Summary Report

About Department/Center/School: *The School of Water Resources was established in 2008. The School offered an M. Tech. Programme in Water Management for the period 2008-2014. This programme has been revised very recently, and from 2014 onwards, the school will now be offering M. Tech. in Water Engineering and Management. The main aim of the school is to profess the students with integrated and interdisciplinary approaches of water management involving hydrological, biophysical, chemical, economic, institutional, legal, and policy-planning aspects, to solve the ever-growing set of water-related challenges in industry, agriculture, and domestic sectors. The Programme is intended for professionals and researchers from a wide range of backgrounds. It aims to develop knowledge, insight and skills required to design, implement and evaluate water management policies and strategies. Graduates will be able to promote the judicious use of water and achieve effective governance of water resources.*

1. **Academic Programs (Range of Degrees and Disciplines):**
   - *i)* ***M.Tech.+Ph.D.*** *in Water Engineering and Management – 2 years' MTech followed by an optional enrolment in the Ph.D progrmme*
   - *ii)* ***Ph.D*** *in water related research involving quality, quantity and management aspects.*

2. **Major 4-5 Thrust Areas of Research:** *River basin planning and management (considering the aspects of flood, drought or contaminant); Water and wastewater treatment and quality control; Urban, rural and industrial water supply and distribution systems; Remote sensing and GIS application in water resources; Water governance and policy issues; Irrigation and drainage system planning, and Climate impact on water and environment.*

3. **Curriculum and Courses & Teaching Environment**

Items	**Ratio/ Number**	**Items**	**Number/%**
Teacher-student Ratio	NA	Average No. of students motivated (%) to opt of careers Eng/ Tech. Sectors UG/PG/PhD	**100% (PG)**
No. of Faculty members as on today	02	Average No. of students motivated (%) to opt of careers in Science sectors UG/PG/PhD	**0**
Average No. of Tutorial Assistants	00	No. of teaching labs	**1**
No. of UG/DD students	00	Average No. of students per experiments in core courses	**NA**
No. of PG students/PhD students	12/14	No. of Students' workshops/``Tinkering'' Labs	**1**
Average no. of tutors with more than 100 students	NA	No. of new courses introduced	**6**
Average Students placements (%) (UG/DD/PG)	25 (PG)	No. of New program introduced	**1**
No of major curriculum review in both UG & PG level	1 (PG)	Undergraduate Vs PhD strength expressed as Percentage	**NA**
No of UG lab (teaching labs) developed/set-ups	NA	No of PG/research labs developed/new set up	**0**
No of E class rooms	1	No. of lab classes per week	**3-6 (Avg.**

			4.5)
Average No. of Course done per student for B. Tech/DD/M. Tech/Ph.D	13(M.Tech.) 6 (Ph.D)	No. of core/elective/seminar/projects subjects taken for B. Tech, DD, and M. Tech respectively	**08/05/02/01 (M Tech.)**

4. Research and Development & its Environment

Items	**Number**	**Items**	**Number**	**Items**	**No.**
Total No. of Publications in Journals (2008-13)	20	Average no. of citation per paper	**12.38**	No of large interdisciplinary research projects	**04**
Total No. of Publications in Conference & Symposium	2	Average Journal publication per year	**3**	Number of Int. conf./workshops attended by students	**37**
Total No of Books & e-books published	1	h-Index of the department since 2008/overall h-index in Scopus	**4/4**	No. of PDF hired in the Institute	**00**
Total No of Edited Conference Proceedings/book chapters	0/3	Number of papers with citation more that the average no. of citation of the Journals	**--**	No. of international Students as PhDs/PDFs	**00**
Total No. of Technology Developed/transferred	*0/0*	No. of recognitions & Awards, fellows etc to faculty/students (provide break up if necessary)	0/3	No. of International visiting researchers /adjunct faculty stayed here for at least a week	*08/0*
Total No. of Patents Filed/Obtained	*0/0*	Average Retention(%) of Young faculty for at least 10 years	NA	No. of short courses/workshops /conf. organized with international participations	*0/4/0*
Total No. of Copyright Filed/Obtained	*0/0*	No. of Sponsored research Project /fund(lakh) generated from non-internal source	4/*47.895*	Average No. of PhD granted per year	*0*
No. of Publications per Faculty/Masters/PhD students	**3/0/0**	No. of Consultancy /fund (lakh) generated from non-internal source	2/*40.21*	Average No. of PhD Granted per year per faculty	*0*
No. of Publications per Faculty/Masters/PhD students in Top Ten Journals as Identified by the department	**3/0/0**	No of Internal and external Collaborations research papers/research projects/PhD	2/5/24	Patent granted per faculty	*0*

		students			
Average No. of Citation per faculty per year	**35**	No of M. Tech students motivated into pursuing PhD/PhD graduates motivated to pursue career in Academics(abroad or IIT etc)	8/0	Number of articles in collaborations with Ten countries*	*67*
Ranking of the department in terms of average citations per paper within the Institute	**--**	Ranking of the department in terms of total number of Journal publications within the Institute/ publications per faculty	--	No of articles of the dept. contributing towards h-index of the Institute since 2008	--

5. External Stakeholder Engagement and others

Items	**Number**	**Amount Lakh**
No. of PhD/Master students' thesis funded by Industries	0/2	
Total number of Industry sponsored projects and its income (Lakh)	2	*40.21*
No. of Curriculum Development Initiative for Industries	0	
No of Technology transfer/adopted by Industry/Labs	0	
No. of Nationally relevant research projects	5	*52.895*
No of Policy inputs/consultancies provided	1	
No. of Research grant and seed money from internal savings of the Institute per young faculty of the department and its total fund	1	13
No. of Community Relevant projects	NIL	

6. Vision for the Future (in brief):

(a) Departments/centers/schools should spell out its Mission and Vision Statements, (b) Plans for future to achieve the projected goals and (c) measures adopted towards above.

The School's future mission is to establish itself as one of the best academic centre dealing in all aspects of water quantity and quality related education, research, and consulting solutions in India. In order to achieve that, strengthening of M.Tech. and Ph.D. curriculum is in progress. The program is being revised to reinforce the preamble background, boost up sound research and analysis, and integrate management aspects in the scholars in a throughout interdisciplinary approach. Special emphasis on the education and training to tackle the emerging challenges in water management and water quality control is being ensured in order to meet the imminent social and industrial demands in water sector.

As of now, the M. Tech. programme of the school is open to the graduates of Civil and Agricultural engineering only. Provided the school's facilities and faculty strength permits, it is envisioned to make the programme open to other disciplines as well in future in order to integrate all the related aspects of sciences, engineering and even probably economics and law in solving water related issues.

7. External peer review of the Dept./centre/schools (in brief): (a) Date: *March 27, 2013*

(b) Name of the Experts involved and their affiliations in short: *The following three experts were requested for assessment of the school. Prof. Nagesh Kumar, Department of Civil Engg. (IISc Bangalore), Prof. S.R. Singh, INSA Fellow, Lucknow, Dr. S. K. Kamra, Div. of Irrigation and Drainage Engg., CSSRI, Karnal. So far, only Prof. Nagesh Kumar has submitted the assessment report*

(c) Overall recommendations of the peer review committee: Strengths, weaknesses, suggestions and comments

- *The M. Tech. programme is well structured*
- *Shortage of core faculty members to implement the aims of the school as the school is relying upon the faculty members of other departments.*
- *Appreciable activities on organizing lectures, workshops, and training programmes. More such events are needed*
- *Good initiatives for national and international academic and industry collaborations*
- *The school should be able to play major role in policy and decision making in water sector.*
- *Lack of basic infrastructure in the School*
- *Classroom facilities should be independent from office space*
- *Inadequate room for faculties as they are made in a portion of existing class rooms*
- *No separate rooms for library, laboratory and students have to rely on other department for their lab experiments*
- *Unavailability of major equipments and instruments needed for water related analysis and R&D.*

(d) Measures adopted/action taken at the department level to address the recommendations of the peer review report:

- *Efforts have been made to recruit quality faculty members.*
- *M. Tech. programme was revised to make it for focused in order to fulfill the aims of the school.*
- *More space and infrastructure have been requested form the concerned authorities.*

8. **Strengths, Weaknesses, Opportunities & Threats (SWOT) Analysis of the Department**

STRENGTHS √ Pioneer in comprehensive education in water engineering and management in India √ Good quality faculty √ Conducive ambiance and well endowed computational facilities **WEAKNESSES** √ Only 2 core faculty members, joined in Jul 2012 and Aug 2013. √ Space limitation √ Lack of basic infrastructure √ In-adequate sophisticated equipment and labs	**OPPORTUNITIES** √ Increasing awareness on water related issues and challenges √ Water related research is an emerging field in R&D. √ Possibility of more international and national collaborations and joint ventures **THREATS** √ More attractive opportunities outside the IITKGP for faculties and students √ Lack of good quality faculties in the non-conventional fields of water education and research √ Lack of good quality students √ Lack of incentives at par with world class institutes such as MIT, CalTech, etc and the world

√ Inadequate linkages with industry and community	class industries

9. Additional Information, if any

***Note: Ten countries: US, UK, Germany, Japan, Canada, France, Italy, Australia, Singapore, South Korea (optional :China may be replaced with anyone if department wants)**

Important Highlights

Genesis and motivation

The School of Water Resources was established in 2008 to offer the M. Tech. Programme in Water Management to profess the students with integrated and interdisciplinary approaches of water management involving hydrological, biophysical, chemical, economic, institutional, legal, and policy-planning aspects, to solve the ever-growing set of water-related challenges in industry, agriculture, and domestic sectors. The inception of the School took shape from the collective thoughts of several luminaries in water management as it was felt that water, an essential ingredient of all the living systems of this planet, has been under tremendous stress in recent years. Not only is the demand for water rising along with increase in population but also the supply of water is getting stressed day by day due to lowering of its quality because of unabated pollution and also due to over utilization in various sectors. Another aspect, the effects of possible climatic changes, is also looming large in dictating the fate of water in the near future.
It may be appreciated that although water is a subject of research and implementation in the fields of Civil, Agricultural, Mining, Chemical, etc. in a more detailed scale in the respective spheres, the School of Water Resources looks at the boarder management issues related to water and the technologies that may be the most appropriate for its analysis and field implementation on a larger scale. For the sake of comparison, it may be noted that amongst the IIT chain of institutes, a separate academic unit devoted to holistic management of water exists only at IIT Roorkee as the Water Resources Development and Management Department.

Programme structure

The academic programme of the School of Water Resources runs at the Masters and Ph. D. levels. The programme is intended for both fresh graduates from colleges seeking an advanced learning in the field of water management and engineering and also for in-service professionals and researchers from a wide range of backgrounds, who wish to enhance and supplement their already existing knowledge domain with the state-of-the art skills and expertise. The programme consists of foundation, specialization, and integration phases. The foundation phase provides latest insights, context, and concepts in integrated water and environment management issues. In the specialization phase, the students choose to make in-depth study either in Rural and Urban Water Management or Biosystems Engineering. In the integration phase, the students are challenged to bring together and apply their cumulative learning process in the form of an M. Tech. thesis.

Objective

As indicated above, the objective of the M. Tech. / M. S. programmes in water management and engineering offered by the School is aimed at solving the ever-growing set of water-related challenges in industry, agriculture, and domestic sectors. The graduating students are expected to develop knowledge, insight and skills to design, implement and evaluate water management policies and strategies at various scales: from a small community level to a large river watershed domain. It is hoped that the technical expertise of the highly qualified faculty members engaged in the programme will help to shape the graduates who, in turn, will be able to promote the judicious use of water and achieve effective governance of water resources. The Ph. D. candidates are expected to take up either a live problem of the field and obtain a solution to a burning problem in the domain of water or pursue a fundamental problem in the sphere of water science and technology and come up with a new or modified solution strategy. The programme

aims in developing knowledge, insight and skills required to design, implement and evaluate water management policies and strategies. Graduates will be able to promote the judicious use of water and achieve effective governance of water resources.

Mission

The School is committed to promote professionalism in the water management education, research, and transfer of technology programmes and address inadequacies in conventional water management and the need for sustainable ecosystems and their planning.

Vision

It is hoped that the School shall be able to contribute towards solving the most challenging problems of water facing the society/nation/world today. It would be an extreme matter of pride for the School if the graduates passing out are able to utilize their skills in managing droughts, mitigating floods, or even saving a parched and thirsty land from turning into a desert. Even the faculty members associated with the school look forward in associating themselves with projects that aim in providing state-of-the-art solutions to present and future problems of water starting at the small scale, like that of a village, or a large scale domain, like that of the nation, or beyond.

The dreams of setting up this School would be realized when humanity starts benefitting by the outcomes and products of the school in ensuring a stress-free world of water.