work up to wind speed of 50 m/sec if wind speed exceeds this limit the panel becomes horizontal to the ground.

3. **Roofmounted system:**
   - Total capacity = 0.54 MW
   - These are also the fixed axis system type of panels.
   - These make an angle of 13 degrees with the horizontal facing south.
4. **Terracemountedsystem:**
   - Total capacity = 0.12 MW
5. **Solar plant also consist of:**
   - Weather Monitoring Station.
   - UMB – It is a compact all in one weather sensor for measurement of temperature, relative humidity, air pressure.
   - Pyranometer – It is used for measurement of solar radiations. There are two pyranometers, one is horizontal and another is tilted to measure both straight and tilted radiations.
   - Lightning Arrester.

(e) Rain Water Harvesting: Rain water harvesting is to store the rain water and utilize it for various purposes. Kirloskar Oil Engines Ltd. have constructed the rain water harvesting pond which was having a capacity of 16.62 ML.This capacity is expanded by 40% in last 2 years. This has increased the storage capacity to 27.71 ML.Approximately about 1125 m^3 rain water is harvested per year.Rain water harvested is then supplied to paint booths in engine plant 1 and engine plant 2. Daily usage of harvested rain water is about 45 KLD.

Day – 11: 7th December, 2018

Mr. R. A. Nikam, Associate Professor in Department of Environmental Engineering at KITCoE, Kolhapur delivered a session on, "Fundamentals of Sanitation and Plumbing". The learning objectives of his session were 1) To understand significance of plumbing and drainage, 2) To know types and materials for plumbing fixtures, and 3) To study systems of plumbing.

During his session he discussed the real time issues related to the sanitation and plumbing system in India. He told that, India is a country of colossal human dimensions. It is the second most populated country in the world, with more than 1.25 billion people, of which about 400 million live in cities. Consequently, problems also appear on a larger scale, and the most significant of them is that of

sanitation. India is in first place globally for having the greatest number of urban-dwelling inhabitants living without sanitation. It is estimated; more than eight million homes do not have toilet installations. He also told that, the primary aim of sanitation is to protect public health and environment and hygiene promotion is an integral part of sanitation. Sanitation encompasses four engineering infrastructure facilities: (i) Wastewater management systems, (ii) Drainage systems for storm water drainage, (iii) Excreta management systems and (iv) Solid waste management systems.

He mentioned that India is witnessing an increase in urbanization, increase to the tune of 31.8% decadal in urban population. Water supply and sanitation in Public Health Engineering have acquired very important place in the building construction and maintenance field. Development in plumbing engineering, sanitary fixtures and pipes is taking place at a fast pace. New materials and designs are coming in the market every day. The subject gains more importance as more and more vertical rise buildings are being constructed in India. But the personnel involved in the implementation of the sanitary system, especially the plumbing engineers and plumbers, are not well acquainted with modern and systematic steps of working, standards and newer materials and designs, thus resulting in poor hygiene causing pollution in general. Plumbers constitute a major proposition of ground staff and are important as they are crucial work force in implementation, operation and maintenance of water related infrastructure. Hence it is necessary to train the cadre and help them update their knowledge and skills on current practices so that the hygiene and service delivery could be improved.

For proper design and construction of house drainage system, he elaborated various principles that are commonly adopted. He mentioned that, It is advisable to lay sewers by the side of building rather than below the buildings. Drains should be laid straight between inspection chambers or man holes. All sharp bends and junctions should be avoided. The entire system should be property ventilated from the starting point to the final point of disposal. The house drain should be connected to the public sewer only if the level permits i.e. only when public sewer is deeper than the house drain. The house drainages should contain enough number of traps at suitable points for efficient functioning of it. The house drain should be disconnected from the public sewer by the provision of an intercepting trap so as not to allow foul gases from public sewer to enter the house drain. Joints of chains should be water fight and should be property tested before putting the drain line in use.

He discussed that, lateral sewers be laid at proper gradients so that they will develop self clearing velocity. Layout of house drainage systems should permit easy cleaning and removal of obstructions. Materials of plumbing should comply with standard requirements. They should be non absorbent and earth cushioning should be provided to protect them from external loads. The size of the lateral sewers should be such that they will not over flow at the time of maximum discharge. That means size of the drains should be such that max. discharge carried by them without flooding at any point. All branch drains should be as short as possible. Internal dia. of all pipes such as soil, waste, ventilating should not be less than 75 mm and that of drains should not be < 100 mm. For self cleaning velocity of 0.75 m/s and gradient 1:40 for 100 mm dia pipe and 1:60 for 150 mm dia pipe should be attained. He also

elaborated on points such as requirements of plumbing fixture, materials for plumbing, types of plumbing fixtures, plumbing system and layout, design parameters and design principles.

After this session, Mr. S. S. Shaha, Associate Professor and Mr. Bharat Ingavale, Assistant Professor in Department of Environmental Engineering at KITCoE, Kolhapur conducted demonstration sessions on, "Water Quality Monitoring" and "Wastewater Analysis". Mr. Shaha and Mr. Ingavale briefly explained that, availability of water is crucial element for providing better sanitation facilities. Hence provision of good quality of water gains importance in sanitation sector. To ensure the quality of water, its analysis for different parameters needs to be done. Also, to verify the performance of treatment technologies for wastewater, treated wastewater analysis for different parameters needs to be done before its discharge into natural environment. Considering these aspects the laboratory demonstration session was conducted.

For analysis of water and wastewater the participants were enlightened about the chemistry and basics behind these laboratory experiments. During these sessions participants were provided with fundamental knowledge of carrying out various laboratory tests on water and wastewater. The participants were informed about the standard procedures, chemical preparations, significance of tests, importance of conducting tests, as well as discharge standards for water and wastewater. Following is the list of parameters for which laboratory demonstrations were conducted.

Water Quality Monitoring		
Sr. No.	**Parameter**	**Instrument/ Procedure**
1.	pH	pH Meter
2.	Turbidity and Jar Test	Turbidity Meter and Jar Test Apparatus
3.	Conductivity	Conductivity Meter
4.	Solids	Standard Methods
5.	Chlorides	Standard Methods

Wastewater Analysis		
Sr. No.	**Parameter**	**Instrument/ Procedure**
1.	COD	Standard Methods
2.	BOD	Standard Methods
3.	Solids	Standard Methods
4.	Residual Chlorine	Orthotoludine Test
5.	Heavy Metals	Atomic Absorption Spectrophotometer

Day – 12: 8th December, 2018

Mr. Indra Kant Jha, Technical Head at Society for Innovation and Entrepreneurship (SINE), IIT Bombay, Mumbai, delivered his sessions on, "Integrated Solid Waste Management Technology for Urban India" and "Nallah Rejuvenation".

During his session he talked about Status of Municipal Solid Waste Management in Urban India and briefed about the State wise Solid Waste Generation and Processing, where he mentioned that, as of 2016, Maharashtra generates highest quantity, 26820 MT/day of solid waste, Uttar Pradesh with

19180 MT/day is the second highest solid waste generating state and Chandigarh is the only Union Territory which processes 100% of its solid waste. While explaining the disposal methodology in practice, he mentioned that, in urban region, composting is widely used in around 21 states for treatment and disposal of wet waste with a total of 282 plants established as per 2011. Vermicomposting and RDF are other technologies which are being used for waste management. Few waste to energy plants and biomethanation plants are established within the country for waste treatment. Current status for waste treatment facilities might have changed after new rules, Solid Waste Management, 2016 were released. He elaborated State-wise Waste Management Practices as follows:

States/UTs	Composting	Vermi-Composting	Bio-methanation	Palletisation (RDF)	Waste to Energy
Andaman and Nicobar Islands	1	0	0	0	-
Andhra Pradesh	24	-	-	11	2
Assam	1	-	-	-	-
Chandigarh	-	-	-	1	-
Chhattisgarh	6	-	-	-	-
Delhi	3	-	-	-	3
Goa	14	-	-	-	-
Gujarat	3	93	-	6	-
Himachal Pradesh	10	-	-	-	-
Jammu and Kashmir	1	-	-	-	-
Jharkhand	4	-	-	-	-
Kerala	21	7	10	1	1
Madhya Pradesh	7	-	-	2	-
Maharashtra	6	2	5	5	2
Meghalaya	1	1	-	-	-
Nagaland	1	1	-	-	-
Odisha	1	-	-	-	-
Punjab	1	3	-	-	-
Sikkim	1	-	-	-	-
Tamil Nadu	162	24	-	3	-
Tripura	1	-	-	-	-
West Bengal	13	7	-	-	-
Total	**282**	**138**	**15**	**29**	

While explaining the Integrated Waste Treatment Approach and Modality of Waste Management, he briefed about the 'Centralised approach' which pertains to planning, decision making, implementation, monitoring and evaluation as part of the operationalization of any initiative/intervention and the 'Decentralised Management system' which pertains to planning from below (involving the primary stakeholders), ensuring active role for the primary stakeholders (i.e., the

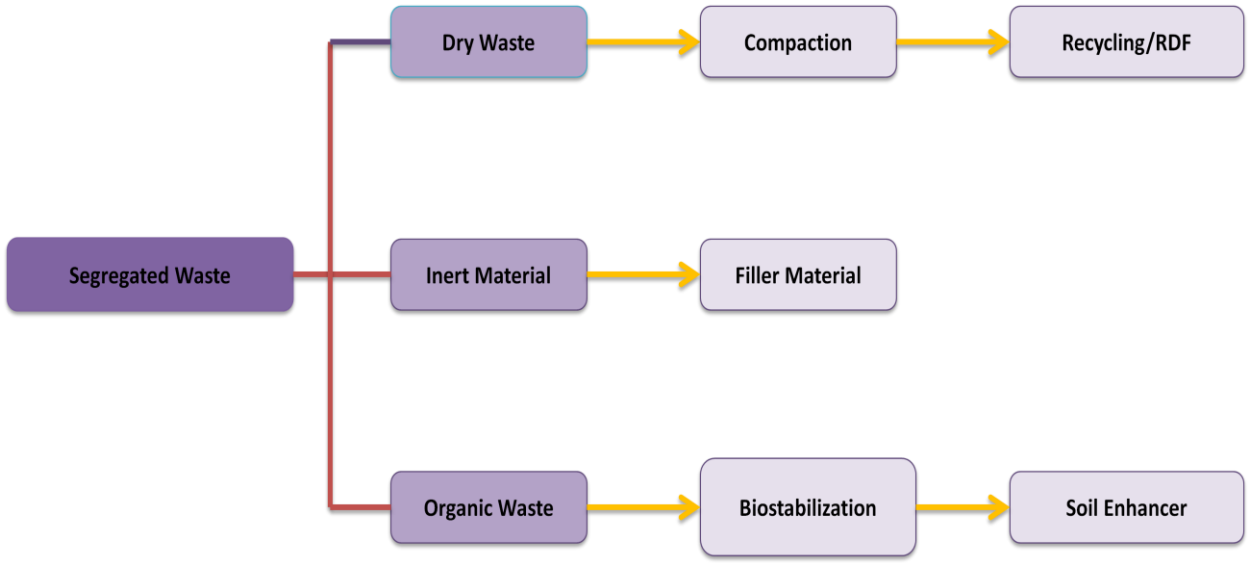
community) in the decision making, implementation, monitoring and evaluation of the programme/ initiative/ activity. He summarized the centralized and decentralized technologies using below tables.

Factors	Centralised	Decentralised
Waste quantum to be handled	For ULB centralised level	At community level
Technology applied Biodegradable waste: Dry waste: Inert waste:	Windrows/ Aerated Static Pile/large In-vessel composting/ Biomethanation Recycling/ RDF feed to Incinerator or Gasifiers Landfill disposal	Composting at my backyard: Vermicomposting/ Aerated Static pile/ Pit or bin composting/ Silo Composting Biogas or gobar gas plants or biomethantion plant upto 5 TPD capacity One common facility for management (central treatment) Landfill disposal
Community acceptance	Objection by neighbours due to noise, odour, traffic, mosquitoes and other health concerns	Management with the involvement of the community, No concerns for mosquitoes and other health related issues
Capex and Opex	High due to large area footprint, collection and transportation costs, operation cost is high	Established with minimal cost in gardens or empty municipal lands, with the help of community Operated by the monthly collection from society, from sale of recyclables
Social upliftment	Based on engineered system	Involves informal waste workers, providing them livelihood and upliftment
Innovation for technologies	Not open to new technologies, as chances of failure is high	Provides scope of innovation
Risk involved	1 private player establishes the facility and operates it. In case of failure of the system, entire management system collapses	Multiple players operate the facilities at smaller scale, where chances of failure are less. In case of failure the waste can be easily managed in other systems, or by establishing new system. Does not disturb the management of the entire ULB
PPP Model	DBOT/ DFBOT/ BOT	Build, own and operate by the community (BOO)

He made session interesting by discussing different case studies.

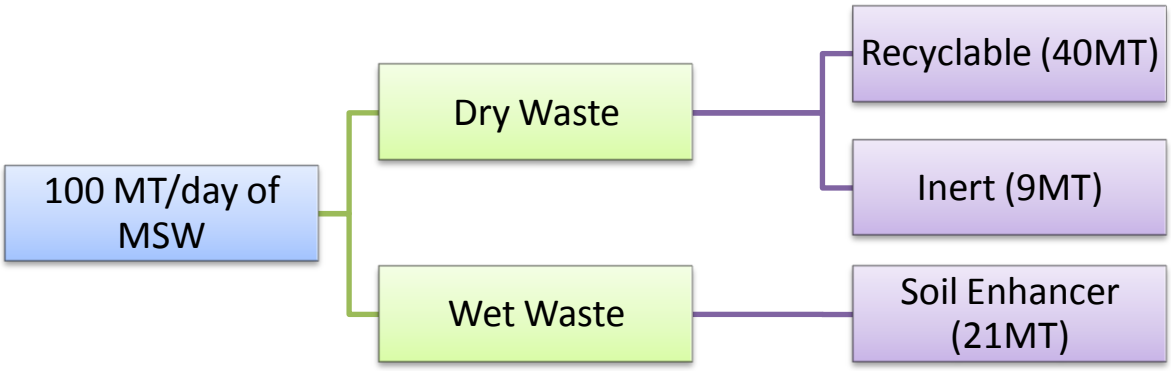
Case Study – 1: Mira Bhayandar Municipal Corporation Dry Waste:

- Integrated Municipal SWM plan for 500 MT/day of municipal waste for Mira Bhaindar Municipal Corporation (MBMC).
- MBMC waste segregation into three categories viz. Dry Waste, Inert Waste and Organic Waste and it is finally collected at the common waste disposal site at Uttan.



Case Study – 2: Naya Raipur Development Authority

- Naya Raipur is a developing planned city.
- Present population for Naya Raipur is 58464 generating approx. 24 MT of waste per day (@0.4kg/per capita waste generated).
- Based on the development plan, waste estimation for 2020 (1st developmental phase) is 180 MT.
- IMSWM design plan proposed is modular, for 100 MT, post which the facility would be expanded as per requirement.



His inputs during the session made participants to participants understand the importance of Integrated Solid Waste Management in Urban Areas. He also delivered noble talk on, "Nallah Rejuvenation" where he briefed that, rapid urbanization in the last 3-4 decades coupled with encroachments in the river area and its catchment areas along with the dumping of sewage, industrial wastewater and solid waste converted once pristine flowing river to a Nallah. Currently Mr. Jha is working on a project entitled, "Nallah Rejuvenation" at SINE, IITB, Mumbai. He mentioned that, in the first-of-its-kind river rejuvenation activity, the Panchaganga river project in Kolhapur City will

oversee the amortization of tremendous amount of polluted water and have more than 100 fall structures constructed to turn this rain side river to a perennial river.

The Valedictory Function of the Two Week Certificate Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions" was commenced on 8th December, 2018 at 4.00 pm. For this program, Prof. Ajay Deshpande from College of Agriculture, Kolhapur was invited as a Chief Guest. Dr. V. V. Karjinni, Director of KITCoE, Kolhapur was the President of the function. Ms. Kiran Kedge, Assistant Professor in the Department of Environmental Engineering hosted the function. Dr. Akshay R. Thorvat, Associate Professor and Head of Department of Environmetnal Engineering at KITCoE, Kolhapur had taken the review of Two Week Certificate Course and shared his experience during the course. Dr. Ajay Deshpande talked about the Issues related to Water and Sanitation. He briefed about the challenges that are there in front of technocrats to deal with the Water and Sanitation Problems. He mentioned that, there is a need of developing low cost and low maintenance treatment technologies so as to deal with the Water and Sanitation Problems. Dr. V. V. Karjinni, shared his experiences related to Sanitation Issues and appealed all the participants to plan their activities to solve the local level problems related to Sanitation. He also asked all the participants to plan awareness programs at various levels to develop the capacity of people, students, faculties, practioners and engineers regarding sanitation issues.

After Presidential Address, participants were invited to share their experiences during the two week certificate course. Participants had given their feedback and assured the organizers that, they will plan further activities to create awareness at local level related to sanitation. Then certificates were distributed to all the participants and the valedictory program was concluded.

Registration Details:

Two Week Certification Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions"
26th November to 8th December, 2018

ONLY CAPITAL LETTERS **Registration Details**

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Two Week Certification Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions"
26th November to 8th December, 2018

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Two Week Certification Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions"
26th November to 8th December, 2018

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29	Nikhil Dnyandeo Patil	9552952394	nikhil.patil.nd@gmail.com	
30	Keshav Padam Bagla	9168148239	baglakeshav@gmail.com	

Day wise Attendance Sheets:

KOLHAPUR INSTITUTE OF TECHNOLOGY's COLLEGE OF ENGINEERING (AUTONOMOUS), KOLHAPUR

Two Week Certification Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions"
26th November to 8th December, 2018

ATTENDANCE SHEET

Saturday, 08/12/2018

Sr. No.	Name of Participant	Session I	Session II
		Mr. Indra Kant Jha Solid Waste Management for Urban India	**Mr. Indra Kant Jha** Nallah Rejuvenation
		Signature of Participant	
1	Amruta Patil		
2	Keshav P. Bagla		
3	M. V. Kanthi		
4	Maheshwari Sawant		
5	Mandar Pawari		
6	S. Santhosh Reddy		
7	Supriya S Rajaram		
8	Vandana Pusalkar		
9	Amol Kulkarni		
10	Gayatri Karajgar		
11	Sanket Topale		
12	Shyam Desai		
13	Buddham Kamble		
14	Nikhil Patil		
15	Shriraj Naik		
16	Laxman Kawathe		
17	Sujit Kamble		
18	Siddharth Kudale		
19	Shreerang Mane		
20	Girija Mali		
21	Sakshi Thorat		
22	Harshada Vibhute		
23	Nandini Kad		
24	Vivek Raut		
25	Aarti Patil		
26	Ajim S. Sutar		
27	Dhiraj K Pawar-Medhe		
28	Shrikant Jadhav		
29	Viraj Ghantani		
30	Kunal Jagdale		

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26th November to 8th December, 2018

ATTENDANCE SHEET

Monday, 26/11/2018

Sr. No.	Name of Participant	Session I	Session II	Session III
		Dr. K. S. Lokesh Key Note Address	**Mr. Vijay Gawade** Social Mobilization for Sustainable Rural Sanitation	**Mr. Vijay Gawade** Water Audits for Urban Areas
		Signature of Participant		
1	Amruta Patil			
2	Keshav P. Bagla			
3	M. V. Kanthi			
4	Maheshwari Sawant			
5	Mandar Pawari			
6	S. Santhosh Reddy			
7	Supriya S Rajaram			
8	Vandana Pusalkar			
9	Amol Kulkarni			
10	Gayatri Karajgar			
11	Sanket Topale			
12	Shyam Desai			
13	Buddham Kamble			
14	Nikhil Patil			
15	Shriraj Naik			
16	Laxman Kawathe			
17	Sujit Kamble			
18	Siddharth Kudale			
19	Shreerang Mane			
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21	Sakshi Thorat			
22	Harshada Vibhute			
23	Nandini Kad			
24	Vivek Raut			
25	Aarti Patil			
26	Ajim S. Sutar			
27	Dhiraj K Pawar-Medhe			
28	Shrikant Jadhav			
29	Viraj Ghantani			
30	Kunal Jagdale			

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ATTENDANCE SHEET

Tuesday, 27/11/2018

Sr. No.	Name of Participant	Session I **Mr. Sanjay Nandre** Waste to Wealth	Session II **Mr. Sanjay Nandre** Low Cost Treatments of Solid Wastes	Session III **Mr. Rohit Walvekar** Tiger Bio Filter: Sustainable Sewage Treatment Technology
		Signature of Participant		
1	Amruta Patil			
2	Keshav P. Bagla			
3	M. V. Kanthi			
4	Maheshwari Sawant			
5	Mandar Pawari			
6	S. Santhosh Reddy			
7	Supriya S Rajaram			
8	Vandana Pusalkar			
9	Amol Kulkarni			
10	Gayatri Karajgar			
11	Sanket Topale			
12	Shyam Desai			
13	Buddham Kamble			
14	Nikhil Patil			
15	Shriraj Naik			
16	Laxman Kawathe			
17	Sujit Kamble			
18	Siddharth Kudale			
19	Shreerang Mane			
20	Girija Mali			
21	Sakshi Thorat			
22	Harshada Vibhute			
23	Nandini Kad			
24	Vivek Raut			
25	Aarti Patil			
26	Ajim S. Sutar			
27	Dhiraj K Pawar-Medhe			
28	Shrikant Jadhav			
29	Viraj Ghantani			
30	Kunal Jagdale			

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Two Week Certification Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions"
26th November to 8th December, 2018

ATTENDANCE SHEET

Wednesday, 28/11/2018

Sr. No.	Name of Participant	Session I	Session II
		Site Visit I Waste to Energy Plant	**Site Visit II** Sewage Treatment Plant
		Signature of Participant	
1	Amruta Patil		
2	Keshav P. Bagla		
3	M. V. Kanthi		
4	Maheshwari Sawant		
5	Mandar Pawari		
6	S. Santhosh Reddy		
7	Supriya S Rajaram		
8	Vandana Pusalkar		
9	Amol Kulkarni		
10	Gayatri Karajgar		
11	Sanket Topale		
12	Shyam Desai		
13	Buddham Kamble		
14	Nikhil Patil		
15	Shriraj Naik		
16	Laxman Kawathe		
17	Sujit Kamble		
18	Siddharth Kudale		
19	Shreerang Mane		
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25	Aarti Patil		
26	Ajim S. Sutar		
27	Dhiraj K Pawar-Medhe		
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29	Viraj Ghantani		
30	Kunal Jagdale		

KOLHAPUR INSTITUTE OF TECHNOLOGY's COLLEGE OF ENGINEERING (AUTONOMOUS), KOLHAPUR

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ATTENDANCE SHEET

Thursday, 29/11/2018

Sr. No.	Name of Participant	Session I	Session II
		Site Visit III Faecal Sludge Treatment Plant at Wai	Demonstration of Scheduled Desludging Operation at Wai
		Signature of Participant	
1	Amruta Patil		
2	Keshav P. Bagla		
3	M. V. Kanthi		
4	Maheshwari Sawant		
5	Mandar Pawari		
6	S. Santhosh Reddy		
7	Supriya S Rajaram		
8	Vandana Pusalkar		
9	Amol Kulkarni		
10	Gayatri Karajgar		
11	Sanket Topale		
12	Shyam Desai		
13	Buddham Kamble		
14	Nikhil Patil		
15	Shriraj Naik		
16	Laxman Kawathe		
17	Sujit Kamble		
18	Siddharth Kudale		
19	Shreerang Mane		
20	Girija Mali		
21	Sakshi Thorat		
22	Harshada Vibhute		
23	Nandini Kad		
24	Vivek Raut		
25	Aarti Patil		
26	Ajim S. Sutar		
27	Dhiraj K Pawar-Medhe		
28	Shrikant Jadhav		
29	Viraj Ghantani		
30	Kunal Jagdale		

KOLHAPUR INSTITUTE OF TECHNOLOGY's COLLEGE OF ENGINEERING (AUTONOMOUS), KOLHAPUR

Two Week Certification Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions"
26th November to 8th December, 2018

ATTENDANCE SHEET

Friday, 30/11/2018

Sr. No.	Name of Participant	Session I	Session II	Session III
		Mr. Saurabh Kale and Mr. Dhawal Patil	Mr. Saurabh Kale	Mr. Saurabh Kale and Mr. Dhawal Patil
		Signature of Participant		
1	Amruta Patil			
2	Keshav P. Bagla			
3	M. V. Kanthi			
4	Maheshwari Sawant			
5	Mandar Pawari			
6	S. Santhosh Reddy			
7	Supriya S Rajaram			
8	Vandana Pusalkar			
9	Amol Kulkarni			
10	Gayatri Karajgar			
11	Sanket Topale			
12	Shyam Desai			
13	Buddham Kamble			
14	Nikhil Patil			
15	Shriraj Naik			
16	Laxman Kawathe			
17	Sujit Kamble			
18	Siddharth Kudale			
19	Shreerang Mane			
20	Girija Mali			
21	Sakshi Thorat			
22	Harshada Vibhute			
23	Nandini Kad			
24	Vivek Raut			
25	Aarti Patil			
26	Ajim S. Sutar			
27	Dhiraj K Pawar-Medhe			
28	Shrikant Jadhav			
29	Viraj Ghantani			
30	Kunal Jagdale			

KOLHAPUR INSTITUTE OF TECHNOLOGY's COLLEGE OF ENGINEERING (AUTONOMOUS), KOLHAPUR

Two Week Certification Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions"
26th November to 8th December, 2018

ATTENDANCE SHEET

Saturday, 01/12/2018

Sr. No.	Name of Participant	Session I	Session II	Session III
		Mr. Dhawal Patil Faecal Sludge Treatment - I	**Mr. Dhawal Patil** Faecal Sludge Treatment - II	**Mr. Dhawal Patil and Mr. Saurabh Kale** Group Work - Designing of FSTP Components
		Signature of Participant		
1	Amruta Patil			
2	Keshav P. Bagla			
3	M. V. Kanthi			
4	Maheshwari Sawant			
5	Mandar Pawari			
6	S. Santhosh Reddy			
7	Supriya S Rajaram			
8	Vandana Pusalkar			
9	Amol Kulkarni			
10	Gayatri Karajgar			
11	Sanket Topale			
12	Shyam Desai			
13	Buddham Kamble			
14	Nikhil Patil			
15	Shriraj Naik			
16	Laxman Kawathe			
17	Sujit Kamble			
18	Siddharth Kudale			
19	Shreerang Mane			
20	Girija Mali			
21	Sakshi Thorat			
22	Harshada Vibhute			
23	Nandini Kad			
24	Vivek Raut			
25	Aarti Patil			
26	Ajim S. Sutar			
27	Dhiraj K Pawar-Medhe			
28	Shrikant Jadhav			
29	Viraj Ghantani			
30	Kunal Jagdale			

KOLHAPUR INSTITUTE OF TECHNOLOGY's COLLEGE OF ENGINEERING (AUTONOMOUS), KOLHAPUR

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ATTENDANCE SHEET

Monday, 03/12/2018

Sr. No.	Name of Participant	Session I **Dr. M. R. Patil** Integrated Rain Water Harvesting	Session II **Dr. M. R. Patil** Integrated Solid Waste Management	Session III **Mr. Rohit Walvekar** Sewage Collection and Treatment
		Signature of Participant		
1	Amruta Patil			
2	Keshav P. Bagla			
3	M. V. Kanthi			
4	Maheshwari Sawant			
5	Mandar Pawari			
6	S. Santhosh Reddy			
7	Supriya S Rajaram			
8	Vandana Pusalkar			
9	Amol Kulkarni			
10	Gayatri Karajgar			
11	Sanket Topale			
12	Shyam Desai			
13	Buddham Kamble			
14	Nikhil Patil			
15	Shriraj Naik			
16	Laxman Kawathe			
17	Sujit Kamble			
18	Siddharth Kudale			
19	Shreerang Mane			
20	Girija Mali			
21	Sakshi Thorat			
22	Harshada Vibhute			
23	Nandini Kad			
24	Vivek Raut			
25	Aarti Patil			
26	Ajim S. Sutar			
27	Dhiraj K Pawar-Medhe			
28	Shrikant Jadhav			
29	Viraj Ghantani			
30	Kunal Jagdale			

KOLHAPUR INSTITUTE OF TECHNOLOGY's COLLEGE OF ENGINEERING (AUTONOMOUS), KOLHAPUR

Two Week Certification Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions"
26th November to 8th December, 2018

ATTENDANCE SHEET

Tuesday, 04/12/2018

Sr. No.	Name of Participant	Session I	Session II	Session III
		Dr. G. R. Munavalli Low Cost Water Treatment	**Dr. G. R. Munavalli** Decentralized Sewage Treatment	**Mr. A. A. Katkar & Mr. B. C. Ingavale** City Sanitation Plan of Kolhapur City: A Case Study
		Signature of Participant		
1	Amruta Patil			
2	Keshav P. Bagla			
3	M. V. Kanthi			
4	Maheshwari Sawant			
5	Mandar Pawari			
6	S. Santhosh Reddy			
7	Supriya S Rajaram			
8	Vandana Pusalkar			
9	Amol Kulkarni			
10	Gayatri Karajgar			
11	Sanket Topale			
12	Shyam Desai			
13	Buddham Kamble			
14	Nikhil Patil			
15	Shriraj Naik			
16	Laxman Kawathe			
17	Sujit Kamble			
18	Siddharth Kudale			
19	Shreerang Mane			
20	Girija Mali			
21	Sakshi Thorat			
22	Harshada Vibhute			
23	Nandini Kad			
24	Vivek Raut			
25	Aarti Patil			
26	Ajim S. Sutar			
27	Dhiraj K Pawar-Medhe			
28	Shrikant Jadhav			
29	Viraj Ghantani			
30	Kunal Jagdale			

KOLHAPUR INSTITUTE OF TECHNOLOGY's COLLEGE OF ENGINEERING (AUTONOMOUS), KOLHAPUR

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ATTENDANCE SHEET

Wednesday, 05/12/2018

Sr. No.	Name of Participant	Session I	Session II	Session III
		Mr. Ashish Deosthali Environmentally Sustainable Development of Villages	**Mr. Ashish Deosthali** National Urban Sanitation Policy for City Sanitation Plan	**Mr. S. S. Shaha** Demonstration Session – II: Case Study
		Signature of Participant		
1	Amruta Patil			
2	Keshav P. Bagla			
3	M. V. Kanthi			
4	Maheshwari Sawant			
5	Mandar Pawari			
6	S. Santhosh Reddy			
7	Supriya S Rajaram			
8	Vandana Pusalkar			
9	Amol Kulkarni			
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11	Sanket Topale			
12	Shyam Desai			
13	Buddham Kamble			
14	Nikhil Patil			
15	Shriraj Naik			
16	Laxman Kawathe			
17	Sujit Kamble			
18	Siddharth Kudale			
19	Shreerang Mane			
20	Girija Mali			
21	Sakshi Thorat			
22	Harshada Vibhute			
23	Nandini Kad			
24	Vivek Raut			
25	Aarti Patil			
26	Ajim S. Sutar			
27	Dhiraj K Pawar-Medhe			
28	Shrikant Jadhav			
29	Viraj Ghantani			
30	Kunal Jagdale			

KOLHAPUR INSTITUTE OF TECHNOLOGY's COLLEGE OF ENGINEERING (AUTONOMOUS), KOLHAPUR

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ATTENDANCE SHEET

Thursday, 06/12/2018

Sr. No.	Name of Participant	Session I	Session II
		Site Visit IV Common Effluent Treatment Plant (CETP), Five Star MIDC, Kagal	**Site Visit V** Kirloskar Oil Engines Ltd., Five Star MIDC, Kagal
		Signature of Participant	
1	Amruta Patil		
2	Keshav P. Bagla		
3	M. V. Kanthi		
4	Maheshwari Sawant		
5	Mandar Pawari		
6	S. Santhosh Reddy		
7	Supriya S Rajaram		
8	Vandana Pusalkar		
9	Amol Kulkarni		
10	Gayatri Karajgar		
11	Sanket Topale		
12	Shyam Desai		
13	Buddham Kamble		
14	Nikhil Patil		
15	Shriraj Naik		
16	Laxman Kawathe		
17	Sujit Kamble		
18	Siddharth Kudale		
19	Shreerang Mane		
20	Girija Mali		
21	Sakshi Thorat		
22	Harshada Vibhute		
23	Nandini Kad		
24	Vivek Raut		
25	Aarti Patil		
26	Ajim S. Sutar		
27	Dhiraj K Pawar-Medhe		
28	Shrikant Jadhav		
29	Viraj Ghantani		
30	Kunal Jagdale		

KOLHAPUR INSTITUTE OF TECHNOLOGY's COLLEGE OF ENGINEERING (AUTONOMOUS), KOLHAPUR

Two Week Certification Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions"
26th November to 8th December, 2018

ATTENDANCE SHEET

Friday, 07/12/2018

Sr. No.	Name of Participant	Session I	Session II	Session III
		Mr. R. A. Nikam Sanitation Requirements, Concepts and Principles	~~**Mr. B. C. Ingavale**~~ Demonstration Session – III: Laboratory Work: Water Quality Monitoring	**Mr. S. S. Shaha** Demonstration Session – IV: Laboratory Work: Wastewater Analysis
		Signature of Participant		
1	Amruta Patil			
2	Keshav P. Bagla			
3	M. V. Kanthi			
4	Maheshwari Sawant			
5	Mandar Pawari			
6	S. Santhosh Reddy			
7	Supriya S Rajaram			
8	Vandana Pusalkar			
9	Amol Kulkarni			
10	Gayatri Karajgar			
11	Sanket Topale			
12	Shyam Desai			
13	Buddham Kamble			
14	Nikhil Patil			
15	Shriraj Naik			
16	Laxman Kawathe			
17	Sujit Kamble			
18	Siddharth Kudale			
19	Shreerang Mane			
20	Girija Mali			
21	Sakshi Thorat			
22	Harshada Vibhute			
23	Nandini Kad			
24	Vivek Raut			
25	Aarti Patil			
26	Ajim S. Sutar			
27	Dhiraj K Pawar-Medhe			
28	Shrikant Jadhav			
29	Viraj Ghantani			
30	Kunal Jagdale			

Feedback Forms (Sample):

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur (25)
DEPARTMENT OF ENVIRONMENTAL ENGINEERING

Certificate Course Feedback Form

Course Title: Two Week Certification Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions"

Date: 26th November to 8th December, 2018 **Venue:** KITCoE, Kolhapur

Please fill the short questionnaire to make the course better.

Your background:

Name: Mr. M.J. Pawar Designation: Asst. Prof.

Organization: MPCOE, Velneshwar,

Contact No.: 9689073633 Email: mandarjpawar@gmail.com.

Your Highest Qualifications: Diploma/ Degree/ ME/ MTech/ PhD

ME

THE DESIGN OF THE COURSE

A. Were objectives of the course clear to you? Y ☑ / N ☐

B. The course contents met with your expectations
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 4

C. The lecture sequence was well planned
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 3

D. The contents were illustrated with
1. Too few examples 2. Adequate examples — 1

E. The level of the course was
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 4

F. The Site Exposure Visits and Laboratory Demonstrations were
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 4

G. The course exposed you to new knowledge and practices
1. Strongly disagree 2. Strongly agree — 2

H. Will you recommend this course to your colleagues?
1. Not at all 2. Very strongly — 2

THE CONDUCT OF THE COURSE

A. The lectures were clear and easy to understand
1. Strongly disagree 2. Strongly agree — 2

B. The teaching aids were effectively used
1. Strongly disagree 2. Strongly agree — 2

C. The course material handed out was adequate
1. Strongly disagree 2. Strongly agree — 2

D. The instructors encouraged interaction and were helpful
1. Strongly disagree 2. Strongly agree — 2

E. Were objectives of the course realized? Y ☑ / N ☐

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DEPARTMENT OF ENVIRONMENTAL ENGINEERING

F. How was the Food Quality and Hospitality 5++

5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor

G. Please give overall rating of the course

90% - 100%	( )	60% - 70%	( )
80% - 90%	( )	50% - 60%	( )
70% - 80%	(✓)	below 50%	( )

Please comment on the strengths of the course and the way it was conducted.

① Speakers having good knowledge of Topic.
② Site visits are excellent.
③ Food and hospitality also excellent.
④ New topic of fecal and Septage managent.

Please comment on the weaknesses of the course and the way it was conducted.

① Topic should be separated as per - wastewater, water, solid waste, Feacal and Septage. and Air pollution managent.
② Every topic should show some live videos of case studies (min - 3)

Please give suggestions for the improvement of the course.

① Some lectr. on Air pollution and Air quality monitoring also be Include.
② Software use for water and wastewater system design should also Include.

Thank you for your valuable feedback!!

08/12/18

Name and Signature with Date

mr. MJ Pawar

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DEPARTMENT OF ENVIRONMENTAL ENGINEERING

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Certificate Course Feedback Form

Course Title: Two Week Certification Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions"

Date: 26th November to 8th December, 2018 **Venue:** KITCoE, Kolhapur

Please fill the short questionnaire to make the course better.

Your background:

Name: Amruta D. Patil Designation: Ass. professor

Organization: Dr. D. Y. Patil Pratishtha's College of Engg. Salokhenagar, Kolhapur

Contact No.: 7588256519 Email: amrutapatil9890@gmail.com

Your Highest Qualifications: Diploma/ Degree/ ME/ MTech/ PhD ✓

THE DESIGN OF THE COURSE

A. Were objectives of the course clear to you? Y ☑ / N ☐

B. The course contents met with your expectations
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 4

C. The lecture sequence was well planned
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 5

D. The contents were illustrated with
1. Too few examples 2. Adequate examples — 2

E. The level of the course was
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 5

F. The Site Exposure Visits and Laboratory Demonstrations were
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 5

G. The course exposed you to new knowledge and practices
1. Strongly disagree 2. Strongly agree — 2

H. Will you recommend this course to your colleagues?
1. Not at all 2. Very strongly — 2

THE CONDUCT OF THE COURSE

A. The lectures were clear and easy to understand
1. Strongly disagree 2. Strongly agree — 2

B. The teaching aids were effectively used
1. Strongly disagree 2. Strongly agree — 2

C. The course material handed out was adequate
1. Strongly disagree 2. Strongly agree — 2

D. The instructors encouraged interaction and were helpful
1. Strongly disagree 2. Strongly agree — 2

E. Were objectives of the course realized? Y ☑ / N ☐

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DEPARTMENT OF ENVIRONMENTAL ENGINEERING

F. How was the Food Quality and Hospitality [4]

5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor

G. Please give overall rating of the course

90% - 100%	(✓)	60% - 70%	( )
80% - 90%	( )	50% - 60%	( )
70% - 80%	( )	below 50%	( )

Please comment on the strengths of the course and the way it was conducted.

- New ideas & concepts
- Advanced existing technologies
- Appropriate knowledge
- visit concepts
- Demonstrations of lab work.

Please comment on the weaknesses of the course and the way it was conducted.

- Nil...

Please give suggestions for the improvement of the course.

Thank you for your valuable feedback!!

(18/9/18)
Amruta D Pathj
Name and Signature with Date

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Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur
DEPARTMENT OF ENVIRONMENTAL ENGINEERING

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Certificate Course Feedback Form

Course Title: Two Week Certification Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions"

Date: 26th November to 8th December, 2018 **Venue:** KITCoE, Kolhapur

Please fill the short questionnaire to make the course better.

Your background:

Name: S.Santhosh Reddy Designation: Asst. Professor

Organization: Navasahaydri College of Engineering.

Contact No.: 9763606305 Email: Santhureddy13@gmail.com

Your Highest Qualifications: Diploma/ Degree/ ME/ MTech/ PhD

MTech.

THE DESIGN OF THE COURSE

A. Were objectives of the course clear to you? Y ☑ / N ☐

B. The course contents met with your expectations
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 5

C. The lecture sequence was well planned
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 4

D. The contents were illustrated with
1. Too few examples 2. Adequate examples — 1

E. The level of the course was
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 5

F. The Site Exposure Visits and Laboratory Demonstrations were
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 4

G. The course exposed you to new knowledge and practices
1. Strongly disagree 2. Strongly agree — 2

H. Will you recommend this course to your colleagues?
1. Not at all 2. Very strongly — 2

THE CONDUCT OF THE COURSE

A. The lectures were clear and easy to understand
1. Strongly disagree 2. Strongly agree — 2

B. The teaching aids were effectively used
1. Strongly disagree 2. Strongly agree — 2

C. The course material handed out was adequate
1. Strongly disagree 2. Strongly agree — 2

D. The instructors encouraged interaction and were helpful
1. Strongly disagree 2. Strongly agree — 2

E. Were objectives of the course realized? Y ☑ / N ☐

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DEPARTMENT OF ENVIRONMENTAL ENGINEERING

F. How was the Food Quality and Hospitality [5]

5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor

G. Please give overall rating of the course

90% - 100%	(✓)	60% - 70%	( )
80% - 90%	( )	50% - 60%	( )
70% - 80%	( )	below 50%	( )

Please comment on the strengths of the course and the way it was conducted.

The Discussions Done in the Course were very Good & New Techniques were known clearly. ② Hospatallity arranged was very Good.

Please comment on the weaknesses of the course and the way it was conducted.

Duration of Time was less, Resource Persons Could not been cover the Content in the prescribed Time

Please give suggestions for the improvement of the course.

① Introduce Technical Training courses, that should be job oriented after the completing of the course.

Thank you for your valuable feedback!!

S. Santhosh Reddy.

8/12/18.

Name and Signature with Date

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DEPARTMENT OF ENVIRONMENTAL ENGINEERING

(11)

Certificate Course Feedback Form

Course Title: Two Week Certification Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions"

Date: 26th November to 8th December, 2018 **Venue:** KITCoE, Kolhapur

Please fill the short questionnaire to make the course better.

Your background:

Name: Supriya D. Rajaram Designation: Asst. Prof.

Organization: Sant Gajanan Maharaj College of Engineering Mahagaon.

Contact No.: 9421781386 Email: Supriyarajaram123@gmail.com

Your Highest Qualifications: Diploma/ Degree/ ME/ MTech/ PhD

THE DESIGN OF THE COURSE

A. Were objectives of the course clear to you? Y ☑ / N ☐

B. The course contents met with your expectations
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 5

C. The lecture sequence was well planned
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 4

D. The contents were illustrated with
1. Too few examples 2. Adequate examples — 2

E. The level of the course was
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 5

F. The Site Exposure Visits and Laboratory Demonstrations were
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 5

G. The course exposed you to new knowledge and practices
1. Strongly disagree 2. Strongly agree — 2

H. Will you recommend this course to your colleagues?
1. Not at all 2. Very strongly — 2

THE CONDUCT OF THE COURSE

A. The lectures were clear and easy to understand
1. Strongly disagree 2. Strongly agree — 2

B. The teaching aids were effectively used
1. Strongly disagree 2. Strongly agree — 2

C. The course material handed out was adequate
1. Strongly disagree 2. Strongly agree — 2

D. The instructors encouraged interaction and were helpful
1. Strongly disagree 2. Strongly agree — 2

E. Were objectives of the course realized? Y ☑ / N ☐

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DEPARTMENT OF ENVIRONMENTAL ENGINEERING

F. How was the Food Quality and Hospitality [5]

5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor

G. Please give overall rating of the course

90% - 100%	(✓)	60% - 70%	( )
80% - 90%	( )	50% - 60%	( )
70% - 80%	( )	below 50%	( )

Please comment on the strengths of the course and the way it was conducted.

- The course was very effectively planned & excuted.
- The excellent Speakers were invitied how have provided us a very good practical & theortical knowledge
- The hospitality was also good.

Please comment on the weaknesses of the course and the way it was conducted.

Please give suggestions for the improvement of the course.

Thank you for your valuable feedback!!

8/12/18

Name and Signature with Date

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Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur (7)
DEPARTMENT OF ENVIRONMENTAL ENGINEERING

Certificate Course Feedback Form

Course Title: Two Week Certification Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions"

Date: 26th November to 8th December, 2018 **Venue:** KITCoE, Kolhapur

Please fill the short questionnaire to make the course better.

Your background:

Name: Ajim Sutar Designation: Assistant Professor.

Organization: D.Y. Patil College of Engg. & Technology, Kasba-Bavada.

Contact No.: 9834294437. Email: ajimsutar@yahoo.in

Your Highest Qualifications: Diploma/ Degree/ ME/ MTech/ PhD , M.B.A.

THE DESIGN OF THE COURSE

A. Were objectives of the course clear to you? Y ☑ / N ☐

B. The course contents met with your expectations
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 4

C. The lecture sequence was well planned
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 4

D. The contents were illustrated with
1. Too few examples 2. Adequate examples — 1

E. The level of the course was
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 4

F. The Site Exposure Visits and Laboratory Demonstrations were
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 4

G. The course exposed you to new knowledge and practices
1. Strongly disagree 2. Strongly agree — 2

H. Will you recommend this course to your colleagues?
1. Not at all 2. Very strongly — 2

THE CONDUCT OF THE COURSE

A. The lectures were clear and easy to understand
1. Strongly disagree 2. Strongly agree — 2

B. The teaching aids were effectively used
1. Strongly disagree 2. Strongly agree — 2

C. The course material handed out was adequate
1. Strongly disagree 2. Strongly agree — 2

D. The instructors encouraged interaction and were helpful
1. Strongly disagree 2. Strongly agree — 2

E. Were objectives of the course realized? Y ☑ / N ☐

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Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur
DEPARTMENT OF ENVIRONMENTAL ENGINEERING

F. How was the Food Quality and Hospitality [5]

5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor

G. Please give overall rating of the course

90% - 100%	( )	60% - 70%	( )
80% - 90%	( )	50% - 60%	( )
70% - 80%	(✓)	below 50%	( )

Please comment on the strengths of the course and the way it was conducted.

1) Few topics like FSSM, tiger biofilters & toilets, were really new.
2) Resource persons were actually apt.

Please comment on the weaknesses of the course and the way it was conducted.

1) Repetition of few topics
2) Site visits could be diversified and elaborative
3) Less approach towards software use.

Please give suggestions for the improvement of the course.

1) Must include software approach & handson.
2) ~~Rep~~

Thank you for your valuable feedback!!

Name and Signature with Date
Ajin Sutar
08/12/2018

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Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur
DEPARTMENT OF ENVIRONMENTAL ENGINEERING

(1)

Certificate Course Feedback Form

Course Title: Two Week Certification Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions"

Date: 26th November to 8th December, 2018 **Venue:** KITCoE, Kolhapur

Please fill the short questionnaire to make the course better.

Your background:

Name: Ar. Vandana D. Pusalkar Designation: Assistant Professor

Organization: S.P.S.M.B.H's. College of Architecture, Kolhapur.

Contact No.: 9923385005 Email: vandana.pusalkar@gmail.com

Your Highest Qualifications: Diploma/ Degree/ ME/ MTech/ PhD

M. Arch (General) Pursuing PhD from VTU, Belgavi

THE DESIGN OF THE COURSE

A. Were objectives of the course clear to you? Y ☑ / N ☐

B. The course contents met with your expectations
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 5

C. The lecture sequence was well planned
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 3

D. The contents were illustrated with
1. Too few examples 2. Adequate examples — 2

E. The level of the course was
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 4

F. The Site Exposure Visits and Laboratory Demonstrations were
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 5

G. The course exposed you to new knowledge and practices
1. Strongly disagree 2. Strongly agree — 2

H. Will you recommend this course to your colleagues?
1. Not at all 2. Very strongly — 2

THE CONDUCT OF THE COURSE

A. The lectures were clear and easy to understand
1. Strongly disagree 2. Strongly agree — 2

B. The teaching aids were effectively used
1. Strongly disagree 2. Strongly agree — 2

C. The course material handed out was adequate
1. Strongly disagree 2. Strongly agree — 2

D. The instructors encouraged interaction and were helpful
1. Strongly disagree 2. Strongly agree — 2

E. Were objectives of the course realized? Y ☑ / N ☐

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Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur
DEPARTMENT OF ENVIRONMENTAL ENGINEERING

F. How was the Food Quality and Hospitality [5]

5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor

G. Please give overall rating of the course

90% - 100%	(✓)	60% - 70%	( )
80% - 90%	( )	50% - 60%	( )
70% - 80%	( )	below 50%	( )

Please comment on the strengths of the course and the way it was conducted.

Overall exposure to Sanitation and Envi. Engg. all issues, problems and Best possible solutions. Economic feasibility of the projects, funding agencies and role and responsibilities of every citizen.

Please comment on the weaknesses of the course and the way it was conducted.

It was very well thought and executed.
No weaknesses.

Please give suggestions for the improvement of the course.

Landscape planners, Urban designers those are doing environmental related projects should be invited, ecologist also will help to enrich this course.

Thank you for your valuable feedback!!

8/12/2018
Ar. Vandana. Dhaval Purohit
Name and Signature with Date

Supported by National Institute of Urban Affairs (NIUA), New Delhi under Sanitation Capacity Building Platform

(2)

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur
DEPARTMENT OF ENVIRONMENTAL ENGINEERING

Certificate Course Feedback Form

Course Title: Two Week Certification Course on "Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions"

Date: 26th November to 8th December, 2018 **Venue:** KITCoE, Kolhapur

Please fill the short questionnaire to make the course better.

Your background:

Name: MAHANTESH V KANTHI Designation: ASSOCIATE PROFESSOR.

Organization: ANGADI INSTITUTE OF TECHNOLOGY & MANAGEMENT BELAGAVI

Contact No.: 9343487323 Email: mvkanthi65@gmail.com

Your Highest Qualifications: Diploma/ Degree/ ME/ MTech/ PhD

THE DESIGN OF THE COURSE

A. Were objectives of the course clear to you? Y ☑ / N ☐

B. The course contents met with your expectations
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 5

C. The lecture sequence was well planned
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 5

D. The contents were illustrated with
1. Too few examples 2. Adequate examples — 2

E. The level of the course was
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 5

F. The Site Exposure Visits and Laboratory Demonstrations were
5: Excellent, 4: Very good, 3: Good, 2: Satisfactory, 1: Poor — 5

G. The course exposed you to new knowledge and practices
1. Strongly disagree 2. Strongly agree — 2

H. Will you recommend this course to your colleagues?
1. Not at all 2. Very strongly — 2

THE CONDUCT OF THE COURSE

A. The lectures were clear and easy to understand
1. Strongly disagree 2. Strongly agree — 2

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C. The course material handed out was adequate
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E. Were objectives of the course realized? Y ☑ / N ☐

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Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur
DEPARTMENT OF ENVIRONMENTAL ENGINEERING

F. How was the Food Quality and Hospitality [5]

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90% - 100%	( )	60% - 70%	( )
80% - 90%	(✓)	50% - 60%	( )
70% - 80%	( )	below 50%	( )

Please comment on the strengths of the course and the way it was conducted.

1) SELECTION OF COURSECONTENT
2) SELECTION OF RESOURCE PERSON.
3) ARRANGEMENT OF HALL & PRESENTATION.
4) HOSPITALITY

Please comment on the weaknesses of the course and the way it was conducted.

ACTIVITY SESSIONS

Please give suggestions for the improvement of the course.

TIE UP WITH CAREER PROVIDE ORGANISATION.

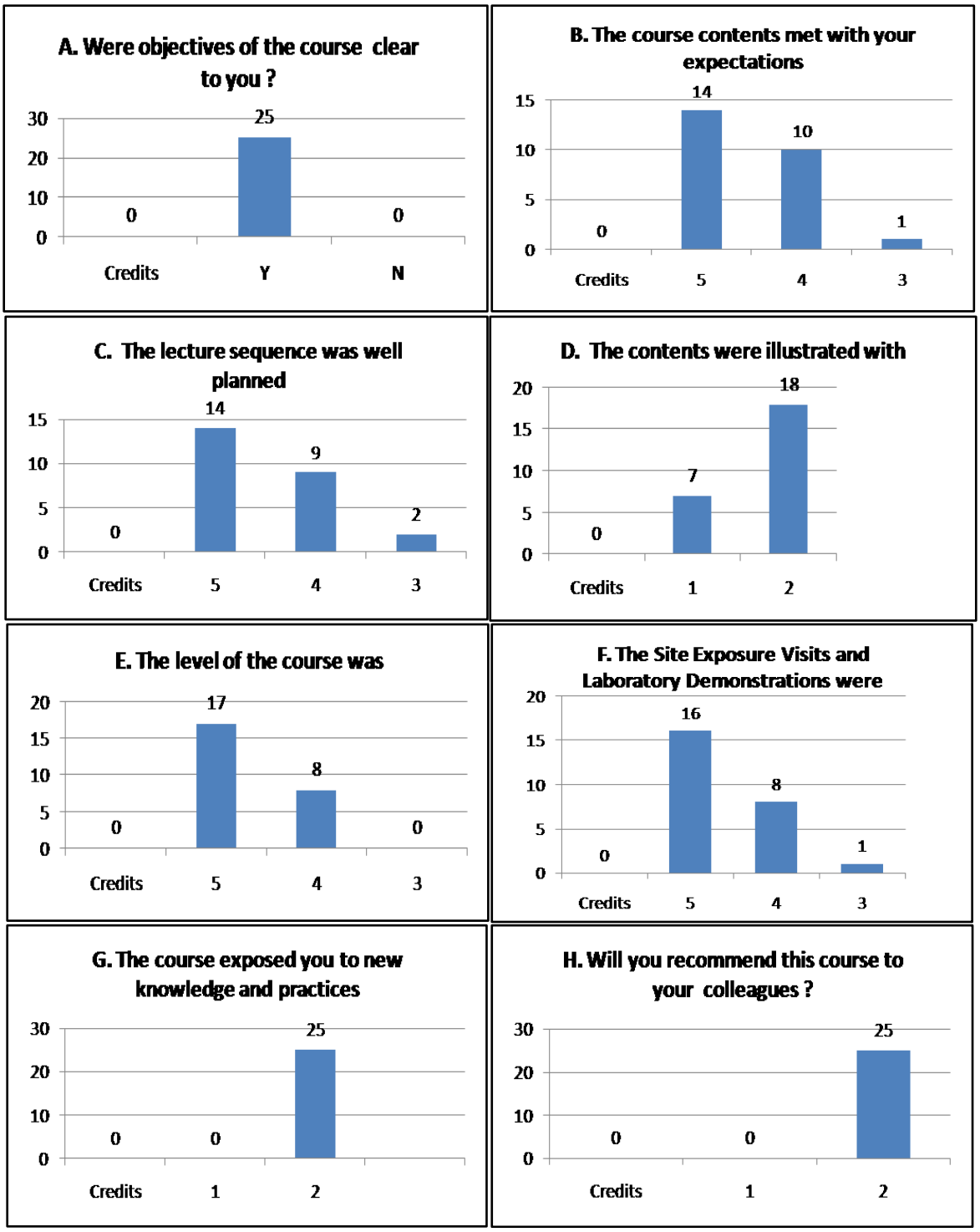
Thank you for your valuable feedback!!

8/12/2018
(M.V. Kamthi)
Name and Signature with Date

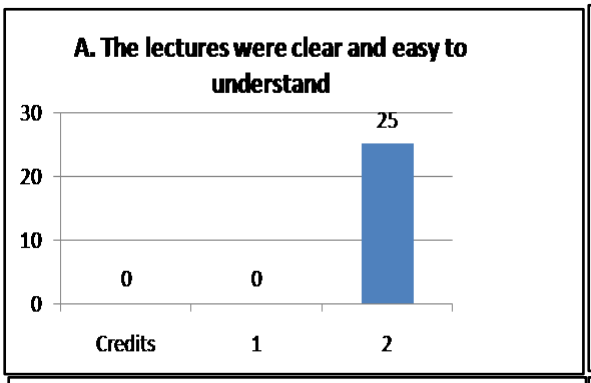
Supported by National Institute of Urban Affairs (NIUA), New Delhi under Sanitation Capacity Building Platform

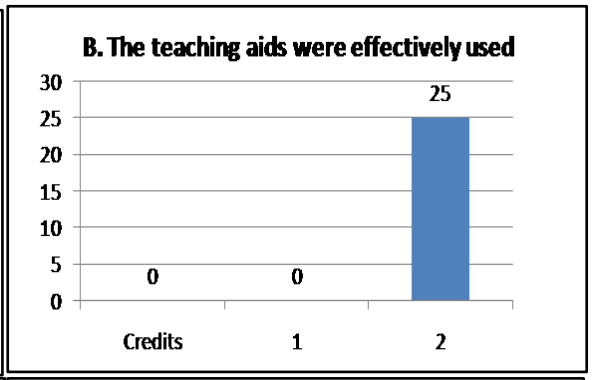
Feedback Report (Graphical):

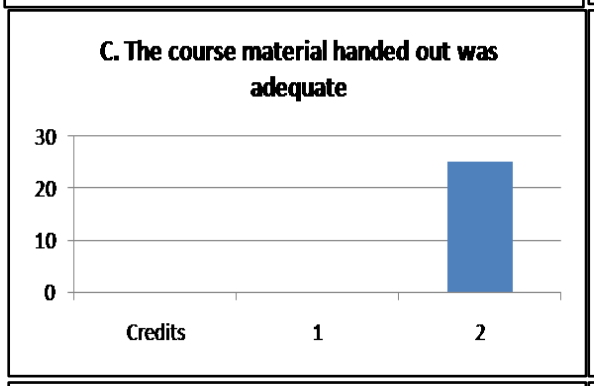
1. **The Design of the Course:**

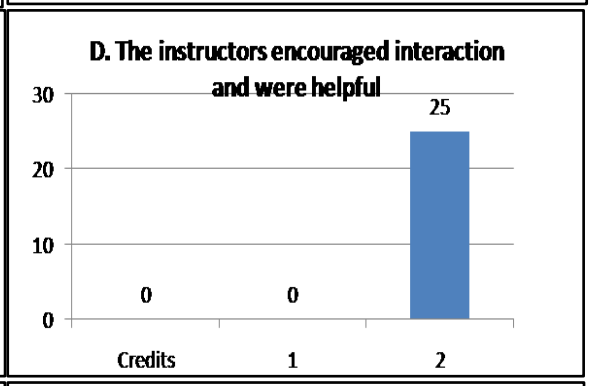


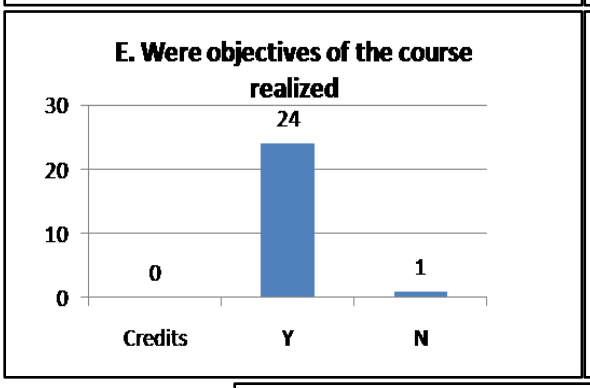
2. The Conduct of the Course:

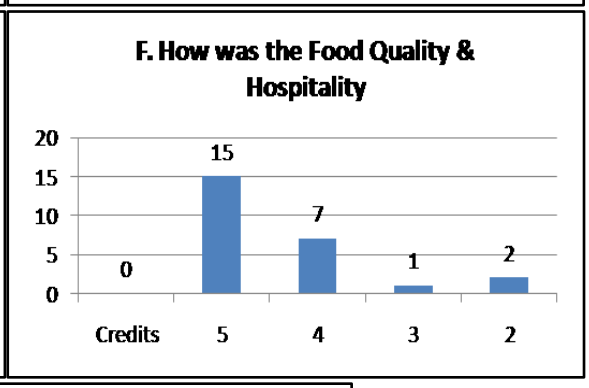


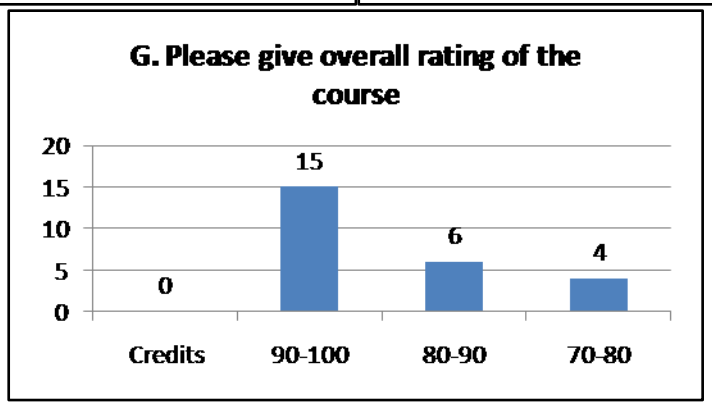












Sample Certificate:

National Institute of Urban Affairs

SCBP

KOLHAPUR INSTITUTE OF TECHNOLOGY'S COLLEGE OF ENGINEERING (AUTONOMOUS), KOLHAPUR

Certificate

This is to certify that Vivek Ramchandra Raut from Kalpataru Group of Services Pvt. Ltd. has successfully completed Two Week Certification Course on **'Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions'** under Sanitation Capacity Building Platform (SCBP) jointly organized by National Institute of Urban Affairs (NIUA), New Delhi and Department of Environmental Engineering, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur from 26th November to 8th December, 2018.

Dr. A. R. Thorvat
Nodal Faculty and Head
Department of Environmental Engineering

Dr. V. V. Karjinni
Director,
KIT CoE, Kolhapur

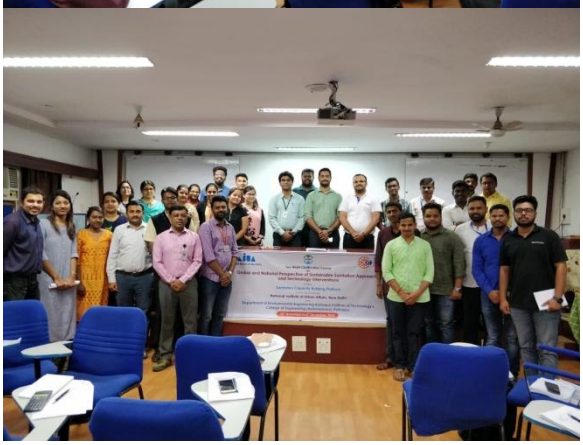
Mr. D. S. Kapur
Team Lead SCBP
NIUA, New Delhi

Photographs during the Two Week Course:








KIT
COLLEGE OF ENGINEERING
Shot on OnePlus



Shot on OnePlus
By Shreerang Mane


Shot on OnePlus
By Shreerang Mane


CITY SANITATION PLAN


KOLH


Present Status
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Technology
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Urban India
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on
Global and National Perspective of Sustainable Sanitation Approaches
and Technology Interventions'