

**NATIONAL BOARD OF ACCREDITATION**

**SELF ASSESSMENT REPORT (SAR)  
FOR ACCREDITATION OF  
PG ENGINEERING PROGRAMMES  
(ENVIRONMENTAL ENGINEERING)  
(TIER-I)**



**NATIONAL BOARD OF ACCREDITATION**

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**DEPARTMENT OF CIVIL ENGINEERING  
VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY  
NAGPUR-440010**

**(January, 2013)**

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# Self Assessment Report (SAR) PG

## Part A

### 1. Institutional Information

#### 1.1. Name and address of the institution and affiliating university:

VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY (VNIT)  
SOUTH AMBAZARI ROAD, NAGPUR - 440010

#### 1.2. Name, designation, telephone number, and e-mail address of the contact person for the NBA:

**Dr. Narendra S. Chaudhari,**

Director VNIT.

Phone No.: 0712-2801363

Email: [director@vnit.ac.in](mailto:director@vnit.ac.in)

**Dr. K D Kulat,**

Professor, Department of Electronics Engineering

Phone No.: 0712-2801345

Email: [kdkulat@ece.vnit.ac.in](mailto:kdkulat@ece.vnit.ac.in) / [kishor\\_kulat@yahoo.com](mailto:kishor_kulat@yahoo.com)

#### 1.3. History of the institution (including the date of introduction and number of seats of various programmes of study along with the NBA accreditation, if any) in a tabular form:

##### 1.3.1 Historical Background

The VNIT, Nagpur is one of the thirty National Institutes of Technology in the country. The Central Government by Act of Parliament (National Institutes of Technology Act, 2007 (29 of 2007) declared VNIT Nagpur as an Institute of National Importance. The Act was brought into force from 15<sup>th</sup> August 2007.

VNIT Nagpur was conferred the Deemed to be University status (under University Grants Commission Act, 1956 (3 of 1956) with effect from 26<sup>th</sup> June 2002 by the Central Government. Earlier, the Institute was known as Visvesvaraya Regional College of Engineering (VRCE). It was established in the year 1960 under the scheme sponsored by Government of India and Government of Maharashtra. The college was started in June 1960 by amalgamating the State Government

Engineering College functioning at Nagpur since July 1956. In the meeting held in October 1962, the Governing Board of the college resolved to name it after the eminent engineer, planner, and statesman of the country Sir M. Visvesvaraya.

### **1.3.2 Location**

Nagpur known as Orange City is centrally located and well-connected to all parts of the country by air, rail and road. It is also the second capital of Maharashtra. Nagpur is the largest city in central India and the winter capital of the state of Maharashtra. It is a fast growing metropolis and is the third most populous city in Maharashtra after Mumbai and Pune, and also one of the country's most industrialized cities, with a population of 2,405,421, Nagpur is the 13<sup>th</sup> most populous city and 13<sup>th</sup> largest urban agglomeration in India. It is the 154<sup>th</sup> largest agglomeration and 164<sup>th</sup> largest contiguous urban areas in the world.

Nagpur is the seat of the annual winter session of the Maharashtra state assembly, "Vidhan Sabha". Nagpur is a major commercial and political centre of the Vidarbha region of Maharashtra. In addition, the city derives political importance from being the headquarters for the Hindu nationalist organisation RSS and an important location for the Dalit Buddhist movement.

According to a survey by ABP News-Ipsos, Nagpur has been identified as the best city in India by topping the liveability, greenery, public transport, and health care indices. It is famous for the Nagpur Orange and is known as the "Orange City" for being a major trade center of oranges cultivated in the region.

The city was founded by the Gonds and later became a part of the Maratha Empire under the royal Bhonsale dynasty. The British East India Company took over Nagpur in the 19<sup>th</sup> century and made it the capital of the Central Provinces and Berar. After the first reorganisation of states, the city lost its status as the capital. Following the informal "Nagpur Pact" between political leaders, it was made the second capital of Maharashtra.

Nagpur is also called the "Tiger Capital of India" as it connects many tiger reserves in India to the world. It is among the important cities for the Information Technology Sector in Maharashtra. Nagpur lies at the dead centre of the country with

the Zero Mile marker indicating the geographical centre of India. City of Nagpur is considered as geographic centre of India with its famous Zero Mile stone. Major National highways and rail networks connecting Delhi with Hyderabad/Bangalore/Kanyakumari and Mumbai with Kolkata pass through the city. It is now recognized as Tiger Capital of India with major Tiger National parks around the city. It is popularly known as "Orange City". Nagpur is second capital of Maharashtra State.

VNIT is located in the heart of Nagpur city on sprawling campus of 214 acres. The campus can be located on Google maps as VNIT, N 21<sup>0</sup>, 7' 28", E 79<sup>0</sup>, 3' 8". The official website address for VNIT is: [www.vnit.ac.in](http://www.vnit.ac.in).

### **1.3.3 Regular Academic Programmes:**

#### **Academic Programmes**

The Institute offers 9 Under-Graduate programs viz., B. Tech. in Chemical, Civil, Computer Science and Engineering, Electrical and Electronics, Electronics and Communication, Mechanical, Metallurgical and Materials and Mining Engineering and Bachelor of Architecture.

The Institute also offers 16 Post-Graduate Full time programs (2 years duration) viz., M. Tech. in Industrial Engg., Heat Power Engg, CAD-CAM, Materials Engg, VLSI Design, Communication System Engineering, Computer Science Engg., Industrial Engg., Integrated Power System, Power Electronics and Drives, Structural Engineering, Structural Dynamics and Earthquake Engineering, Environmental Engineering, Water Resources Engineering., Construction Technology and Management, Transportation Engineering and Urban Planning. The Institute also offers M.Tech. by research and Ph. D. (Full/Part Time) programs in all engineering departments.

Institute has started M.Sc. programs in Chemistry, Mathematics and Physics from current year.

The Doctoral Research is undertaken in all Engineering and Sciences departments. Institute is a recognized centre under QIP scheme for Ph.D. program in

Electrical and Metallurgical & Materials Engineering department and for M. Tech. program in Electrical and Civil Engineering departments.

Sr.No.	Program Name	Year	Intake Capacity
<b><u>Under Graduate Program : B. Arch/B. Tech.</u></b>			
01.	Architecture	1960	62
02.	Chemical Engineering	2006	92
03.	Civil Engineering	1956	92
04.	Computer Science Engg.	1987	92
05.	Electronics and Communication Engineering	1980	92
06.	Electrical And Electronics	1960	92
07.	Mechanical Engineering	1960	92
08.	Metal and Materials Engineering	1960	92
09.	Mining Engineering	1982	32
	<b>TOTAL</b>		<b>738</b>
<b><u>Post Graduate &amp; Research Programs : M. Tech.</u></b>			
01.	Environmental Engineering	1966	32
02.	Water Resources Engineering	2011	20
03.	Construction Technology	2010	20
04.	Transportation Engineering	2011	20
05.	VLSI Design	2007	20
06.	Communication System Engineering	2012	20
07.	Computer Science Engineering	2007	20
08.	Industrial Engineering	1989	20
09.	Heat Power Engineering	2002	20
10.	CAD-CAM	2010	20
11.	Integrated Power System	1968	20
12.	Power Electronics & Drives	2010	20+5 SP
13.	Material Engineering	1960	20
14.	Structural Dynamics and Earthquake Engineering	2003	20
15.	Structural Engineering	1991	20
16.	Excavation Engineering	2012	
16.	Urban Planning	1988	20
	<b>TOTAL</b>		<b>320</b>
<b><u>M. Sc.</u></b>			
01.	M. Sc. Chemistry	2013	20
02.	M. Sc. Mathematics	2013	20
03.	M. Sc. Physics	2013	20
	<b>TOTAL</b>		<b>60</b>

### 1.3.4 Accreditation Status:

National Board of Accreditation granted accreditation to the various eligible programs in 2009 wide letter No. F.No. NBA/ACCR-44 (II)/2002, Dated 2<sup>nd</sup> March 2009. The details are given below:

The Accreditation Status of the programme(s) are:

Sr.No.	Name of UG & PG Programme(s)	Accreditation Status	Period of validity w.e.f. 10.02.2009
01.	B.Tech. Electronics & Comm. Engg.	Accredited	3 Years
02.	B.Tech. Mechanical Engg.	Accredited	3 Years
03.	B.Tech. Civil Engg.	Accredited	3 Years
04.	B.Tech. Computer Science & Engg.	Accredited	3 Years
05.	B.Tech. Mining Engg.	Accredited	5 Years
06.	B.Tech. Metallurgical & Materials Engg.	Accredited	5 Years
07.	B.Tech. Electrical & Electronics Engg.	Accredited	5 Years
08.	M.Tech. Integrated power System	Accredited	3 Years
09.	M.Tech. Structural Dynamics & Earth Quate Engg.	Accredited	3 Years
10.	M.Tech. Environmental Engg.	Accredited	3 Years
11.	M.Tech. Structural Engg.	Accredited	3 Years
12.	M.Tech. VLSI Design	Accredited	3 Years
13.	M.Tech. Industrial Engg.	Accredited	3 Years
14.	M.Tech. Ferrous Process Metallurgy	WITHDRAWN WITHDRAWN	
15.	M.Tech. Ferrous Process Metallurgy		

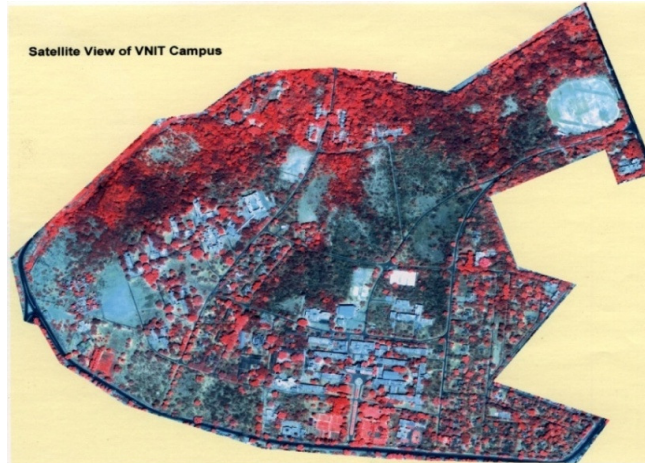
(Total number of programmes Accredited vide this letter – Twelve and Withdrawn – Two)

#### New M.Tech. Programs started (year)

Sr.No.	Title of Program	Intake
01.	Transportation Engineering (2011)	20
02.	Communication System Engineering (2012)	20
03.	Water Resources Engineering (2011)	20
04	Construction Technology and Management	20
	Total Increased Intake	<b>80</b>

## Campus

VNIT Campus is spread over an area of 214 acres near Ambazari Lake. It presents a panorama of harmony in architecture and natural beauty.



The campus has been organized in three functional sectors:

- Hostels for students, Health centre, sports complex
- Academic Buildings, Administrative Building, and Library
- Residential Sector for family & staff

The academic buildings are located fairly in close proximity, to the hostels and the staff quarters. The campus has a full-fledged computerized branch of State Bank of India with ATM facility, Canara Bank, Post office as well as courier services and other needs of students, residents and office are nearby.

The Institute has its own full fledged Health Center with a full time residential Medical Officer. The specialized medical services of a Psychological Counsellor, Dietician, Physiotherapist, Pathology lab, Yoga centre, and also medical consultants in Ayurveda and Homeopathy are available. Patients suffering from serious illness / requiring intensive care are referred to the Govt. Medical College and Hospital and other Health care centres duly approved under the CGHS. A full time dedicated Ambulance service is available at the health centre.

Spacious and multicuisine canteen is located close to the instruction zone and hostels. Two more cafeterias exist on the campus. The Institute has a well-equipped Gymkhana apart from various playgrounds for Tennis, Badminton, Volley Ball, Foot Ball, Hockey, and Cricket. NCC unit is also located on campus.



**1.4. Ownership status: Govt. (central/state) / trust / society  
(Govt./NGO/private)/private/other:**

CENTRAL GOVT. MHRD Declared as Institute of National Importance by NIT Act of 2007 (27 of 2007).

**1.5. Mission and Vision of the Institution:**

**Mission**

The Mission of VNIT is to achieve high standards of excellence in generating and propagating knowledge in engineering and allied disciplines. VNIT is committed to providing an education that combines rigorous academics with joy of discovery. The Institute encourages its community to engage in a dialogue with society to be able to effectively contribute for the betterment of humankind.

**Vision**

To contribute effectively to the national endeavour of producing quality human resource of world class standard by developing a sustainable technical education system to meet the changing technological needs of the Country, incorporating relevant social concerns and to build an environment to create and propagate innovative technologies for the economic development of the Nation.

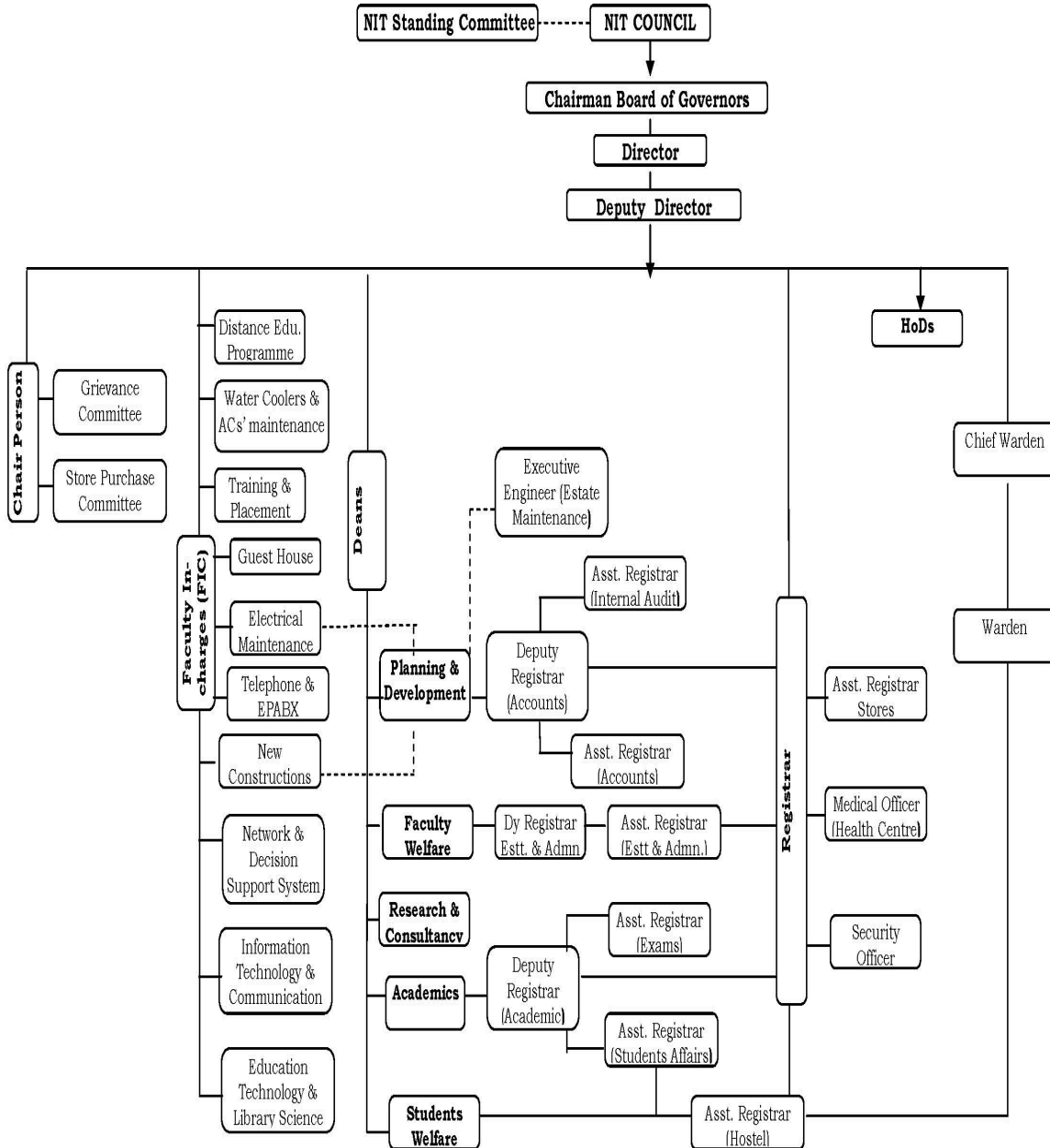
**1.6. Organisational Structure:**

**1.6.1 Administration**

As per the provisions of the NIT Act, the Board of Governors (BoG) is responsible for superintendence, direction, and control of the Institute. Thus, the BoG is vested with full powers of the affairs of administration/management and finances of the Institute. Members of the Board represent Government of India, Government of Maharashtra, Industries, and faculty of the Institute. The Director is the principal academic and executive officer of the Institute. Besides the BoG, the Senate, the Finance Committee (FC) and the Building and Works Committee (BWC) are statutory committees and therefore, authorities of the Institute.

Apart from the above statutory committees, the Board has the power to constitute various sub-committees for smooth and efficient administration. Thus, the Board has constituted the Stores Purchase Committee (SPC), Grievance Committee (GC), and Special Cell. The SPC administers the centralized procurement of equipment and material whereas the GC provides a platform to hear the views of staff and faculty on grievances. The Special Cell functions to protect the interest of backward-class candidates through procedural, institutional, and other safeguards.

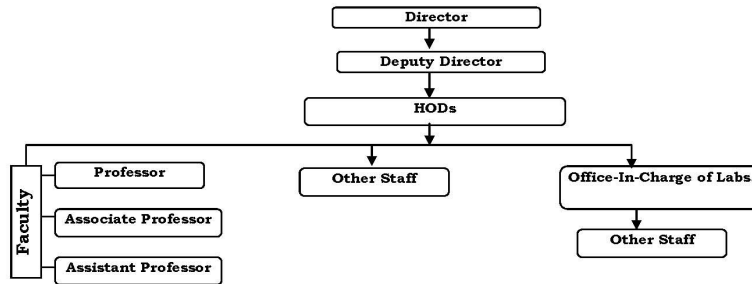
**1.6.2 Flow Chart showing Institutional Administration**  
**Figure - 1**



### 1.6.3 Flow Chart showing the hierarchy of Academic Departments

Figure - 2

#### 1. ACADEMIC DEPARTMENTS

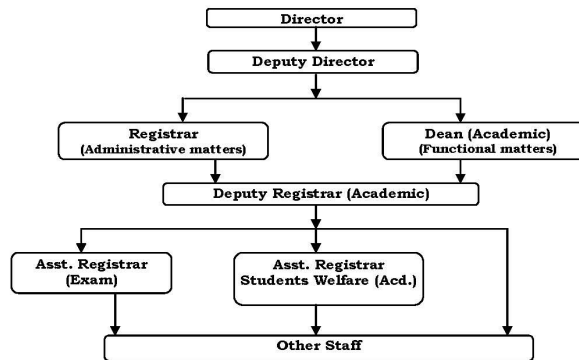


	Reporting Officer	Reviewing Officer
Professor	Director	Director
Associate Professor / Assistant Professor	HoD	Director
Group – A other than above	HoD	Deputy Director/ Director
Group – C/Other Staff	Lab-In-Charge / HoD	HoD

**Note:** i) In case Associate Professor is HoD, Director shall also be Reporting Officer for all the Associate Professor in that Departments.

ii) In case, Assistant Professor is HoD, Director shall also be Reporting Officer for all faculty.

#### 2. ACADEMIC SECTION



	Reporting Officer	Reviewing Officer
Group – A	Registrar *	Deputy Director /Director
Group – C/Other Staff	Section Head	Registrar

\* In consultation with Dean (Academic)

**1.7. Financial status: Govt. (central/state) / grants-in-aid / not-for-profit / private self- financing / other:**

(Instruction: Financial status of the institute has to be mentioned here.)

**CFI (Centrally funded institution)**

**1.8. Nature of the trust/society:**

Also list other institutions/colleges run by the trust/society

(Instruction: Way of functioning and activities of the trust/society have to be listed here.)

Name of the Institution	Year of establishment	Location
NA	-	-

**1.9. External sources of funds: (Rs. in Lacs)**

Name of the External Source	CFY 2013-14	CFYm1 2012-13 *	CFYm2 2011-12	CFYm3 2010-11
Plan	3825=00	00	7500=00	2200=00
Non Plan	1620=00	3200=00	4249=00	1500=00

(Instruction: The different sources of the external funds over the last three financial years are to be listed here.)

\* No funds under plan were received.

**1.10 Internally acquired funds: (In Rupees)**

Name of the Internall Source	CFY	CFYm1 2010-11	CFYm2 2011-12	CFYm3 2012-13
Students' fee	2,70,14,268	8,62,01,169	100,32,5,522	17,79,67,064
Interest & Other Income	4,88,21,680	8,16,88,699	5,63,25,522	3,23,85,087

(Instruction: The different sources of the internal funds over the last three financial years are to be listed here.)

### 1.11 Scholarships or any other financial assistance provided to students?

VNIT Nagpur is making available to its students and research scholars several avenues for receiving assistance towards scholarships, free ships etc. some of the several scholarships available to VNIT students are :

- [1] Indian Oil Corporation Scholarship, Indian Oil Corporation has announced 2600 Scholarships for students of 10+/ITI, MBBS, Engineering & MBA on merit basis.
- [2] NTPC Scholarship, NTPC is offering 35 scholarships to students belonging to SC/ST/PC categories persons who are pursuing 4 years full time degree course in engineering on a competitive basis for applicant from NIT.
- [3] ONGC Engineering Scholarships ONGC offers 75 Scholarships for SC/ST students who are pursuing higher education in Engineering, Geology, Geophysics and MBA.
- [4] GATE stipend for qualified post graduate students.
- [5] AICTE PG Scholarship 2013 for M.E./M.Tech/M.Pharma Students AICTE PG Scholarship 2013 for M.E./M.Tech/M.Pharma second year students.
- [6] AICTE Scholarships for GATE Qualified Candidates 2013 For GATE Qualified Candidates 2013 for M.E./M.Tech/ second year students.
- [7] Cargill Global Scholarships Program for Undergraduate Students 2013 Cargill Global Scholarships Program for Undergraduate Students 2013 is the global scholarship program for India, Brazil, Russia, China and the USA countries.
- [8] North South Foundation Scholarships 2014 (NSF) Scholarships 2014 for those doing BE/BTech.
- [9] NATIONWIDE EDUCATION AND SCHOLARSHIP TEST (N.E.S.T.) 2013 Natinalwide education and scholarship test (n.e.s.t.) 2013 For Degree Students of Science Engg. Courses.
- [10] Scholarship for Physically Handicapped Students National Handicapped Finance and Development Corporation (NHFDC).
- [11] MOMA scholarship–Annually government of India offers 20000 scholarships that distributed among the students of minority communities throughout the country, to eligible students from this institute.
- [12] State Government Scholarships from Social Welfare Department for eligible students from this institute.

The aggregate amount of Scholarship amount in (Rs.) year wise is indicated below:

Details	CFY	CFYm1	CFYm2	CFYm3
Category				
Scholarship Assistance	Various sources given in 1.11			
Amount	3,28,05,922	1,74,86,164	1,77,64,254	2,37,27,156

**1.12 Basis/criterion for admission to the institution:**

**All India entrance**/state- level entrance/ university entrance/12<sup>th</sup> standard mark sheet / others:

(Instruction: The basis/criterion for student intake has to be listed here.)

**1.13 Total number of engineering students:**

	CFY 2012-13	CFYm1 2011-12	CFYm2 2010-11	CFYm3 2009-10
Total no. of boys	2868	2636	2398	2142
Total no. of girls	708	583	500	457
Total no. of students	3576	3219	2898	2599

Total number of other students, if any

(Instruction: Total number of engineering students, both boys and girls, has to be listed here. The data may be categorised in a tabular form under graduate or post graduate engineering, or other programme, if applicable.)

**1.14 Total number of employees:**

(Instruction: Total number of employees, both men and women, has to be listed here. The data may be categorised in a tabular form as teaching and supporting staff.)

Minimum and maximum number of staff on roll in the engineering institution, during the CAY and the previous CAYs (1st July to 30th June):

Items	GENDER	CAY		CAYm1		CAYm2		CAYm3	
		Min	Max	Min	Max	Min	Max	Min	Max
Teaching staff in engineering	M		131		122		123		119
	F		23		20		20		19
Teaching staff in sciences & humanities Physical Edu.	M		24		15		17		16
	F		7		7		7		7
Non teaching staff	M		9		10		10		12
	F		3		3		3		3

**A. Regular Staff**

**B. Contract Staff**

Items	GENDER	CAY		CAYm1		CAYm2		CAYm3	
		Min	Max	Min	Max	Min	Max	Min	Max
Teaching staff in engineering	M	00	01	00	01	00	02	00	00
	F	00	00	00	00	00	00	00	00
Teaching staff in sciences & humanities	M	00	01	00	00	00	00	00	00
	F	00	00	00	00	00	00	00	00
Non teaching staff	M	00	73	00	75	00	77	00	76
	F	00	19	00	19	00	19	00	19

## 2. Departmental Information

2.1. *Name and address of the department:*

**Department of Civil Engineering**  
**Visvesvaraya National Institute of Technology, Nagpur**  
**South Ambazari Road, Nagpur, Maharashtra - 440010**

2.2. *Name, designation, telephone number, and e-mail address of the contact person for the NBA:*

**Dr.A.R. Tembhurkar**  
**Head,**  
**Telephone No.: 0712-2801371, 09850363905**  
**Email:artembhurkar@civ.vnit.ac.in**

2.3. *History of the department including date of introduction and number of seats of various programmes of study along with the NBA accreditation, if any:*

Civil Engineering Department is the oldest department in this institute right from the establishment of Government College of Engineering in Nagpur 1956. The department offers the undergraduate course of B.Tech in Civil Engineering and Four Postgraduate Courses of M.Tech as given below.

<b>Program</b>	<b>Description</b>
<b>UG in Civil Engineering</b>	Started with 60 seats in 1956 Intake increased to 71 in 2008 Intake increase to 82 in 2009 Intake increase to 92 in 2010
<b>PG in Civil Engineering Department</b>	
1. Environmental Engineering	Started in 1966 (32 seats )
2. Water Resources Engineering	Started in 2005 (20 seats )
3. Construction Technology	Started in 2010 (20 seats )
4. Transportation Engineering	Started in 2012 (20 seats )

The Courses in the Department of Civil Engineering were accredited in 2001 and 2008.



#### **2.4. Mission and Vision of the Department**

##### **VISION:**

To contribute effectively to the National Endeavour of producing quality human resource of world class standard in civil engineering by developing a sustainable technical education system to meet the changing technological needs of the Country incorporating relevant of social concerns and to build an environment to create and propagate innovative technologies for the economic development of Nation.

##### **MISSION:**

The Mission of the undergraduate civil engineering program is to develop students into capable civil engineering graduates by imparting appropriate high quality education in Civil Engineering so that they could be readily adapted by the service sector to meet the challenges faced by the Nation. The program strives for excellence in engineering education and profession. It also aims to promote all round development of the personality of students by suitably involving them in Co-curricular and extra-curricular activities.

#### **2.5. List of the programmes/ departments which share human resources and/or the facilities of this department/programme (in %):**

(Instruction: The institution needs to mention the different programmes being run in the department which share the human resources and facilities with this department/programme being accredited.)

S.No.	Name of the Programme	Human resource Share in %	Facilities (Laboratory/Library/Internet) share in %
1.	UG	15% Shared by Dept. of Applied Mechanics	10% Shared by Dept. of Applied Mechanics
2.	PG	5% (Mathematics Department)	0%

#### **2.6. Total number of students: 2012-13**

UG:  $92 \times 3 = 276$  students at any time in the department

PG:  $20 \times 8 = 160$  students at any time in the department

#### **2.7. Minimum and maximum number of staff on roll during the current and three previous academic years (1st July to 30th June) in the department:**

Items	CAY		CAYm1		CAYm2	
	Min	Max	Min	Max	Min	Max
Teaching Faculty with the	17	18	16	18	15	16

Program						
Non teaching Staff	6	6	6	6	7	7
Total	23	24	22	24	22	23

*2.7.1. Summary of budget for the CFY and the actual expenditure incurred in the CFYm1, CFYm2 and CFYm3 (for the Department):*

<b>Items</b>	<b>Budget in CFY</b>	<b>Actual expenses in CFY</b>	<b>Budgeted in CFYm1</b>	<b>Actual Expenses in CFYm1</b>	<b>Budgeted in CFYm2</b>	<b>Actual Expenses in CFYm2</b>
	Budgeted in 2012-13 in INR	Actual expenses in 2012-13 in INR	Budgeted in 2011-2012 in INR	Actual Expenses in 2011-2012	Budgeted in 2010-2011	Actual Expenses In 2010-2011
Laboratory Equipments	20 lacs	1902851	20 lacs	2278164	18 lacs	1723760
Software purchase	40 lacs	3846628	5 lacs	490819	2 lacs	206000
Laboratory consumables	6 lacs	654252	1 lacs	49297	1 lacs	116620
Maintenance and spares	1 lacs	-	1 lacs	88258	1 lacs	79888
Travel	0 lacs		0 lacs		0 lacs	
Miscellaneous expenses for academic activities	10 lacs	1236184	1 lacs		0.5 lacs	
<b>Total</b>	<b>77 lacs</b>	<b>7639915</b>	<b>28 lacs</b>	<b>2906538</b>	<b>22.5 lacs</b>	<b>2126268</b>

\*The amount shown under expenditure does not include many items of routine expenses met from Centralised Institutional Source 'such as AMC/Computer Consumables and student related travel expenditure which, however, are aggregated in The Institutionla Income Expenditure statement in Part I - item I-10.

### A-3 Programme Specific Information

## 3. Programme Specific information

3.1. *Name of the Programme:* **Environmental Engineering**

3.2. *Title of the Degree:* **Master of Technology (Environmental Engineering)**

3.3. *Name, designation, telephone number, and e-mail address of the Programme coordinator for the NBA:*

**Dr.A.R. Tembhurkar**  
**Head,**  
**Department of Civil Engineering**  
**Telephone No. 0712-2801371, 09850363905**  
**Email: artembhurkar@civ.vnit.ac.in**

3.4. *History of the programme along with the NBA accreditation, if any:*

Programme	Description
M.Tech. (Environmental Engineering)	Started in 1966 (32 seats ) (including 10 sponsored by CPHEEO, Ministry of Urban Development, Govt. of India)

3.5. *Deficiencies, weaknesses/concerns from previous accreditations:*

1. There are no hostels for M.Tech and Ph.D male students.
2. Only 50% of the faculty has PhD degrees.
3. Although faculty is encouraged to register for PhD, the registration being largely in VNIT, it will lead to inbreeding of faculty. Also, the number of PG and research students is rather small.
4. Only senior faculty is involved in research and publishes reasonably good papers. Overall no of PhDs produced and no of publications are not good enough for an NIT.
5. A lot of obsolete and useless equipment is lying in various departments.

3.6. *Total number of students in the programme: 43( 1st Sem . 23 ; 3rd Sem. 20)*

3.7. *Minimum and maximum number of staff for the current and three previous academic years (1st July to 30th June) in the programme:*

Items	CAY		CAYm1		CAYm2		CAYm3	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Teaching staff in the department *	6	9	6	9	6	9	6	9
Non-teaching staff *	2	2	2	2	2	2	2	2

*Note: Exclusively for M.Tech. in Environmental Engineering.*

**3.8. Summary of budget for the CFY and the actual expenditure incurred in the CFYm1, CFYm2 and CFYm3 (exclusively for this programme in the department):**

<b>Items</b>	<b>Budget in CFY</b>	<b>Actual expenses in CFY</b>	<b>Budgeted in CFYm1</b>	<b>Actual Expenses in CFYm1</b>	<b>Budgeted in CFYm2</b>	<b>Actual Expenses in CFYm2</b>
	Budgeted in 2012-13 in INR	Actual expenses in 2012-13 in INR	Budgeted in 2011-2012 in INR	Actual Expenses in 2011-2012	Budgeted in 2010-2011	Actual Expenses In 2010-2011
Laboratory Equipments	20 lacs	1902851	20 lacs	2278164	18 lacs	1723760
Software purchase	40 lacs	3846628	5 lacs	490819	2 lacs	206000
Laboratory consumables	6 lacs	654252	1 lacs	49297	1 lacs	116620
Maintenance and spares	1 lacs	-	1 lacs	88258	1 lacs	79888
Travel	0 lacs		0 lacs		0 lacs	
Miscellaneous expenses for academic activities	10 lacs	1236184	1 lacs		0.5 lacs	
<b>Total</b>	<b>77 lacs</b>	<b>7639915</b>	<b>28 lacs</b>	<b>2906538</b>	<b>22.5 lacs</b>	<b>2126268</b>

\*Program specific library resources and softwares are purchased through centralized funding.

## B-1 Vision, Mission and Programme Educational Objectives

### **PART B**

#### **1. Vision, Mission and Programme Educational Objectives (75)**

##### **1.1. Vision and Mission (5)**

##### **1.1.1. State the Vision and Mission of the institute and department (1)**

Vision and Mission of the **institute**:

##### **Vision**

To contribute effectively to the national endeavour of producing quality human resource of world class standard by developing a sustainable technical education system to meet the changing technological needs of the country, incorporating relevant social concerns and to build an environment to create and propagate innovative technologies for the economic development of the nation.

##### **Mission**

The Mission of VNIT is to achieve high standards of excellence in generating and propagating knowledge in engineering and allied disciplines. V.N.I.T. is committed to providing an education that combines rigorous academics with joy of discovery. The Institute encourages its community to engage in a dialogue with society to be able to effectively contribute for the betterment of humankind.

##### **Vision and Mission of the Department:**

##### **VISION:**

The post graduate program in Environmental Engineering aims at further enhancing the knowledge and skills of the graduates in the specific area of Environmental Engineering. This program will mould the graduates into excellent researchers, academicians and entrepreneurs in the field of Environmental Engineering.

##### **MISSION:**

The mission of the post graduate program in Environmental Engineering is:

1. To provide students with a supportive environment that facilitates learning the advances in Environmental Engineering.
2. To impart the state-of-the-art knowledge in the relevant field of Environmental Engineering.
3. To provide excellence in learning through dedicated teaching, innovation and research.
4. To imbibe self-learning attitudes and professional ethics.
5. To prepare students to face the challenges in the area of environmental engineering.

##### **1.1.2. Indicate how and where the Vision and Mission are published and disseminated (2)**

(Describe in which media (e.g. websites, curricula books) the vision and mission are

published and how these are disseminated among stakeholders)

The display of vision and mission are at following locations through the banners, display boards.

1. Head of the Department's Office
2. Departmental corridor
3. Departmental Brochure
4. Institute website/Departmental web site

**1.1.3. Mention the process for defining Vision and Mission of the department (2)**

(Articulate the process involved in defining the vision and mission of the department from the vision and mission of the institute.)

The vision and mission of the “Civil Engineering Department” are in line with the institute vision and mission. These were defined keeping in view the priorities of the MHRD. These points were discussed in the departmental meetings and vision and mission statement is finalised.

**1.2. Programme Educational Objectives (10)**

**1.2.1. Describe the Programme Educational Objectives (PEOs) (1)**

The main objectives of Environmental Engineering program are:

1. To develop specialised manpower for Environmental Engineering and management.
2. To enhance analytical skills so as to enable to solve complex industrial and social problems.
3. To augment the students' capacity in pursuing research in emerging areas of Environmental Engineering.
4. To improve students' perspective towards environmental issues by sensitising and building the awareness of green technologies.
5. To inculcate the culture of research oriented projects with state-of-art facility laboratories in Environmental Engineering.

**1.2.2. State how and where the PEOs are published and disseminated (1)**

(Describe in which media (e.g. websites, curricula books) the PEOs are published and how these are disseminated among stakeholders)

The display of PEOs is at following locations;

1. Departmental Brochure
2. Institute website/Departmental web site

**1.2.3. List the stakeholders of the programme (1)**

(List stakeholders of the programme under consideration for accreditation and articulate their relevance)

Major stakeholders of this programme are:

1. Students, Parents, Society, Academia
2. State/central pollution control boards
3. State public health engineering departments/water supply & sewerage boards
4. Research Organisations such as: CSIR-NEERI, CRRI, RRSSC, MRSAC, IWPRS, MERI.
5. Govt. /Public Sector Organisations such as: CPWD, MJP, VIDC, PWD, NMC. NIT, NHAI, NTPC, WCL, CPCB, SPCB ...

**1.2.4. State the process for establishing the PEOs (3)**

(Describe the process that periodically documents and demonstrates that the PEOs are based on the needs of the programme’s various stakeholders)

1. Frequent departmental meetings
2. Meeting with expert from Institute of excellence for quality improvement.
3. Class Committees with participation of students and their feedback
4. Peer review of the departmental academic activity

**1.2.5. Establish consistency of the PEOs with the Mission of the institute (4)**

POs	Mission				
	To provide students with a supportive environment that facilitates learning the advances in Environmental Engineering.	To impart the state-of-the-art knowledge in the relevant field of Environmental Engineering.	To provide excellence in learning through dedicated teaching, innovation and research.	To imbibe self-learning attitudes and professional ethics.	To prepare students to face the challenges in the area of power systems.
1	x	x	x	x	x
2	x	x	x		x
3		x	x		x
4		x	x	x	
5	x	x	x	x	

The departmental mission is consistently followed by reviewing objectives and deliverables through departmental meeting, mentor’s suggestion, student feedback.

**1.3. Achievement of Programme Educational Objectives (20)**

**1.3.1. Justify the academic factors involved in achievement of the PEOs (10)**

(Describe the broad curricular components that contribute towards the attainment of the Programme Educational Objectives.)

Achievements of the PEO's is judged to measure the avenues for further improvements in the program educational objectives. The various factors involved in the achievement of the PEO's are as below:

- The curriculum is one of the main tools to prepare students in achieving PEOs. Therefore, the relevance of the courses in the program specific curriculum to PEO needs to be quantified in order to establish their level of support to PEO. The broad curriculum is based on making students understand Environmental Engineering fundamentals, designs of Environmental systems, their operations, analysis, control and management.
- Direct Assessment Procedures: The grades allotted to the students in the continuous mode as well as in the end term exam are one of the indicators of the attainment of PEO's. Grades indicate the level of understanding of the students and hence achievements of the educational objectives.
- Indirect assessment of the student learning is dependent on various other procedures objected towards collecting information regarding the achievement of PEO's viz., Satisfaction surveys conducted on current students (Feed Backs), class committee meetings wherein discussion regarding the course and course assessment is done, satisfaction surveys conducted amongst passed out students and alumni. Apart from this inputs are taken indirectly from the user departments and the current practices are included in the teaching learning process in relevant courses.
- This is further more integrated with relevant practical sessions, experts/guests seminars, projects, and industrial visits.
- The industry institute interaction helps to build students confidence in their problem solving abilities.

### **1.3.2. Explain how the administrative system helps in ensuring the achievement of the PEOs (10)**

(Describe the committees and their functions, working process and related regulations.)

Several systematic administrative procedures directly or indirectly ensure the achievements of the PEO's. These are:

- The Academic Council (Senate) is the prime body within the Institute which is responsible for all the academic activities in the institute. This body receives proposals from the academic departments (The respective BOS) and discusses the proposals for their implementations. All other academic activities are also thoroughly discussed in the Senate.
- The curriculum improvement, modifications and additions are governed by



Board of Studies (BOS) and executed through senate on a continuous basis based on the feedback from the stakeholders and changing societal needs. This is feasible because our institute is autonomous. The BOS is held once in a semester and all the faculty members are contributing in the curriculum development along with the experts from the IIT/NIT/Industry/Research Institutes. The student class committee meets twice in each semester and their views are incorporated in order to improve the curriculum. The scheme of examination and award of the degree is followed as per the rules set by the senate.

- The training and Placement (T&P) department formally takes feedback from the companies who are coming for campus placement regarding the student quality. These feedbacks are tabulated and used for the up gradation of the Educational Objectives. The companies also objectively indicate the status of the students and their performance levels. The pre placement and post placement meetings also in a way act as feedback mechanism to the students where the students directly interact with the industry representatives.
- The class Committees have been formed to ensure the attainment of the PEO's wherein the results of the student, coverage within each subject and the mode of the coverage is discussed at length. Certain issues raised by the students are addressed in these meetings. These meetings are held thrice, i.e, after every sessional exam.
- There is also a mechanism wherein each student has been allotted one Faculty Advisor (FA) who is responsible to monitor the progress of the student closely. The student is mandatorily required to discuss the courses he selects during registration process after consultation with the FA in every semester. The performance in sessionals and the End Term exam is also monitored by the FA and guidelines are issued. The attendance of the student is also monitored by the FA so as to ensure his involvement in the educational procedure.
- The valuation of all the exams is open for student's observation where students personally can see his answer book and discuss the valuation with the respective course coordinator.
- The parents also may discuss the progress of the student with the respective FA from time to time. If the progress of the student is poor then the FA can specially call the parent for discussion which regularly happens.
- The Feed Back from the industry i. e. the user departments and the society at large including the parents is planned henceforth in future to cover certain other factors from the environment to further upgrade and attain the PEO's.

#### **1.4. Assessment of the achievement of the Programme Educational Objectives (35)**

**1.4.1. Indicate tools and processes used in assessment of the achievement of the PEOs (5)**

Describe the assessment process that periodically documents and demonstrates the degree to which the Programme Educational Objectives are attained. (10)

Include information on: (15)

- a) A listing and description of the assessment processes used to gather the data upon which the evaluation of each programme educational objective is based. Examples of data collection processes may include, but are not limited to, employer surveys, graduate surveys, focus groups, industrial advisory committee meetings, or other processes that are relevant and appropriate to the programme;
- b) The frequency with which these assessment processes are carried out.

**(a) The feedback from Training and Placement / Once in a year**

The Feedbacks from the companies conducting the on campus interviews is obtained by the Training and Placement department regularly. For Civil Engineering Department, one Training and Placement secretary is appointed who is responsible to communicate the feedbacks from the companies to the students. Apart from that, a systematic tabulated sheet is prepared by the T & P department which is also placed in front of the Senate and discussions on this are done, preferably each semester.

**(b) The feedback from student class committees / Thrice in a semester**

The class Committees have been formed to ensure the attainment of the PEO's. Issues related to student learning are discussed at length. Certain issues raised by the students are addressed in these meetings. These meetings are held thrice, i.e, after every sessional exam. The various factors related to students discussed in these meetings are:

1. The results of the student: The grades obtained by the students in each course are discussed apart from the procedure to see the answer books. The major issues regarding the educational procedure in the duration of the course are discussed and the process of learning is moderated.
2. Coverage within each subject and the mode of the coverage is also discussed. It may be seen from the minutes of these class committee meetings that every issue is discussed Viz. audability of the teachers in the class, the overall impact of the class room teaching, facilities in the class room and labs, the support mechanisms in the labs, the time schedule for assignments and seminars etc.
3. The attendance issue of students not regular in their presence in the class is also discussed. Students with less than critical attendance are especially communicated through their FA.

(c) The Board of Studies includes members from the industry and other educational institutes of excellence as mentors. These experts suggest areas of skills and knowledge to be improved upon, by the students in the context of changing situation. These experts also suggest some changes to be brought upon in the course curriculum from time to time.

**This meeting happens twice in a year at least.**

(d) The continuous academic quality assessment is carried out through a peer (external) review process **once in a year.**

(e) Feedback forms from students and its analysis for improvement / **every semester**

The Feed Back forms have been specially designed to cover all the aspects related to the PEO's. This Feed Back form contains following areas (Feed Back Form is given as Appendices II):

1. The teachers knowledge and interaction in the class
2. The pace of the teaching
3. The interest generation in the course
4. Facilities for the course (Books, Manuals etc.)
5. Lab Facilities

(f) New modes of feedbacks have been recently started which includes Graduate Surveys and alumni survey. The outcomes of these surveys are utilised for upgrading and facilitating the PEO's further.

**These are conducted once in a year.**

Students are free to suggest improvement or changes in any of the aspects as deemed correct by the course coordinator.

#### **1.4.2. Provide the evidence for the achievement of the PEOs (30)**

**a) The expected level of attainment for each of the program educational objectives;**

The achievement of the PEO's are evident by the performance of the graduates of this program and the achievements may be quantified through surveys of the graduates already working in the industry. Surveys have been conducted this year from the students recently graduated and the students who have graduated 5-10 years back.

The surveys are oriented towards understanding the contribution of the learning through this program which has helped these students in their promotions and attaining a position of leadership in their respective organizations.

Following are the PEO's and the evidences which could be gathered through these surveys for fulfilment of the PEO's.

1. Actively engage in problem solving using engineering principles to address the evolving needs of the society. The student should be able to plan and design various environmental engineering structures and systems.
2. To be able to succeed in positions in civil engineering practice or research, and in other fields they choose to pursue and enrol in advanced studies. To lead or occupy position of importance in organizations involved in civil engineering profession and research.
3. Make ethical decisions and demonstrate a commitment to service to the profession and society. To focus on the sustainability aspects of the systems for insuring the social responsibilities.
4. Acquire a position or degree that values adaptability and innovation in their work. The degree possessed by the student must be recognised at all levels.
5. Pursue lifelong learning, and to be leaders, both in their chosen profession and in other activities. To be innovative and creative through sustained reference to the academic materials.

**b) Summaries of the results of the evaluation processes and an analysis illustrating the extent to which each of the programme educational objectives is being attained;**

1. Primary indicator of attainment of PEO's is the placement status.
2. Second indicator of attainment is the sustained performance of the graduate in the organization in the areas covered in the PEO's.
3. Third indicator is the progression of the students in the respective organization which is based on attainment of the PEO's.

**c) How the results are documented and maintained.**

- The PEO's may be directly correlated with the career achievements and career progression of the graduates. The alumni association within the institute maintains the data regarding the alumni as well as now the graduate feedbacks are conducted by the department. Various graduates have reached to excellent positions in the industry and other organizations and are contributing significantly in the nations development. There are several leaders who are leading the companies and organizations having graduated from this department. There are few entrepreneurs also who are not only contributing technically but also providing employment to other engineers.
- The results of the evaluation process are tabulated and discussed in the departmental meetings.

- The formats for Feedback from students and alumni have been designed.

**1.5. Indicate how the PEOs have been redefined in the past (5)**

(Articulate with rationale how the results of the evaluation of PEOs have been used to review/redefine the PEOs)

Earlier, there were no formal processes for PEOs. However these were assessed on the basis of performance of past three pass out batches and feedback given by stakeholders. But now in the recent past, a formal method of conducting graduate surveys and monitoring and redefining PEO's have been taken up by the department.

- The BOS continuously discusses the POE's in its meetings. There are expert members from industry and Institutes of excellence which provide important and crucial inputs for redefining the PEO's based on the changes in the external world and requirements.
- The graduate Surveys also provide data for the modifications of the PEO's.
- The department faculty is engaged in the consultancy jobs provided to the industry. This is an area which continuously upgrades the current upgrades in the technology and its implementation. Based on the industry requirement, the faculty members are continuously upgrading the skills so that consultancy projects may be taken up. This also helps in upgrading the PEO's based on the changes in the industry.
- The new courses have been introduced frequently depending upon the requirements of the industry and this has been seen as one of the important fact in up gradation of the PEO's.
- Faculty members of the department are also involved in the research. They have research projects and the research publications by the faculty members and by the other scientists are also taken into account while redefining the PEO's.

## 2. Programme Outcomes (250)

### 2.1. Definition and Validation of Course Outcomes and Programme Outcomes (20)

#### 2.1.1. List the Course Outcomes (COs) and Programme Outcomes (POs) (1)

Course Code	Course title	Course Outcomes ( COs)
<b>DC (Departmental Core)</b>		
CEL 405	Industrial Wastewater Treatment, Recycle & Reuse	<ol style="list-style-type: none"> <li>1. Understand and apply basic concepts of wastewater treatment.</li> <li>2. Design system, component or processes for industrial wastewater treatment.</li> <li>3. Understand how to identify, formulate and do engineering design calculations using hydraulic principles and calculation techniques for industrial wastewater treatment process.</li> <li>4. Understand and demonstrate the process of developing treatment alternative flow sheets through case studies and team-oriented technical presentations</li> <li>5. A knowledge of contemporary issues of industrial wastewater treatment.</li> </ol>
CEL 501	Environmental Chemistry & Microbiology	<ol style="list-style-type: none"> <li>1. Gain a broad theoretical understanding of Environmental Chemistry and microbiology</li> <li>2. Get accustomed with the measurement and analysis of various water characteristics</li> <li>3. To knowledge about the biological characteristics of drinking water and determination of the same.</li> <li>4. Contemporary issues and developments.</li> </ol>
CEP 501	Environmental Monitoring Laboratory-I.	<ol style="list-style-type: none"> <li>1. Understand methods of measurement and analysis of various drinking water parameters</li> <li>2. To get the practical knowledge about biological characteristics of water and wastewaters</li> <li>3. To understand the potability of any water source.</li> <li>4. Knowledge about the testing of water</li> </ol>

		for various purposes.
CEL 502	Municipal and Industrial Water Treatment	<ol style="list-style-type: none"> <li>1. Understand the quality of water required for municipal and industrial purpose.</li> <li>2. Understand the types of processes used to treat water for municipal and industrial purpose</li> <li>3. Understand how processes are configured in water treatment systems.</li> <li>4. Design water treatment units for conventional and specific water treatment</li> <li>5. Understand the fundamental engineering and science principles that are used to operate the processes used in treatment systems.</li> </ol>
CEL 503	Municipal Wastewater Treatment	<ol style="list-style-type: none"> <li>1. Understanding the purpose, operation, underlying mechanisms and basic design principles of common municipal wastewater treatment processes and their residuals.</li> <li>2. be able to apply these to produce functional design of municipal wastewater treatment system.</li> </ol>
CEL 504	Water Supply and Wastewater Collection Systems	The students will be able to gain the knowledge about the water supply and waste water collection systems. The students will be able to analyse and design the water distribution systems.
CEL 505	Municipal Solid Waste Management	<ol style="list-style-type: none"> <li>1. Gain a broad understanding of municipal solid waste</li> <li>2. Knowledge about the classification of solid waste and sources of solid waste</li> <li>3. Methods of processing and disposal of solid waste.</li> </ol>
CEL 506	Air Pollution Control	<ol style="list-style-type: none"> <li>1. Gain a broad understanding of air pollution and its control</li> <li>2. Methods of sampling and analysis of air pollutants</li> <li>3. Effects of air pollutants on human, animals, plants and materials</li> <li>4. Control of various air pollutants and Design of control equipment.</li> </ol>
CED 501	Project Phase I	To do the research on specific problem in the

		field of environmental engineering. The students will use their theoretical knowledge gained during the last semesters solve actual problem in the area of environmental engineering.
CED 502	Project Phase II	As above
MAL 407	Statistics and O. R. Techniques	The students will be able to analyse the data using various statistical methods.
CEP-502	Environmental Monitoring Laboratory-II	<ol style="list-style-type: none"> <li>1. Do the sampling and analysis of wastewater samples from the field.</li> <li>2. Do the sampling and analysis of air pollutants</li> <li>3. Do the characteristics of solid waste</li> </ol>
CEL 507	Environmental Engineering System Design	<ol style="list-style-type: none"> <li>1. Be able to make functional hydraulic and engineering design of environmental engineering systems with proper knowledge and</li> <li>2. the understanding of the basic design requirements and limitations.</li> </ol>
CEL 508	Environmental Geotechnics	<ol style="list-style-type: none"> <li>1. Understand social and environmental concerns and their expanse.</li> <li>2. Have an insight of design requirements of various components.</li> <li>3. Decide use of different materials</li> <li>4. Monitor pollution levels</li> <li>5. Select appropriate remediation solutions.</li> </ol>
CEL 509	Bioremediation: Principles & Applications	The students will be able to understand principles and application for the removal of pollutants from water, air, wastewater and solid waste management.
CEL 510	Environmental Management	Be able to understand and identify major environmental issues of sustainable development and contribute to improving quality of environmental with recourse to appropriate tools of environmental management.
CEL 511	Environmental Engineering Systems Optimization	The students will be able to understand optimization of various environmental engineering systems.
CEL 512	Environmental Biotechnology	The students will be able to gain the knowledge about the biotechnology and its application in the area of environmental engineering for the removal of various pollutants. The students will be able to apply



		the knowledge of biotechnology for the environmental management.
CEL 513	Environmental Systems Modeling	The students will be able to understand the modelling of various environmental engineering systems.
CEL 559	Energy Efficient Buildings	<ol style="list-style-type: none"> <li>1. Gain a broad understanding of energy efficient building designs.</li> <li>2. Identify, formulate, and solve engineering problems</li> <li>3. contemporary issues and development</li> <li>4. use the techniques, skills, and modern engineering tools necessary for engineering practice.</li> </ol>
CEL 561	Risk Analysis and Decision making	The students will be able to understand the analysis of risk involved in the application of any methodology in the management of environment.
CEL 412	Spatial analysis for Resources Management	<ol style="list-style-type: none"> <li>1. Understand the remote sensing data products</li> <li>2. Generate digital data in different spatial formats</li> <li>3. Understand spatial, 3D, Network and proximity analysis</li> <li>4. Understand the use of Customised products</li> <li>5. Visualize resources and their interaction</li> <li>6. Analyse the spatial data and provide solutions</li> </ol>
CEL 418	Energy Conversion & Environment	<ol style="list-style-type: none"> <li>1. Understand and apply basic concept of energy conversion and environmental protection.</li> <li>2. Understand fundamentals of waste to energy technology</li> <li>3. Develop skill to conduct environmental appraisal, perform energy audit and assessment of energy potential of energy sources</li> <li>4. Perform engineering calculations to design energy conversion systems using scientific and engineering principles</li> <li>5. Understand contemporary environmental and social issues related to energy conversion</li> </ol>
CEL 417	Hazardous Waste Management	<ol style="list-style-type: none"> <li>1. Gain a broad knowledge about the hazardous waste</li> <li>2. Understand sources and classification of</li> </ol>

		hazardous waste. 3. Waste minimization technics 4. Management of hazardous waste 5. Various rules and regulations for the management and handling of hazardous waste
CEL 432	Environmental Impact Assessment	The students will be able to assess the impact on the environment of various environment management techniques. The students will be able to analyse the impact on environment due to some new developmental activities.
CEL 574	Seminar	The students will be able to improve the communication skill

The Course outcomes of M. Tech. Environmental Engineering program are given above and also in Program Curriculum section with respective subjects. The program outcomes are as follows.

Parameters on which the PO's of the program are based are given as below and aim of PO's is to enable students to:

- a) Work in Environmental Engineering sector which is involved with various aspects of planning, design, construction and operation of Environmental Engineering systems.
- b) Design and analyse the complex problems and provide state of the art solutions.
- c) Contribute to the academic and research in the field of environmental engineering.
- d) Develop knowledge and skills in the area of broad domain of environmental engineering.

**Program outcomes adopted for correlation to course outcomes.**

Graduates Attributes (GA's) form a set of individually assessable outcomes that are the components indicative of the graduate's potential to acquire competence to practice at the appropriate level. The GA's are indicators of the attributes expected of a graduate from an accredited program. The Graduates of this program must acquire:

- a. An ability to apply knowledge of mathematics, science, and engineering to solve environmental engineering problems
- b. An ability to identify, formulate, design and conduct experiments, as well as to analyse and interpret data
- c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, safety, and sustainability
- d. An ability to understand engineering and management functions and to be able to function on multidisciplinary teams

- e. An ability to identify, formulate, and solve environmental engineering problems
- f. An understanding of professional and ethical responsibility to extend the social benefit of the environmental engineering project
- g. An ability to communicate effectively to handle complex engineering activities with the engineering community and the society at large, and should possess the skill of technical writing and effective presentation.
- h. The broad education necessary to understand the impact of engineering solutions in a global, economic, and societal context
- i. A recognition of the need for, and an ability to engage in independent life-long learning to incorporate technological innovations
- j. A knowledge of contemporary issues and environment,
- k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

### **2.1.2. State how and where the POs are published and disseminated (1)**

(Describe in which media (e.g. websites, curricula books) the POs are published and how these are disseminated among stakeholders)

The PO's of the Civil Engineering Program are widely physically displayed in the labs, departmental rooms etc. These have also been included in:

- Departmental syllabus booklet,
- departmental information brochure,
- website

### **2.1.3. Indicate processes employed for defining the POs (3)**

(Describe the process that periodically documents and demonstrates that the POs are defined in alignment with the graduate attributes prescribed by the NBA.)

- i. The curriculum improvement, modifications and additions are governed by BOS and executed through Senate on a continuous basis, ours being an autonomous institute. The mentor committee consists of experts from IIT/NIT/Industry/Research Institute who meet on a regular basis.
- ii. The BOS is held once in a semester and all the faculty members are contributing in the curriculum development. The student committee meets twice in each semester and their views are incorporated in order to improve the curriculum.
- iii. The scheme of examination and award of the degree is followed as per the rules set by the senate.

**2.1.4 Indicate how the defined POs are aligned to Graduate Attributes prescribed by the NBA (7)**

(Indicate how the POs defined for the programme are aligned with the Graduate Attributes of NBA as articulated in accreditation manual.)

<b>Program Outcomes</b>	<b>Graduate Attributes</b>
a. An ability to apply knowledge of mathematics, science, and engineering to solve environmental engineering problems	<b>Engineering Knowledge:</b> Apply the knowledge of mathematics, science, and engineering fundamentals and engineering specialisation to solution of complex engineering problems
b. An ability to identify, formulate, design and conduct experiments, as well as to analyse and interpret data	<b>Problem Analysis:</b> Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences
c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, safety, and sustainability	<b>Design/ Development of Solutions:</b> Design solutions for complex engineering problem and design system components or process that meet specified needs with appropriate consideration for public health and safety, and the cultural societal and environmental considerations
d. An ability to understand engineering and management functions and to be able to function on multidisciplinary team	<b>Project Management &amp; finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as member and leader in a team to manage projects and in multi disciplinary environments
e. An ability to identify, formulate, and solve environmental engineering problems	<b>Conduct investigations of complex problems:</b> use research based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
f. An understanding of professional and ethical responsibility to extend the social benefit of the environmental engineering project	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibility and norms of the engineering practise.
g. An ability to communicate	<b>Communication:</b> communicate

effectively to handle complex engineering activities with the engineering community and the society at large, and should possess the skill of technical writing and effective presentation.	effectively to on complex engineering activities with the engineering community and the society at large such as being able to comprehend and write effective reports and design documentations, make effective presentation, and give and receive clear instructions.
h. The broad education necessary to understand the impact of engineering solutions in a global, economic, and societal context	<b>The engineer and society:</b> Apply reaseaning informed by the contextual knowledge to asses societal health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practise.
i. A recognition of the need for, and an ability to engage in independent life-long learning to incorporate technological innovations	<b>Life Long Learning:</b> Recognition the need for, and the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
j. A knowledge of contemporary issues and environment	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental context and demonstrate the knowledge of and need for sustainable development
k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

### 2.1.5 Establish the correlation between the POs and the PEOs (8)

PEOs/POs	a	b	c	d	e	f	g	h	i	j	k
1	x		x		x				x		x
2	x	x	x		x			x			x
3	x	x	x		x		x			x	x
4	x	x	x		x		x	x			
5	x		x	x	x		x		x		x

**2.2 Attainment of Programme Outcomes (75)**

**2.2.1. Illustrate how the course outcomes contribute to the POs (5)**

Course Code	Course title	PO's										
		a	b	c	d	e	f	g	h	i	j	k
<b>DC (Departmental Core)</b>												
CEL 405	Industrial Wastewater Treatment, Recycle & Reuse	x	x			x					x	
CEL 501	Environmental Chemistry & Microbiology	x	x	x	x	x						
CEP 501	Environmental Monitoring Laboratory-I.	x	x	x		x					x	x
CEL 502	Municipal and Industrial Water Treatment	x	x	x								x
CEL 503	Municipal Wastewater Treatment	x	x	x				x				x
CEL 504	Water Supply and Wastewater Collection Systems	x	x			x					x	
CEL 505	Municipal Solid Waste Management	x	x		x	x			x			
CEL 506	Air Pollution Control	x	x			x					x	
CED 501	Project Phase I	x	x	x		X						
CED 502	Project Phase II	x	x	x		x					X	
MAL 407	Statistics and O. R. Techniques	x	x		x	x						X
CEP-502	Environmental Monitoring Laboratory-II	x	x	x		x	x					x
CEL 507	Environmental Engineering System Design	x	x	x	x	x						
CEL 508	Environmental Geotechnics	x	x	x	x	x						X
CEL 509	Bioremediation: Principles & Applications	x	x	x	x	x						X
CEL 510	Environmental Management	x			x						x	X
CEL 511	Environmental Engineering Systems Optimization	x	x		x	x						X
CEL 512	Environmental Biotechnology	x		x		x				X		
CEL 513	Environmental Systems	x	x				x					X

	Modeling											
CEL 559	Energy Efficient Buildings	x	x	x	x	x	x	x	x	x	x	x
CEL 561	Risk Analysis and Decision making	x	x	x	x	x	x	x	x	x	x	x
CEL 412	Spatial analysis for Resources Management	x	x	x	x	x	x	x	x	x	x	x
CEL 418	Energy Conversion & Environment	x	x	x	x	x	x	x	x	x	x	x
CEL 417	Hazardous Waste Management	x	x	x	x	x						
CEL 432	Environmental Impact Assessment	x	x	x	x	x	x	x	x	x	x	x
CEL 574	Seminar	x				x					x	x

(Provide the correlation between the course outcomes and the programme outcomes. The strength of the correlation may also be indicated)

**2.2.2 Explain how modes of delivery of courses help in attainment of the POs (5)**

(Describe the different course delivery methods/modes (e.g. lecture interspersed with discussion, asynchronous mode of interaction, group discussion, project etc.) used to deliver the courses and justify the effectiveness of these methods for the attainment of the POs. This may be further justified using the indirect assessment methods such as course-end surveys)

PO/Modes of delivery	1.Black / White Boards	2. Lab/ Experiment	3. Guest Lecture	4. Visit	5.Presentation	6.Assignment
a	x	x			x	x
b		x				
c	x	x	x	x	x	x
d		x			x	
e					x	x
f			x	x		
g			x		x	
h		x	x	x		
i					x	x
j	x	x	x			
k		x			x	x

**2.2.3. Indicate how assessment tools used to assess the impact of delivery of course/course content contribute towards the attainment of course outcomes/programme outcomes (15)**

Assessments/POs	a	b	c	d	e	f	g	h	i	j	k
Assignments	x		x		x				x		x
Examination	x	x	x		x			x			x
Research Paper	x	x	x		x		x			x	x
Projects	x	x	x		x		x	x			
Seminar	x		x	x	x		x		x		x

**2.2.4 Indicate the extent to which laboratory and project course work are contributing towards attainment of POs (50)**

- Projects offered are with latest and new technological development in the area of Environmental Engineering
- Projects are offered broadly in the area of water and waste water engineering based on lab scale models and/or field plants

Assessments/POs	a	b	c	d	e	f	g	h	i	j	k
Laboratory	x	x	x	x				x		x	x
Projects	x	x	x		x		x	x			

**2.3. Evaluation of the attainment of Programme Outcomes (125)**

**2.3.1. Describe assessment tools and processes used for assessing the attainment of each PO (25)**

Describe the assessment process that periodically documents and demonstrates the degree to which the Programme Outcomes are attained.

PO	PO Description	Assessment Tools & Processes for attainment of PO
<b>a</b>	An ability to apply knowledge of mathematics, science, and engineering to solve environmental engineering problems	<ol style="list-style-type: none"> <li>1. Numerical and analysis based problems are asked in assignments.</li> <li>2. Tutorials are conducted on design based problems.</li> <li>3. Observation based exercises are</li> </ol>



		conducted.
<b>b</b>	An ability to identify, formulate, design and conduct experiments, as well as to analyze and interpret data	<ol style="list-style-type: none"> <li>1. There are several courses in curriculum having laboratory experiments.</li> <li>2. Department has well equipped labs to fulfil this outcomes.</li> <li>3. Continuous evaluation is conducted based on experimental exercises.</li> </ol>
<b>c</b>	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, safety, and sustainability	<ol style="list-style-type: none"> <li>1. Several courses to inculcate the design capability of a student are part of curriculum like Design of RCC structures, Design of steel structures etc.</li> <li>2. Students are encouraged for design based mini projects and it's assessment is carried out by presentation and viva voce.</li> <li>3. Design assignments are given to students.</li> </ol>
<b>d</b>	An ability to understand engineering and management functions and to be able to function on multidisciplinary team	<ol style="list-style-type: none"> <li>1. Mini Projects and Major Projects are taken in groups.</li> <li>2. Group seminars are conducted.</li> <li>3. Students are encouraged to organise group events in the department by evolving internal or external members.</li> </ol>
<b>e</b>	An ability to identify, formulate, and solve environmental engineering problems	<ol style="list-style-type: none"> <li>1. Question Papers includes the aspect of problem identification &amp; problem solving.</li> <li>2. Students are encouraged to identify the research problems independently in projects.</li> <li>3. Assignments are oriented to problem identification &amp; problem solving.</li> </ol>
<b>f</b>	An understanding of	<ol style="list-style-type: none"> <li>1. Students are provided ample</li> </ol>

	professional and ethical responsibility to extend the social benefit of the environmental engineering project	<p>knowledge on professional ethics during the delivery of each course pertaining to that course.</p> <p>2. Guest lectures are arranged to give knowledge of the professional responsibilities.</p>
<b>g</b>	An ability to communicate effectively to handle complex engineering activities with the engineering community and the society at large, and should possess the skill of technical writing and effective presentation.	<p>1. Seminars by students is integral part of every course for internal assessment marks.</p> <p>2. Viva voce for laboratory exercises provide opportunity to express understanding of student.</p> <p>3. Students are encouraged to ask questions in the class and carry out discussion on queries.</p>
<b>h</b>	The broad education necessary to understand the impact of engineering solutions in a global, economic, and societal context	<p>1. Several courses include the aspect of impacts of the engineering solutions on a global, economic, environmental and societal context.</p> <p>2. Seminar topics delivered by the students are selected by the course coordinator to cover these aspects.</p> <p>3. Certain course are designed and included in the curriculum which are especially oriented towards achievement of this objective viz. Environment impact assessment, spatial analysis for resources management, engineering geology etc.</p>
<b>i</b>	A recognition of the need for, and an ability to engage in independent life-long learning to incorporate technological innovations	<p>1. Changes evident in the industry and society are incorporated in the course syllabi of each subject from time to time by the coordinator which implies the need of continuous learning.</p>

		2. Students are encouraged to refer to the research journals and technical magazines to abreast their current knowledge about the changes and continuous learning therefore.
<b>j</b>	A knowledge of contemporary issues and environment	<ol style="list-style-type: none"> <li>1. Observation and discussion of the current issues pertaining to aspects within civil engineering are encouraged within each course.</li> <li>2. Student seminars are oriented to cover the current problems related to the program.</li> <li>3. Students projects touch several areas of current issues and problems and try to resolve some of these problems, viz. problems in solid waste management, water supply, transportation, green buildings, disaster management, groundwater availability etc.</li> </ol>
<b>k</b>	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	<ol style="list-style-type: none"> <li>1. Several courses within the curriculum cover the aspect of imbibing technical skills and modern engineering tools necessary for engineering practice, viz. design practices, experimental skills and software knowledge.</li> <li>2. Projects in the 3rd year and Final year of the course is also oriented towards learning the technical skills and engineering practices.</li> </ol>

- a) Examination- Two sessional examinations per semester are conducted with end semester examination based on complete coverage of syllabus. The average grade of the students in specified core subject is taken as a key performance indicator.

- b) Assignments and seminars are conducted as a part of continuous assessment.
- c) Students are encouraged to appear for IES/CSIR examinations for their employment.
- d) Assessment is continuous throughout the semester. After every written examination students are encouraged to pursue their valued answer books. This gives complete transparency. Students are benefited by discussing their answers and perceptions with the faculty members.

### 2.3.2. Indicate results of evaluation of each PO (100)

The program outcomes are as follows:

Students are able to:

- a. apply knowledge of Environmental engineering  
**Results of PO (a):** Students are working in the area of environmental engineering in good numbers.
- b. design and conduct experiments, as well as to analyze and interpret data in the area of Environmental engineering  
**Results of PO (b):** Students are working in the research institutes.
- c. design an environmental system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability  
**Results of PO (c):** Many of the students are working as consultants and contributing in environmental research institutes.
- d. function on multidisciplinary teams  
**Results of PO (d):** Students are pursuing higher education as well as working in software industries.
- e. Expose identify, formulate, and solve environmental engineering problems  
**Results of PO (e):** Students are also working in R & D areas in reputed industries.
- f. understand professional and ethical responsibility  
**Results of PO (f):** Many of the students are working as faculties in various premier educational institutes.
- g. communicate effectively.  
**Results of PO (g):** Many students are working in the field of marketing.
- h. understand the impact of environmental engineering solutions in a global, economic, environmental, and societal context  
**Results of PO (h):** Many students are working in the area of environmental engineering globally
- i. recognize the need for, and an ability to engage in life-long learning.  
**Results of PO (i):** Many students are working in the field of environmental engineering
- j. understand and solve the contemporary issues  
**Results of PO (j):**

- k. Use the techniques, skills, and modern engineering tools necessary for environmental engineering practices.

*Results of PO (k):* Students are sensitized towards the global warming and challenges of sustainable development.

#### **2.4. Use of evaluation results towards improvement of the programme (30)**

##### **2.4.1. Indicate how the results of evaluation used for curricular improvement (5)**

Each subject is assessed with the performance of the students including those failed. Any deficiency on account of content/teaching in the subject is modified in BOS meeting with the help of student class committee meeting and their feedback.

##### **2.4.2. Indicate how results of evaluation used for improvement of course delivery and assessment (10)**

The course evaluation and delivery skills of the teacher are assessed by the students in each semester. This feedback is compiled by the committee and its outcome is intimated to concern teacher.

##### **2.4.3. State the process used for revising/redefining the POs (15)**

All the feedbacks are provided with student feedback is collected by the department so as to improve upon the process of teaching/ learning.

The suggested correction/modification in the syllabus of various subjects is taken up the in BOS for discussions. Any corrections/allevation/modifications approved by the BOS are implemented from the ensuing sessions.

Experienced Engineers, academicians and researchers are invited to work on the BOS, thus contributing their expertise and knowledge. The out come based education and assessment is being introduced for the first time and the results of the feedback and surveys of the stakeholders are part of the system. However the results and their use in revising and redefining the POs, COs as well as PEOs will only be evident at the next accreditation cycle.

## B-3 Programme Curriculum

### 3. Programme Curriculum (75)

#### 3.1. Curriculum (15)

##### 3.1.1. Describe the Structure of the Curriculum (5)

#### OVERALL CREDIT STRUCTURE

Postgraduate core (DC)		Postgraduate Elective (DE)	
Category	Credit	Category	Credit
DC	74	DE	30
Total	74	Total	30
Grand Total DC + DE		104	

Course Code	Course	Structure	Credits
<b>Departmental Core, DC</b>			
CEL 501	Environmental Chemistry & Microbiology	3-0-0	6
CEP 501	Environmental Monitoring Laboratory-I.	0-0-2	2
CEL 502	Municipal and Industrial Water Treatment	3-0-0	6
CEL 503	Municipal Wastewater Treatment	3-0-0	6
CEL 504	Water Supply and Wastewater Collection Systems	3-0-0	6
CEL 505	Municipal Solid Waste Management	3-0-0	6
CEL 506	Air Pollution Control	3-0-0	6
CEL 405	Industrial Wastewater Treatment, Recycle & Reuse	3-0-0	6
CED 501	Project Phase I	-	6
CED 502	Project Phase II	-	18
MAL 407	Statistics and O. R. Techniques	3-0-0	6
			74
<b>Departmental Elective, DE</b>			
CEP-502	Environmental Monitoring Laboratory-II	0-0-2	2
CEL 507	Environmental Engineering System Design	0-0-2	2
CEL 508	Environmental Geotechnics	3-0-0	6
CEL 509	Bioremediation : Principles & Applications	3-0-0	6
CEL 510	Environmental Management	3-0-0	6
CEL 511	Environmental Engineering Systems Optimization	3-0-0	6
CEL 512	Environmental Biotechnology	3-0-0	6
CEL 513	Environmental Systems Modelling	3-0-0	6
CEL 559	Energy Efficient Buildings	3-0-0	6
CEL 561	Risk Analysis and Decision making	3-0-0	6
CEL 412	Spatial analysis for Resources Management	3-0-2	8
CEL 418	Energy Conversion & Environment	3-0-0	6
CEL 417	Hazardous Waste Management	3-0-0	6

CEL 432	Environmental Impact Assessment	3-0-0	6
CEL 574	Seminar	0-0-0	2

### M. Tech Environmental Engineering

Category	Credits
Departmental Core	74
Department Electives	30
HM	
OC	
Total	104

I Semester				II Semester			
Code	Course	L-T-P	Credits	Code	Course	L-T-P	Credits
Core				Core			
CEL501	Environmental Chemistry & Microbiology	3-0-0	6	MAL 407	Statistics & optimization Technique	3-0-0	6
CEL 502	Municipal and Industrial Water Treatment	3-0-0	6	CEL505	Municipal Solid Waste Mgmt.	3-0-0	6
CEP 501	Environmental Monitoring Laboratory-I.	0-0-2	2	CEL405	Industrial Waste Water Treatment, Recycle & Reuse	3-0-0	6
CEL 503	Municipal Wastewater Treatment	3-0-0	6	<b>Elective</b>			
CEL 504	Water Supply and Wastewater Collection Systems	3-0-0	6	CEL510	Environmental Management	3-0-0	6
CEL 506	Air Pollution Control	3-0-0	6	CEL 422	Hazardous Waste Mgmt	3-0-0	6
				CEL512	Environmental Biotechnology	3-0-0	6
				CEL511	Environmental Engineering Systems Optimization	3-0-0	6
				CEL 509	Bioremediation : Principles & Applications	3-0-0	6
				CEL 561	Risk Analysis	3-0-0	6

					and Decision making		
				CEL 507	Environmental Engineering System Design	0-0-2	2
				CEP-502	Environmental Monitoring Laboratory-II	0-0-2	2
				CEL 574	Seminar	0-0-0	2
<b>III Semester</b>				<b>IV Semester</b>			
Code	Course	L-T-P	Credits	Code	Course	L-T-P	Credits
Core				Core			
CEL 501	Project Phase I	-	6	CEL 502	Project II		18
Elective							
CEL 508	Environmental Geotechnics	3-0-0	6				
CEL 513	Environmental Systems Modelling	3-0-0	6				
CEL559	Energy Efficient Buildings	3-0-0	6				
CEL 412	Spatial Analysis of Resources mgt	3-0-2	8				
CEL 418	Energy Conversion & Environment	3-0-0	6				
CEL 432	Environmental Impact Assessment	3-0-0	6				

**3.1.2 Justify how the curricular structure helps for the attainment of the POs and PEOs (10)**

Subjects\POs	a	b	c	d	e	f	g	h	i	j	k
<b>Core</b>											
Environmental Chemistry & Microbiology	×	×	×	×	×	×		×			
Municipal and Industrial Water Treatment	×	×	×	×	×	×		×		×	



Environmental Monitoring Laboratory-I.	x	x	x	x	x	x	x	x			
Municipal Wastewater Treatment	x	x	x	x	x	x	x	x			
Water Supply and Wastewater Collection Systems	x	x		x	x	x	x	x	x	x	x
Air Pollution Control	x		x	x	x	x	x	x			
Statistics & optimization Technique			x	x	x	x	x		x		
Municipal Solid Waste Mgmt.											
Industrial Waste Water Treatment, Recycle & Reuse	x	x	x	x	x	x	x	x			
Environmental Management	x	x				x		x	x		
Hazardous Waste Mgmt	x	x		x		x	x	x		x	
Environmental Biotechnology	x	x	x	x	x	x	x	x	x	x	x
Environmental Engineering Systems Optimization											
Bioremediation : Principles & Applications	x	x	x	x	x	x			x	x	x
Risk Analysis and Decision making	x	x		x	x	x	x		x		
Environmental Engineering System Design	x	x	x	x	x	x	x		x		
Environmental Monitoring Laboratory-II											
Seminar	x	x	x	x	x	x	x				
Project Phase I											
Environmental Geotechnics	x	x			x	x	x	x	x		
Environmental Systems Modelling	x	x			x	x	x			x	x
Energy Efficient Buildings	x	x	x	x	x	x	x	x	x	x	
Spatial Analysis of Resources mgt	x	x	x		x	x	x				

Energy Conversion & Environment	×	×	×		×	×	×				
Environmental Impact Assessment	×	×	×	×	×	×		×			
Project II	×	×	×			×		×			

Subjects/PEOs	1	2	3	4	5
Environmental Chemistry & Microbiology					
Municipal and Industrial Water Treatment	×	×	×		×
Environmental Monitoring Laboratory-I.	×	×	×		×
Municipal Wastewater Treatment	×	×	×		×
Water Supply and Wastewater Collection Systems					
Air Pollution Control	×	×	×	×	×
Statistics & optimization Technique	×	×	×		×
Municipal Solid Waste Mgmt.		×	×		×
Industrial Waste Water Treatment, Recycle & Reuse					
Environmental Management	×	×	×		×
Hazardous Waste Mgmt	×	×	×		×
Environmental Biotechnology	×	×	×		
Environmental Engineering Systems Optimization	×	×	×	×	×
Bioremediation : Principles & Applications					
Risk Analysis and Decision making		×			
Environmental Engineering System Design	×	×	×		×
Environmental Monitoring Laboratory-II	×	×	×	×	×
Seminar					
Project Phase I					

Environmental Geotechnics					
Environmental Systems Modelling	×	×	×		
Energy Efficient Buildings	×		×	×	×
Spatial Analysis of Resources mgt	×	×	×		×
Energy Conversion & Environment					
Environmental Impact Assessment	×	×	×		×
Project II	×	×	×		×

### 3.2. Indicate interaction with R&D organisations / Industry (40)

The department has signed MOU with NEERI Nagpur and MPCB for promotion of research and development in the area of environmental engineering.

The department has undertaken consultancy/sponsored research projects with various govt. and user agencies viz. MJP, NMC, NIT, MPCB, etc.

### 3.3. Curriculum Development (15)

#### 3.3.1. State the process for designing the programme curriculum (5)

The broad curriculum is based on making students to understand Environmental management. This is further more integrated with relevant practical sessions, experts/guests seminars, projects, and field visits. The industry institute interaction helps to build the relevant.

#### 3.3.2. Illustrate the measures and processes used to improve courses and curriculum (10)

The curriculum improvement, modifications and additions are governed by BOS and executed through Senate on a continuous basis, ours being an autonomous Institute. The mentor committee consists of experts from an IIT/NIT/Industry/Research Institute.

The BOS is held every year or/and as and when necessary. All the faculty members effectively contribute in the curriculum development. The student committee meets every semester and their views are incorporated in order to improve the curriculum.

The scheme of examination and award of the degree is followed as per the rules set by the senate.

### **3.4. Course Syllabi (5)**

#### **M.TECH (Environmental Engineering)**

##### **CEL 501- Environmental Chemistry & Microbiology (3-0-0); Credits 6**

Basic concepts of oxidation and reduction reactions, Gas laws and their application in Environmental Engineering, Osmosis, Dialysis, Principles of solvent extraction, Amphoteric hydroxides.

Concept of pH, and its application in Environmental Engineering, Definitions and basic concepts of acids, bases and buffers, colloid chemistry, Basic concepts of carbohydrates, proteins, lipids and enzymes, Definition and concept of Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD) and Total Organic Carbon (TOC).

Chemistry of water treatment processes like coagulation, disinfection, water softening and demineralization.

Definitions of Ecology and ecosystem, structure and components of ecosystem, concepts of trophic levels, food chain and food web, types of ecosystem, productivity, sulphur cycle, nitrogen cycle.

Introduction to Microbiology, Haeckel's classification, Morphology and structure of bacteria, nutritional requirement and nutritional classification of bacteria, Growth of bacteria, Indicator bacteria, Multiple Tube Dilution (MTD) and Membrane Filter (MF) techniques, Definition and characteristics of viruses.

##### **REFERENCE:**

1. C. N. Sawyer and P. L. McCarty, Chemistry for Environmental Engineers, McGraw Hill, Latest.
2. Pelezar Reid & Chan, Microbiology Tata McGraw Hill, Latest.
3. Powar & Dagainawala, General Microbiology Vol. I &II, Himalaya Publishing House, Latest.

##### **CEP 501- Environmental Monitoring Laboratory I (0-0-2); Credits: 2**

1. Determination of following parameters in water
  - 1) Alkalinity 2) Chloride 3) Hardness 4) Sulphate
  - 5) Turbidity 6) Dissolved oxygen 7) Kjeldahl nitrogen 8) Iron 9) Manganese 10) Heavy metals
2. Determination of COD and BOD of wastewater
3. MTD method for enumeration of indicator bacteria in water
4. Heterotrophic plate count for enumeration of bacteria.

##### **REFERENCE:**

1. Standard Methods for the Examination of Water & Wastewater, APHA, AWWA, WEF, Latest.

### **CEL 502- Municipal and Industrial Water Treatment (3-0-0); Credits: 6**

Water quality criteria and standards, Requirement of water treatment facilities, Unit operation & Unit process, Synthesizing water treatment system, Site selection, Process selection, Theory and Application of water treatment process- aeration, coagulation, flocculation, sedimentation, filtration, disinfection. Hydraulic design of water treatment plant, Advances/ modification/ modern development in water treatment, Control of water treatment process, O&M of water treatment plant, Water treatment plant residuals management. Industrial Water Quality requirement, Specific treatment for industrial purpose; Softening, Lime Soda and Ion Exchange, Desalination- Distillation processes, Reverse Osmosis, Electrodialysis; Flouride Removal, Arsenic Removal, Fe and Mn removal, Taste and Odor and color Removal, Adsorption, Ultrafiltration, Water treatment for Swimming Pool.

#### **REFERENCE:**

1. Fair Geyer & Okun, Water and Waste water Engineering Vol I and II, John Wiley & Sons 1<sup>st</sup>.
2. W.J.Weber Physiochemical process for water quality control, John Wiley & Sons 2<sup>nd</sup>.
3. ASCE, AWWA Water treatment plant design
4. CPHEEO, Manual on Water supply and Treatment, Govt. of India Publication.
5. R.L.Sank, Water treatment plant for practising engineers, Ann Arbor Science.

### **CEP 502- Environmental Monitoring Laboratory II (3-0-0); Credits: 6**

Collection, preservation and analysis of samples from water treatment plants, municipal wastewater treatment plants or industrial wastewater treatment plants, Collection and analysis of air samples for SPM, RSPM, SO<sub>2</sub>, NO<sub>x</sub>, etc. Characterization of municipal solid wastes

Minimum TEN practicals shall be performed from the list given below:

1. Study of various sampling and analytical equipment in air pollution
2. Determination of wind speed and direction
3. Preparation of wind rose diagram
4. Modeling of air pollution concentration
5. Determination of Particulate (SPM and RSPM) matter concentration in atmosphere by using high volume sampler
6. Determination of dust fall in atmosphere
7. Sampling and analysis of SO<sub>2</sub> in atmosphere
8. Sampling and analysis of NO<sub>2</sub> in atmosphere
9. Sampling and analysis of CO in atmosphere
10. Analysis of VOCs in air
11. Analysis of hazardous air pollutants
12. Characteristics and composition of solid waste
13. Proximate analysis of solid waste
14. Determination of calorific value of solid waste
15. Elemental analysis (CHNOS) of solid waste

16. Heavy metal analysis of solid waste
17. Toxicity characteristic leaching procedure (TCLP) for solid waste samples
18. Extractions of samples for pesticides

**REFERENCE:**

1. Standard Methods for the Examination of Water & Wastewater, APHA, AWWA, WEF.
2. IS Code No. 5182 Parts 1 to 20.
3. IS Code No. 10158, 9234 & 9235

**CEL 503- Municipal Wastewater Treatment (3-0-0); Credits: 6**

Objectives of municipal wastewater treatment, constituents of sewage and sewage characteristics, conventional municipal wastewater treatment flow sheet, functions of different unit processes, treatment requirements. Process analysis : Reaction and reaction kinetics, mass balance analysis, reactors and hydraulic characteristics, reactor selection, practical aspects of reactor design.

Preliminary treatment: Screening grit removal; Primary Treatment: Principles of sedimentation

Biological treatment : Principles of biological treatment, Role of microorganisms in WWT, types of biological processes for WWT, introduction to microbial metabolism, kinetics of biological growth, aerobic and anaerobic treatment of sewage, suspended and attached growth biological treatment processes - Activated sludge, tricking filters, biological disc. Packed bed and fluidized bed treatment, stabilization ponds, combined biological treatment processes.

Biological phosphorus and nitrogen removal

Sludge treatment: Sludge treatment flowsheets, sludge quality and quantity, various methods of sludge treatment, aerobic and anaerobic sludge digestion, sludge conditioning, dewatering of sludge, conveyance, storage and disposal.

Water reclamation technologies

Advanced waste water treatment: Principles of tertiary treatment, Reuse and resource recovery, and recent developments.

**REFERENCE:**

1. Metcalf and Eddy, Wastewater Engineering, Treatment, Disposal and Reuse, McGraw Hill, Fourth Edition, 2002.
2. S.J. Arceivala, Wastewater Treatment and Disposal, Marcel Dekker, 1981.
3. Davis & Cornwell, Introduction to Environmental Engineering, McGraw Hill, International, 1998.
4. Qasim S.R, Wastewater Treatment Plant Planning, Design and Operation, Holt Rinehart & Winston, N. Y, 1990.

**CEL 504- Water Supply and Wastewater Collection Systems (3-0-0); Credits: 6**

Analysis of flow in pipe network using Hardy Cross, Newton-Raphson and Linear Theory method, Reservoirs, Pumps and Valves in Water distribution systems, Pumps and Pumping Stations, Pipe Appurtenances, Pipe material selection, laying and jointing of pipes, Water supply to multi-storeyed buildings, Water supply during fairs, festivals and emergencies. Maintenance of distribution system.

Design of pumping main including water hammer consideration, Critical path method for design of water distribution networks.

Objectives, Type of systems and sewers, requisites for sewerage system design, Hydraulics of sewers, Velocity of equal cleansing, Sewer shape vis-a-vis their usefulness, sewer invert drop.

**REFERENCE:**

1. Bhawe P. R. And Gupta R, Analysis of Water Distribution Networks, Narosa Publishing Co., New Delhi (2006).
2. Fair G. M., Geyer J. C. & Okun D. A., Water & Wastewater Engg. Vol. I & II, John-Willey & Sons, New York.
3. McGhee N. J. & Steel E. W., Water supply and sewerage, McGraw hill publications, 1991.
4. CPHEEO, Manual on water supply and treatment, Ministry of urban development, GoI.
5. CPHEEO, Manual on Sewerage and Sewage Treatment, Ministry of urban development, GoI.
6. Bhawe P.R, Optimal design of water distribution networks, Narosa Publishing Co., New Delhi (2003).

**CEL 505- Municipal Solid Waste Management**

**(3-0-0); Credits: 6**

Sources, Classification, Composition – Quality – characteristics-Physical, Chemical and microbiology involved , Quantity-generation of municipal refuse, per capita contribution, Density, Sampling;

Collection and transportation of waste-refuse transportation vehicles ; optimization of routes, maintenance of vehicles; industrial waste management; reduction, Recycle, Reuse, Recovery and Reporting; hazardous waste management;

Disposal of waste by land filling, site selection, leachate and gas collection, lining; composting of waste, methods, factors affecting, Incineration, types, energy recovery and products of incineration; Processing of waste for useful products-pyrolysis, RDF; Legislation and regulatory trends

**REFERENCE:**

1. Bhawe A.D., Sundaresan B.B, Solid Waste Management, Collection, Processing and Disposal, Mundrashilp offset printers, Nagpur, 2001.
2. Vesilind A. P., Worrell W., Reinhart Solid Waste Engineering Thomson Books Cole. 2002.
3. Tchobanoglous G., Theisen H, Vigil S.A., Integrated Solid Waste Management Engineering Principles and Management Issues, Tata McGraw Hill International Editions Civil Engg. Series, 1993.

4. CPHEEO, MoUD, CPHEEO manual on municipal solid waste management, GoI, New Delhi.
5. Syed R. Qasim, Walterchiang Sanitary landfill leachate generation control and treatment, Techromic publishing co. Inc. 1994.
6. Amalendu bagchi, Design of landfills & integrated solid waste management John wiley & sons. Inc.
7. S. S. Dara A text book of environmental chemistry and pollution control S. Chand & Co. Ltd. 2002
8. American public works association Municipal refuse disposal Public administration service, Chicago 1970.

**CEL 506- Air Pollution Control**

**(3-0-0); Credits: 6**

Sources, Classification, Causes and effects of air pollution; Metrological parameters of dilution, dispersion, distribution of emission of stack pollutants, Air quality monitoring, sampling and analysis of air from ambient and other sources of pollutants, Monitoring Instrumentation and principles of operation, Exhaust pollution, Control equipment for gaseous and particulate pollutants, Legislation and regulatory trends, Impacts of air pollution.

**REFERENCE:**

1. Rao M.N. and Rao H.V. N, Air Pollution, Tata Mc-Graw Hill Publishing Co. New Delhi, Third Edition, 1992.
2. Y. Anjaneyulu, A textbook of air pollution & control technology, Allied publishers.
3. Nevers N.D, Air Pollution control Engineering, Editions Civil Engineering series, 1995.
4. Rao C.S., Environmental Pollution Control Engg, New Age International Pvt. Ltd. Publishers, 2006.
5. Stern A. C, Air pollution, Tata McGraw Hill International, Vol I to IX.
6. Kudesia v. P., Air Pollution, Pragati prakashan, meerut 2<sup>nd</sup> 1980.

**CEL 507- Environmental Engineering Systems Design**

**(0-0-2); Credits: 2**

Design aspects of water and waste water systems ranging from pipeline to treatment plant; sanitary landfill; a detailed design of atleast one unit will be completed as either an individual or class project.

**REFERENCE:**

1. Qasim S.R Wastewater Treatment Plant Planning, Design and Operation Holt Rinehart & Winston, N. Y 1990.
2. Dr. A.G. Bhole, Water Treatment Plant Design Indian Water works Association 1<sup>st</sup> edition.
3. Amalendu Bagchi, Design of landfill & Integrated Solid waste Management, John Willey & Sons, Inc. 2<sup>nd</sup> edition.

**CEL 508- Environmental Geotechnics**

**(0-0-3); Credits: 6**



Source, Production and Classification of Wastes. Soil Pollution Processes; Physical-chemical and Biological Interactions in Soil. Effects on Geotechnical Properties and Case Studies. Waste Disposal Facilities such as Landfills and Impoundments, Slurry walls, etc. Barrier Systems- Basic concepts, Stability, compatibility and performance, Geo- membranes. Monitoring Sub surface contamination; Stabilization/ Solidification of Wastes. Remediation Methods.

**REFERENCE:**

1. Daniel, D. E., Geotechnical Practice for Waste Disposal, Chapman and Hall, London 1993.
2. Reddi, L. N., and Inyang, H. F., Geoenvironmental Engineering - Principles and Applications, Marcel Dekker, Inc., 2000.
3. Hsai-Yang Fang, Introduction to Environmental Geotechnology, CRC Press, 1997.

**CEL 510- Environmental Management (3-0-0); Credits: 6**

Sustainable development and strategies, Waste minimization and pollution prevention strategies – cleaner technologies, Tools of corporate environmental management; Environmental policy, Environmental management systems; ISO : 14000; Environmental Impact assessment, Indian environmental legislations and environmental acts such as Water Act (1974), Air Act (1981), Environmental (Protection) Act (1986); International Environmental Treaties; Life cycle assessment; environmental labeling, environmental audit, Environmental performance assessment; regulatory standards for industrial wastewaters and atmospheric emission.

**REFERENCE:**

1. Richard Welford, Corporate Environmental Management Systems and Strategies, Universities Press (I) Ltd., Hyderabad, 1996.
2. Paul L. Bishop, Pollution Prevention: Fundamental and Practice, McGraw Hill, International, 2000.
3. Freeman, H.M., Industrial Pollution Prevention Handbook, McGraw Hills 1995.

**CEL 511- Environmental Engineering Systems Optimization (3-0-0); Credits 6**

Principles of economic analysis, mathematics of economic analysis, discounting factors and different discounting techniques. Optimization methods for environmental engg. Systems e.g. pumping main, water transmission & distribution networks, wastewater collection systems, water treatment systems, wastewater treatment systems, solid waste management systems and air pollution control systems.

**REFERENCE:**

1. Haith D. A. Environmental systems optimization, John Willey , New York 1982.
2. Bhave P.R. Optimal design of water distribution networks Narosa Publishing Co., New Delhi.
3. Kalyanmoy Deb Optimization for engineering design Practice Hall.
4. Vedula S. And Majumdar Y. P. Water resources systems-modelling techniques and analysis McGraw Hills Co.

**CEL 512- Environmental Biotechnology (3-0-0); Credits: 6**

Basic concepts of Microbial Biochemistry of carbohydrates, proteins and fats; structure of nucleic acids Deoxyribose nucleic acid - DNA and Ribose nucleic acid – RNA

Basic concepts of biodegradation, biotransformation, bioleaching and biobeneficiation; Different types of microbial associations or interactions.

Environmental monitoring – significance of monitoring bacterial, viral and protozoan pathogens; Techniques of monitoring – gene probes, biosensors and immunoassay.

Basic concepts of Genetic Engineering – genes, chromosomal DNA, plasmid DNA, replication of DNA, genetic code, transformation, transduction and conjugation processes in bacteria, mutation, recombinant DNA techniques.

Biotransformation of biomass / organic waste into value added chemicals and energy, Single cell proteins, Microorganisms involved and biochemical changes of different pollutants present in liquid wastes, Types of reactors, pathways of bioenergy production – biomethane production, bioethanol production etc.

**REFERENCE:**

1. Balasubramanian et al. Concepts in Biotechnology Sangam Books Ltd. Latest.
2. Dubey, Text book of Biotechnology, Latest.
- 3.

**CEL 513- Environmental Systems Modelling (0-0-3); Credits: 6**

Definition; Classification; Examples and Models of Environmental Systems.

Introduction to Air Quality Models; Metrology; Atmospheric Stability and Turbulence; Gaussian Plume Model and Modifications; Numerical Models, Urban Diffusion Models;

Introduction to river, estuarine and lake thermodynamics, Stratification of lakes, Dissolved Oxygen Model for streams, Temperature Models, Prediction of fate of organisms and toxic substances.

Models for predicting water quality changes in water distribution systems

Computational methods in Environmental Modelling.

**REFERENCE:**

1. Gilbert M. Masters Introduction To Env. Engg. and Science Practice hall, India.
2. Thomann R. V. And Muller J. A. Principles of surface water quality modelling and control Harper international edition 1987.
3. Technobangolous G. , Schroader E. D., Water quality Addison-Wesley publishing co. Reading Massachusetts.

**CEL 559 - Energy Efficient Building (3-0-0); Credits: 6**

Conservation & energy efficiency concepts-overview of significance of energy use and energy processes in buildings

Passive solar energy fundamentals & practices in building design- solar astronomical relations and radiation physics and measurements, human thermal comfort, climatological factors, material specifications and heat transfer principles.

Passive solar energy practice in building design- design decisions in building- location, orientation, form, material, Thermal performance evaluation

Passive Solar technologies- trombe wall, thermosiphoned mass wall, water wall, sunspaces, roof ponds, glazed windows, cool towers, under slab rock beds

Design Guidelines & Economic Optimization- Concept of cost/benefit of energy conservation & passive solar technologies.

Advances in computational energy conservation- implementation of computer energy simulation programs into solar designs

**REFERENCE:**

1. Mili Majumdar, Energy Efficient Buildings in India Tata Energy Research Institute.
2. Lal Jayamaha Energy-Efficient Building Systems McGraw Hill Publication.
3. H P Garg, J Prakash Solar Energy Fundamentals & Applications Tata McGraw Hill Publishing.
4. J A Duffie & W A Beckman, Solar Energy and thermal processes John Wiley.
5. A A M Sayigh Solar Energy Applications in Buildings Academic Press

**CEL 561- Risk Analysis and Decision Making**

**(3-0-0); Credits: 6**

Need of Decisions and Risk analysis for construction management, Decision Models, Risk and Uncertainty, Theory and Techniques of Decision and Risk Analysis, Qualitative and Quantitative risk analysis tools /methods, Modelling Value Systems, Value Management for Construction, Competitive Bidding and Risk Sharing, Strategic and integral planning, Decisions making for site selection, construction , execution and operation of projects, Documentation, Project proposals, Economic Analysis, Legal Aspects of project management, Environmental appraisal, ISO 14000, Hazards identification, analysis and risk assessment, Accident and incident Analysis and control systems, IS 3786, S.H.E. Management IS15001, Training & Education Management Oversight and risk tree, Risk control and Treatment, Risk management and Internal control, Risk mitigation, Risk management plan, IT and IS for Risk management

**REFERENCE:**

1. Melvin W. Lifson, Edward F. Shaifer, Decision and Risk Analysis for Construction Management, John Wiley & Sons 1<sup>st</sup>.
2. Ian Cameron, Raghu Raman, Process Systems Risk management Elsevier Academic Press 2005.
3. Chris Marrison Fundamentals of Risk Measurements Tata McGraw Hill 2002.
4. Han Buhlman, Mathematical Methods in Risk Theory Springer- Verlag Berlin Heidelberg 1970.
5. Calow P Hand book of Environmental Risk Assessment and Mngement Blackwell Science Ltd. Oxford, Uk 1998.

**MAL 407- Statistics & Optimization Technique****(3-0-0); Credits: 6**

Sampling Theory: Population Parameter, Sample Statistics, Sampling distributions, Sample mean, Sampling distribution of means, the sample variance, the sampling distribution of variance.

Estimation Theory: Point estimate and interval estimates, reliability, confidence interval estimates of population parameters, confidence intervals for means, proportions and variance.

Tests of Hypothesis and Significance: Statistical decisions, tests of hypotheses and significance, Type I and Type II errors, level of significance, one tailed and two tailed tests. Tests involving small samples and large samples, fitting theoretical distributions to sample frequency distribution, The chi-square test for goodness of fit.

O. R. Techniques

Linear Programming: Formulation of linear programming problem, Graphical solution- simplex method (including Big M method and two phase method), dual problem- duality theory, dual simplex method, revised simplex method.

Transportation problem: existence of solution-degeneracy- MODI method; Assignment problem- traveling salesman problem

Nonlinear programming problem (NLPP): Constrained NLPP, Lagrange's multipliers method – convex NLPP, Kuhn-Tucker conditions.

**REFERENCE:**

1. M.R. Spiegel, Probability and Statistics, McGraw Hill,
2. H.A. Taha, Operation Research, Prentice Hall of India Pvt. Ltd.
3. J.C. Pant, Introduction to Optimisation : Operations Research, Jain Brothers, New Delhi.
4. Miller and Freund, Probability and Statistics for Engineers.

**CEL 405 Industrial Waste Water Treatment Recycle & Reuse (3-0-0); Credits: 6**

Industrial pollution and its measurement; Generation of Industrial wastewater, Disposal standards; Quantification and characterization of wastewater and its variations; Environmental impacts due to discharge of wastewater on streams, land and sewerage system; Industrial waste survey; Stream sanitation, stream sampling, Stream survey; Principles and techniques for Industrial Pollution prevention and control; Waste minimization; recent trends in industrial waste management, Cleaner technologies; Reuse, Recycling and Resource recovery; Volume and strength reduction; Equalization and proportioning; Neutralization; Methods of Disposal and treatment for removal of organic, inorganic, solids, pathogens, heavy metals and other pollutants; Alternatives and Synthesizing industrial waste treatment system; Joint treatment of industrial waste; CETP; Pollution control measures and Treatment of wastes from various industries viz. Pulp and paper, tanning, Sugar, Dairy, Chemical, Cement, Petroleum, Fertilizers, Metal Finishing, Etc.

**REFERENCE:**

1. Nemerow N.L, Theories and Practices of Industrial Waste Treatment, Addison Wesley Publishing CO. NY. 2<sup>nd</sup> edition.
2. W.W.Ecenfelder, Industrial Water Pollution Control Mc-Graw Hill Book Co. 2<sup>nd</sup> edition.
3. Freeman H. M., Industrial Pollution Prevention Handbook McGraw Hill 1<sup>st</sup>.
4. Central Pollution Control Board, India, Comprehensive Industry Document Series.
5. E.B. Besselièvre, The Treatment of Industrial Waste Mc-Graw Hill Book Co. 1<sup>st</sup>.

**CEL 412 Spatial Analysis for Resources Management (3-0-2); Credits: 8**

Fundamentals of Geoinformatics: raster and Vector Data, Resolutions of RS data, Thermal and Radar Sensing, spatial and non spatial information, attribute data collection, data formats, data conversions. RS as a technology for data extraction technique, multithematic data extraction using multispectral sensors, thematic map generation.

Overlay analyses, Buffer analyses, Query shell. Spatial analysis, Modeling of spatial data, Network analysis, digital terrain elevation models, Customization and Decision Support Systems.

Applications of Geoinformatics for spatial management of resources: Run-off estimations, infiltration characteristics, groundwater potential and recharge characteristics, Watershed management, watershed prioritization, Sediment yield estimation, reservoir capacity studies, Spatial analyses for Environment Impact assessment, Monitoring and feedback, Natural indices, Concept of E-Governance using Geoinformatics. Integrated applications using various technologies within Geoinformatics; methods and approach. Real time and temporal analysis using Geoinformatics.

Multidisciplinary applications of Geoinformatics; integration of various segments. Geoinformatics for resources management and utilities management.

**Practical**

Spatial Digital Data and its Formats

Digital Image analysis and Classification

Vector Data generation, topology building and attribution

Overlay, Buffer and Network analysis

Models for Resource analysis.

**REFERENCE:**

1. C.P LO Albert KW Yeung Concepts and techniques of Geographic Information Systems Prentice Hall of India, 2002.
2. C.S. Agrawal & P K Garg, Text Book on Remote Sensing Wheeler First.
3. Paul A. Longley, M. Goodchild, David Maguire, David Rhind, Geographic Information Systems and Science, Wiley, First.

4. Geographic Informaiton System and Enviornment Modeling, Keith C. Clerk, Bradely O Parks, Michel P Crane, Pritince Hall of India, 2002.
5. John R Jensen, Remote Sensing of the Environment ..an Earth Resource Perspective, Pearson Education, 2006.

**CEL 418 Energy Conversion and Environment**

**(3-0-0); Credits: 6**

Overview of Global and Indian Energy Scenario; Resource Conservation and Environmental Movement; Flow of Energy Through Ecosystem; Renewable and Non- Renewable Energy Sources; Sustainable System of Energy; Energy and Resources Conservation Strategies and Policies; Energy audit; Energy Conversion Methods: Thermal, hydro, nuclear, solar, wind, tidal, Energy Analysis; Energy economics; Future Energy Systems; Introduction to Fuel combustion fundamentals, formation of Pollutants, Measurements and Control; Alternative Energy sources Utilizations; Classification of Waste as Fuel; Waste to Energy options: Combustion, Gasification, anaerobic digestion, fermentation, pyrolysis; Fuels Derived from Waste to Energy Technology; Power Generation using Waste to Energy technology, Gas generations and collection in landfills, Potential for biomass and Biogas Energy system.

**REFERENCE:**

1. Fowler J. M. Energy and the Environment McGraw Hill New York 2<sup>nd</sup> edition.
2. D. O. Hall, G. W. Barnard and P. A. Moss, Biomass for Energy in the Developing Countries, Current Roles, Potentials, Problems, Prospects, Pergamon Press Ltd, 1<sup>st</sup> edition.
3. W. C. Turner, Energy Management Handbook Wiley Newyork 1<sup>st</sup> edition.
4. P. Meier, Energy System Analysis for Developing countries, Sringer Verlag 1<sup>st</sup> edition.
5. Dorthy J De Renzo, Energy from Bioconversion of Wate materials, Noyes data Corporation USA 1<sup>st</sup> edition.
6. Francis A.Domino Energy from Solid Waste – Recent Development, Noyes data Corporation USA 1<sup>st</sup> edition.
7. Oliver S. Owen , Daniel D. Chiras, Natural Resource Conservation – Management for Sustainable Future Prentice Hall Publications 6<sup>th</sup> edition.
8. McGraw Hill George Tachonobanoglous, Hilary Thesin, Samuel Vigil 1<sup>st</sup> International Edn.

**CEL 422- Hazardous Waste Management**

**(3-0-0); Credits: 6**

Generation, storage, transportation, treatment, disposal, exchanges and minimization, legislative and technical aspects, current management practices; Environmental audits, pollution prevention, facility development and operations, treatment and disposal methods; physical, chemical, thermal, biological processes, land disposal with general applications to the industrial and energy-producing sectors, Site remediation. Special wastes, such as, infectious and radioactive waste.

**REFERENCE:**

1. M. D. LaGrega, P.L.Buckingham and J.C.Evans, Hazardous Waste Management, McGraw-Hill, Inc., New York, 1994.
2. W.S.Forester and J.H.Skinner, International Perspective on Hazardous Waste Management, Mudra Offset Printers, Bajaj Nagar Nagpur, 2001.
3. G.W.Dawson and B.W.Mercer, Hazardous Waste Management, Academic Press, Inc., London, England 1987.
4. H.M.Freeman, Standard Handbook of Hazardous Waste Treatment and Disposal, McGraw-Hill, Inc., New York, 1989.
5. E.J.Martin and J.H.Johnson, Jr., Hazardous Waste Management Engineering Van Nostrand Reinhold Co. Inc. New York, 1987.

**CEL 432 Environmental Impact Assessments****(3-0-0); Credits: 6**

Evolution of EIA; EIA at project; Regional and policy levels; EIA process in India and other countries; EIA methodologies; Screening and scoping criteria; Rapid and Comprehensive EIA; Environmental health impact assessment, Environment risk analysis; Uncertainties; Practical Applications of EIA; Baseline collection of data; Prediction and assessment of impacts of physical biological and socio-economic environment; Development of environment management plan; Post project monitoring; EIA report and EIS; Review process. Case histories of applications for industrial; Water resources and irrigation projects; ports and harbours, Mining, Transportation and other projects sectors

**TEXT / REFERENCES:**

1. Canter, L. Environmental Impact Assessment, McGraw Hill 1977
2. Rau, GJ. And Wooten, C.D., Environmental Impact Analysis Handbook, McGraw Hill 1980
3. Ministry of Environment and Forests, GoI, Current Documents on Guidelines for EIA.

#### 4. Students' Performance (100)

##### 4.1. Admission intake in the programme (15)

YEAR	Sanctioned Strength of the Programme*	Number of Students Admitted	Percentage of seats filled	Number of Students Admitted with Valid GATE Score/PG entrance of State	Percentage of Students with Valid GATE Score/PG entrance of State
<b>CAY</b> 2012-13	22	20	90.91	20	100
<b>CAYm1</b> 2011-12	20	17	85.00	01	5.88
<b>CAYm2</b> 2010-11	20	08	40.00	01	12.5
<b>CAYm3</b> 2009-10	20	13	65.00	01	7.69

Average percentage of seats filled through approved procedure = 70.23

Average percentage of students admitted with valid GATE Score/PG entrance of state = 31.52

\* additional ten seats are sponsored directly by CPHEEO

YEAR	Number of Students Admitted	API = Academic Performance Index = Average CGPA or Average Marks on a Scale of 10 (Compiled from the Graduation Records)
<b>CAY (12-13)</b>	20	7.61
<b>CAYm1(11-12)</b>	17	7.76
<b>CAYm2 (10-11)</b>	08	7.94
<b>CAYm3 (9-10)</b>	13	8.17

**Average API = 7.87**

##### 4.1.1 Number of seats filled through the admission procedure approved by the University (5)

Assessment will be based on average percentage of seats filled through approved



procedure and points awarded to be proportionate accordingly.

#### 4.1.2 Quality of students as judged from their complete graduation records (5)

$$\text{Assessment} = 1.5 \times \text{Average API} = 11.805$$

#### 4.1.3 Number of students admitted having a valid GATE score/PG entrance of state (5)

Assessment = 10\* (Average percentage of students admitted with valid GATE score/PG entrance of state)

$$= 10 \times 31.52 = 315.2$$

#### 4.2 Success Rate (20)

Provide data for the past three batches of students

GI = Graduation index = (number of students graduated from the programme)/(number of students joined the programme)

Year	Number Of Students Graduated From The Programme	Number Of Students Joined The Programme	Gi
LYG (11-13)	16	17	0.94
LYGm1 (10-12)	08	08	1.00
LYGm2 (09-11)	13	13	1.00

$$\text{Average GI} = 0.98$$

$$\text{Assessment} = 20 \times \text{average GI} = 19.60$$

#### 4.3 Academic Performance (20)

API = Academic Performance Index = Average CGPA or Average Marks

On A Scale Of 10

YEAR	Number of students in the batch	API
LYG	16	7.76
LYGm1	08	7.94
LYGm2	13	8.17

$$\text{Average API} = 7.96$$

$$\text{Assessment} = 2 \times \text{average API} = 15.92$$

#### 4.4. Placement and Higher Studies (20)

$$\text{Assessment Points} = 20 \times (x + 3y)/N$$

where,  $x$  = Number of students placed

$y$  = Number of students admitted for higher studies

with valid qualifying scores/ranks, and

$N$  = Total number of students who were admitted in the batch

maximum assessment points = 20.

Item	LYG	LYGm1	LYGm2
Number of admitted students corresponding to LYG ( $N$ )	17	08	13
Number of students who obtained jobs as per the record in the industry/academia	17	06	13
Number of students who opted for higher studies with valid qualifying scores/ranks ( $y$ )	00	02	00
Assessment points	20	30	20

Average assessment points = 23.33

#### 4.5. Professional Activities (25)

##### 4.5.1. Membership in Professional Societies / Chapters and organising engineering events (5)

- IWWA Student chapters
- EESF (Environmental Engineering Student Forum)

##### 4.5.2. Participation and their outcomes in international/national events (5)

- i) Dr A. R. Tembhurkar, Ädil Mohammed, “ Drinking Water –Heath and Economy” at 24<sup>th</sup> National Convention of IPHE on ‘Water and Sanitation Utility Services in India and Their Heath Implications’ 12-13<sup>th</sup> Feb 2011, Bhubaneshwar

##### 4.5.3. Publication and awards in international/national events (10)

- ii) Dr. A.R.Tembhurkar, Radhika Deshpande “ Powdered Activated Lemon Peels as Adsorbent for Removal of Cutting Oil from Wastewater” Jour. of Hazardous, Toxic

- and Radioactive Waste, American Society for Civil Engineers **ASCE**, Vol 16, No 4 Oct 2012
- iii) Tembhurkar A. R. and Dongre Shilpa, “Comparative studies on fluoride removal using natural adsorbents, viz. Azadirachta Indica (Neem) and Ficus religiosa (Pipal)”, Journal of Institute of Engineers, Vol. 90, 18-23, 2009.
  - iv) Shilpa Tiwari, Dr. A.R. Tembhurkar, “Laboratory Studies on Filtrations Unit with Foam and Sand as Dual Media” International Research Journal of Lab to Land Vol 2(8) Oct 2010, ISSN 0975-282x.
  - v) Gireedhari Patle, Vaidehi Dakwale & Rahul Ralegaonkar (2011) *Design of Green Building: A Case Study for Composite Climate* International Journal of Engineering Research and Applications, Vol. 1, Issue 2, pp.388-395.

#### 4.5.4. Entrepreneurship initiatives and innovations (5)

The student of the department actively participate in the entrepreneurship related activities organised by **E-cell** (entrepreneurship cell) of the institute.

#### 5. Faculty Contributions (200)

List of Faculty Members: Exclusively for the Programme/Shared with other Programmes

Name of the faculty member	Qualification, university, and year of graduation	Designation and date of joining the institution	Distribution of teaching load (%)		
			1 <sup>st</sup> Yr	UG	PG
Dr. V.A.Mhaisalkar	BE, MTech Ph.D.	Professor	00	00	100
Dr. Rajesh Gupta	BE, MTech PhD	Professor	00	00	100
Dr. Y.B.Katpatal	B.Sc. M.Tech., Ph.D.	Professor	00	70	30
Prof. D.J. Katyayan	B.E., M.Tech.	Associate Professor	00	50	50
Dr. (Mrs.) M.V. Latkar	B.Sc., M.Sc. Ph.D.	Associate Professor	00	00	100
Dr. A.R.Tembhurkar	BE, MTech Ph.D.	Associate Professor	-	30	70
Dr. R.V.Ralegaonkar	BE, MTech PhD	Associate Professor	-	40	60
Dr. D.H. Lataye	BE, MTech PhD	Assistant Professor	00	50	50
Dr. S.R.Dongre	BE, MTech PhD	Assistant Professor	00	100	00

**5.1. Student Teacher Ratio (STR) (20)**

**U1** = Number of Students in UG 2<sup>nd</sup> Year

**U2** = Number of Students in UG 3<sup>rd</sup> Year

**U3** = Number of Students in UG 4<sup>th</sup> Year

**P1** = Number of Students in PG 1<sup>st</sup> Year

**P2** = Number of Students in PG 2<sup>nd</sup> Year

**N1** = Total Number of Faculty Members in the Parent Department

S=Number of Students in the Parent Department = **U1 + U2 + U3 + P1 +P2**

Student Teacher Ratio (STR) = S / N1

Assessment = [20 x 13 /STR], subject to maximum of 20.

Year	P1	P2	S	F (N1)	STR	Assessment
<b>CAY 2012-2013</b>	24	20	44	5.6	7.86	33.08
<b>CAYm1 2011-2012</b>	20	16	36	5.6	6.43	40.44
<b>CAYm2 2010-2011</b>	20	08	28	5.6	5.0	52
<b>CAYm3 2009-2010</b>	18	13	31	5.6	5.54	46.93

Average Assessment = 20.00

**5.2. Faculty strength in PG programme (20)**

**X** = Number of faculty members with Ph.D available for PG Programme

**Y** = Number of faculty members with Ph.D. / M.Tech. / M.E available for PG Programme

Assessment will be done on the basis of the number of faculty members with Ph.D./M.Tech./M.E., available for the PG programme. [Minimum number suggested: [4]

	X	Y	Assessment
<b>CAY 2012-2013</b>	08	01	160.00
<b>CAY m1 2011-2012</b>	07	02	70
<b>CAY m2 2010-2011</b>	07	02	70

Assessment = 20 x [X/Y]

**Average Assessment =100**

### 5.3. Faculty Qualifications (30)

Assessment	=	$4 \times \text{FQI}$
where, FQI	=	Faculty qualification index
	=	$(10x + 6y + 4z)/N$ such that, $x + y + z \leq N$ ; and $z \leq y$
where, x	=	Number of faculty members with PhD
y	=	Number of faculty members with ME/ M Tech
z	=	Number of faculty members with BE / BTech / MSc.

	x	y	z	N	FQI	Assessment
CAY <sub>m2</sub> 2010-2011	7	2	0	16	9.11	36.44
CAY <sub>m1</sub> 2011-2012	7	2	0	16	9.11	36.44
CAY 2012-2013	8	1	0	18	9.56	38.24
Average assessment						37.04

### 5.4. Faculty Competencies correlation to Programme Curriculum (15)

(Provide evidence that program curriculum satisfies the applicable programme criteria specified by the appropriate American professional associations such as ASCE. You may list the programme specific criteria and the competencies (specialisation, research publication, course developments etc.,) of faculty to correlate the programme specific criteria and competencies)

Faculty	Specialization	Publication	Course developments
Dr. V A Mhaisalkar	Environmental Impact Assessment Water Treatment Plant Design	1) V. A. Mhaisalkar, P. Gwala, S. Andey, P. Labhsetwar and C. Kshirsagar "Lab Scale study on Electro coagulation defluoridation process optimization along with aluminium leaching in the process and Comparison with Full Scale Plant Operation" Water Science & Technology, 63.12, 201.	Hazardous Waste Management
Dr. Rajesh Gupta	Water Distribution Network	Gupta, R., Vyas, J., Bhawe, P.R., (2012). "Comparison of looped water distribution network designs for various like flow distribution models", Ingenieria Hydraulica y	Water Distribution Systems

	System Optimization	ambiental, Vol. 33, No. 3, 33-43.	
Dr. Y B Katpatal	Remote Sensing and Geographical Information System	<ol style="list-style-type: none"> <li>1. Katpatal, Y.B., and Rama Rao, B.V.S., (2011). "Urban spatial decision support system for municipal solid waste management of Nagpur urban area using high resolution satellite data and Geographic Information System", Journal of Urban Planning and Development. Vol. 137, Issue 1, 65-76, March 2011, doi:10.1061/(ASCE)UP.</li> <li>2. Roy, S. and Katpatal, Y. (2011). "Cyclical Hierarchical Modeling for Water Quality Model-Based DSS Module in an Urban River System." J. Environ. Eng., 137(12), 1176-1184. doi: 10.1061/(ASCE)EE.1943-7870.0000441</li> <li>3. Saklecha P.P., Katpatal Y.B., Rathore S.S., Agarawal D.K. (2011), 'Correlation of Mechanical Properties of weathered Basaltic Terrain for strength Characterization of foundation using ANN', International Journal of Computer Applications (0975 – 8887) Volume 33– No.10, November 2011, pp 7-12.</li> <li>4. Katpatal Y.B., Mhaisalkar V A, Mane Rohit ( 2012) "Conformal Analysis of Spatial shift in High Resolution Satellite Data (HRSD)" Int Journ of GIS April 2012, Journal of Geographic Information System, 2012, 4, 168-175.</li> <li>5. Rajashree Vinod Bothale and Yashwant B. Katpatal 'Response of rainfall and vegetation to ENSO events during 2001 – 2011 in Upper Wardha watershed, Maharashtra, India' Journal of Hydrologic Engineering. Submitted December 13, 2012; accepted April 4, 2013; posted ahead of print April 5, 2013. doi:10.1061/(ASCE)HE.1943-5584.0000</li> </ol>	<ol style="list-style-type: none"> <li>1. RS and GIS</li> <li>2. Spatial Analyses for Resources Management</li> </ol>
Dr. R.V. Ralegaonkar	Green Technology	<ol style="list-style-type: none"> <li>1. Ralegaonkar R. V. (2011) <i>Spatial Indexing of Buildings for Disaster Management</i>, International Journal of Civil Engineering and Architecture, David Publishing, USA, July 2011, Volume 5, No. 7 (Serial No. 44), pp. 655-659</li> <li>2. S.P. Raut, R.V. Ralegaonkar and S.A. Mandavgane (2013) <i>Utilization of recycle paper mill residue and rice husk ash in production of light weight bricks</i> International Journal of Archives of Civil and Mechanical Engineering, Elsevier, Volume 13, pp. 269-275.</li> <li>3. Gireedhari Patle, Vaidehi Dakwale &amp; Rahul Ralegaonkar (2011) <i>Design of Green Building: A Case Study for Composite Climate</i> International Journal of Engineering Research and Applications, Vol. 1, Issue 2, pp.388-395.</li> <li>4. Ralegaonkar R. V. &amp; Gupta R. (2011) <i>Evaluation of a New Static Sunshade for Composite Climate using Experimentation</i>, International Journal of Engineering Research and Applications, Vol. 1, Issue 2, pp.251-258.</li> </ol>	Energy Efficient Buildings
Dr. A.R. Tembhurkar	Waste Water Treatment	<ol style="list-style-type: none"> <li>1. Arti Prasad , Dr. A.R. Tembhurkar, " Development of Software for Selection of Optimal Site for Wastewater Treatment Plant Using Concept of</li> </ol>	Industrial Waste water

		<p>Dominance Matrix” Jour. IAEM Vol. 36(1) Feb. 2009, 21-26.</p> <p>2. Dr. A.R.Tembhurkar, Radhika Deshpande “ Powdered Activated Lemon Peels as Adsorbent for Removal of Cutting Oil from Wastewater” Jour. of Hazardous, Toxic and Radioactive Waste, American Society for Civil Engineers ASCE, Vol 16, No 4 Oct 2012</p>	Treatment
Dr. D.H. Lataye	Water Treatment	<ol style="list-style-type: none"> <li>1. <b>Lataye D. H.</b>, Mishra I. M., Mall I. D. Removal of Pyridine from Aqueous Solution by Adsorption on Bagasse Fly Ash. <i>Ind. Eng. Chem. Res.</i> 45(11) (2006) 3934-3943.</li> <li>2. Sahu A. K., Mall I. D., Srivastava V. C., <b>Lataye D. H.</b> Adsorption of furfural from aqueous solution onto activated carbon: kinetics, equilibrium and thermodynamic study. <i>Sep. Sci. Technol.</i>, 45(5) (2008) 1239-1259.</li> <li>3. <b>Lataye D. H.</b>, Mishra I. M., Mall I. D. Adsorption of 2-picoline onto bagasse fly ash from aqueous solution. <i>Che. Eng. J.</i>, 138 (2008) 35-46.</li> <li>4. <b>Lataye D. H.</b>, Mishra I. M., Mall I. D. Pyridine sorption from aqueous solution by rice husk ash (RHA) and granular activated carbon (GAC): Parametric, kinetic, equilibrium and thermodynamic aspects. <i>J. Hazard. Mater.</i>, 154 (2008) 858–870.</li> <li>5. <b>Lataye D. H.</b>, Mishra I. M., Mall I. D. Multicomponent Sorptive Removal of Toxics-Pyridine, 2-Picoline and 4-Picoline from Aqueous Solution by Bagasse Fly Ash: Optimization of Process Parameters. <i>Ind. Eng. Chem. Res.</i> 47(15) (2008) 5629-5635.</li> <li>6. Lakshmi U. R., Mall I. D., Srivastava V. C., <b>Lataye D. H.</b> Rice husk ash as an effective adsorbent: Evaluation of adsorptive characteristics for Indigo Carmine Dye. <i>J. Environ. Manage.</i>, 90(2) (2009) 710-720.</li> <li>7. <b>Lataye D. H.</b>, Mishra, Indra M., Mall, Indra D. Adsorption of <math>\alpha</math>-picoline on granular activated carbon and rice husk ash from aqueous solution: equilibrium and thermodynamic study, <i>Che. Eng. J.</i> 157 (2009) 139-149.</li> <li>8. <b>Lataye D. H.</b>, Mishra, Indra M., Mall, Indra D. Multicomponent Sorption of Pyridine and its Derivatives from Aqueous Solution onto Rice Husk Ash and Granular Activated Carbon. <i>ASCE: Practice Periodical of Hazardous, Toxic, and Radioactive Waste Management</i>, 18(4) (2009) 218-228.</li> <li>9. <b>Lataye D. H.</b>, Mishra, Indra M., Mall, Indra D. Removal of 4-Picoline from Aqueous Solution by Adsorption onto Bagasse Fly Ash and Rice Husk Ash: Equilibrium, Thermodynamic and Desorption Study. <i>ASCE: Journal of Environmental Engineering</i>, 137 [11] (2011) 1048-1057.</li> <li>10. <u>Rai S., Wasewar K.L., <b>Lataye D.H.</b>, Mishra R.S., Putewar S.P., Chaddha M.J., Mahindran P., Mukhopadhyay J.</u> Neutralization of red mud with pickling waste liquor using Taguchi's design of experimental methodology. <i>Waste Manag Res.</i> (June 29, 2012), doi: 10.1177/0734242X12448518.</li> <li>11. <u>Rai S., Wasewar K.L., <b>Lataye D.H.</b>, Mukhopadhyay J., Yoo C.K.</u> Feasibility of red mud neutralization with sweater using Taguchi's methodology. <i>Int. J Environ. Sci. Technology</i>. DOI: 10.1007/s13762.012.0118.7.</li> <li>12. Singh Kalpana, <b>Lataye Dilip H.</b>, Wasewar Kailas, Chang Kyoo Yoo. Removal of fluoride from aqueous solution: status and techniques. <i>Desalination and Water Treatment</i>. DOI: 10.1080/19443994.2012.749036.</li> </ol>	Hazardous Waste Management

### 5.5. Faculty as participants/resource persons in faculty development / training activities (15)

(Instruction: A faculty member scores maximum five points for a participation/resource person.)

**Participant/resource person in two week faculty development programme: 5 points**

**Participant/resource person in one week faculty development programme: 3 Points**

Name of faculty	(Max. 5 per faculty)		
	CAYm2	CAYm1	CAY
V.A.Mhaisalkar	5	5	5
Rajesh Gupta	5	5	5
Y. B. Kapatal	5	5	5
D.J.Katyanan	3	3	3
A.R.Tembhurkar	5	5	5
Dr. M.V.Latkar	3	3	3
R V Ralegaonkar	5	5	5
D H Lataye	5	5	5
S R Dongre	5	5	5
Sum	41	41	41
N(Number of faculty positions required for an STR)	5.0	6.43	7.86
Assessment = 3x Sum/N	24.6	19.13	15.65
Average assessment			19.79

#### 5.6. Faculty Retention (15)

$$\text{Assessment} = 3 \times \text{RPI}/N$$

Retention point

where RPI = index  
= Points assigned to all faculty members

Where points assigned to a faculty member = 1 point for each year of experience at the institute but not exceeding 5.

Item	CAYm2	CAYm1	CAY
Number of faculty members with experience of less than 1 year ( $x_0$ )	0	0	0
Number of faculty members with 1 to 2 years experience ( $x_1$ )	0	0	0
Number of faculty members with 2 to 3 years experience ( $x_2$ )	0	0	0
Number of faculty members with 3 to 4 years experience ( $x_3$ )	0	0	0
Number of faculty members with 4 to 5 years experience ( $x_4$ )	0	0	0
Number of faculty members with more than 5 years	09	09	09



experience ( $x5$ )			
$N$			
$RPI = x1 + 2x2 + 3x3 + 4x4 + 5x5$	45	45	45
Assessment	15	15	15
Average assessment			15

### 5.7 Faculty Research Publications (FRP) (30)

Assessment of FRP =  $6 \times (\text{Sum of the research publication points scored by each faculty member})/N$

$$= 6 * 60 / 16 = 22.5$$

The research papers considered are those (i) which can be located on Internet and/or are included in hard-copy volumes/proceedings, published by reputed publishers, and (ii) the faculty member's affiliation, in the published papers/books, is of the current institution.

Include a list of all such publications and IPRs along with details of DOI, publisher, month/year, etc.

Name of the faculty (contributing to FRP)	FRP points (max. 5 per faculty)		
	CAY <sub>m2</sub> 2010-11	CAY <sub>m1</sub> 2011-12	CAY 2012-13
Dr. V.A.Mhaisalkar	05	05	04
Dr. Rajesh Gupta	05	05	05
Dr. Y.B.Katpatal	05	05	05
Prof. D.J. Katyayan	00	00	00
Dr. (Mrs.) M.V. Latkar	00	00	00
Dr. A.R.Tembhurkar	05	05	05
Dr. R.V.Ralegaonkar	05	05	05
Dr. D.H. Lataye	05	05	05
Dr. S.R.Dongre	03	04	05
Sum	33	34	34
$N$ (Number of faculty positions required for an STR of 15)	5	6.43	7.86
Assessment of FRP = $6 \times \text{Sum}/N$	39.6	31.73	25.95
Average assessment			32.43

## Faculty Contribution - Research Publications

Name of the faculty	Number of research publications in journals and conferences since joining (Year 2009 onwards)
V.A.Mhaisalkar	<p style="text-align: center;"><b>(a) Research Publications in International /National Referred Journals</b></p> <ol style="list-style-type: none"> <li>1) Padma S.Rao, V.A.Mhaisalkar, A Shrivastava, Animesh Kumar, T. Chakrabarti, S.Devotta, "Environmental Impact of Plantations in and around the Petroleum Refinery: A Case Study" Jour. of Environmental Monitoring and Assessment, July 2009, Springer.</li> <li>2) V.A. Mhaisalkar, Padma S. Rao, A. Shrivastava, Animesh Kumar, S. Devotta "Seasonal Variation of Ambient Levels of Sulphur dioxide in and around a Typical Indian Petroleum Refinery" International Journal of earth Sciences and Engineering ISSN 0974-5904, Vol. 02, No. 03, pp. 231-237, July 2009.</li> <li>3) Partha Chakravarty, V.A.Mhaisalkar and T.Chakrabarti, "Study on Polyhydroxyalkanoate (PHA) Production in Pilot Scale Continuous Mode Wastewater Treatment System" Jour. of Bioresource Technology 101(2010) 2896-2899.</li> <li>4) Padma S.Rao, D.Som, V.A.Mhaisalkar, A Shrivastava and S.Devotta "Hydrocarbons Emission Pattern in Indian Cities", Publication in book titled "Natural and Manmade Disasters : Vulnerability, Preparedness &amp; Mitigation", published by MD Publications Pvt.Ltd., New Delhi 2010</li> <li>5) Padma S.Rao, V.A.Mhaisalkar and S.Devotta, "An Approach for Estimating Green House Gas Emission Inventory and Modeling in a Petroleum Refinery", Publication in book titled " Natural and Manmade Disasters : Vulnerability, Preparedness &amp; Mitigation", published by MD Publications Pvt. Ltd., New Delhi 2010</li> <li>6) V. A. Mhaisalkar, P. Gwala, S. Andey, P. Labhsetwar and C. Kshirsagar "Lab Scale study on Electro coagulation defluoridation process optimization along with aluminium leaching in the process and Comparison with Full Scale Plant Operation" Water Science &amp; Technology, 63.12, 2011.</li> </ol> <p style="text-align: center;"><b>(b) Research Publications in International Conferences/National Conference</b></p> <ol style="list-style-type: none"> <li>1) Abha P. Sargaonkar, P.S.Kelkar, V.A.Mhaisalkar and S.Devotta "Assimilative Capacity of Kanhan River near Nagpur Region (India) using MIKE-11" International Conference on Water, Environment, Energy and Society (WEES-2009), New Delhi, January 12-16, 2009</li> <li>2) V.A. Mhaisalkar, "Environmental Impacts and Management of A Dam Project" National Seminar on Concrete Dam held at Institute of Engineers (I), Nagpur Centre on October 2-3, 2009</li> <li>3) Dhvani Gor and V.A. Mhaisalkar, "Cleaner Production Methods in Food Processing Industries" Presented at National Seminar on Cleaner Production Technology organized by NITTT&amp;R, Chandigarh, November 17-18, 2009</li> <li>4) P.Aswale, M.Karthik, T.Nandy and V.A.Mhaisalkar, "A Review of Technologies to Unleash power from Wastewater Methane Emissions" Indo – Italian Conference of Emerging Trends in Waste Management Technologies Organised at MIT, Pune December 3-4, 2009</li> <li>5) V.A Mhaisalkar, Padma. S.Rao, S.Devotta and S.R.Wate "Emission Inventory and Modeling of a Petroleum Refinery: A Case Study" National Conference on Case Studies in Environmental Management, organized by VNIT, Nagpur, March 5-6, 2011 pp 151-156</li> <li>6) R. S. Bapat, R. V. Ralegaonkar and V. A. Mhaisalkar "Application of Water Conservation Technique to Low Income Group Housing", National Conference on Green Energy and Water Management, March 16, 2012 organised by ITM, College of Engineering Nagpur.</li> </ol>

	<p>7) M. V. Rahate, P. Deshmukh, P.K. Labhasetwar, S. Shukla and V. A. Mhaisalkar “Low Cost Efficient Treatment for Contaminated Water” World Wide Workshop for Young Environmental Scientists at Paris during June 3-7, 2013 on ‘Urban Water, Resources, Risks’.</p>
<p><b>Rajesh Gupta</b></p>	<p style="text-align: center;"><b>(a) Research Publications in International /National Referred Journals</b></p> <ol style="list-style-type: none"> <li>1. Kotharkar, R., Deshpande, S.A., and Gupta, R., (2009). “Vernacular Courtyard housing pattern in <i>varhad</i> region of central India : A case for meaningful conservation”, ABACUS, Journal on Architecture, Conservation and Urban Studies by Department of Architecture, Birla Institute of Technology, Mesra, Ranchi, Jharkhand, vol. 24, No 1, pp 58-71.</li> <li>2. Kotharkar, R., Deshpande, S.A., and Gupta, R., (2009). “Understanding Architectural expression”, Architecture – Time space and people, vol. 9, issue 3, March 2009.</li> <li>3. Naik, U.S., and Gupta, R., (2009). “Optimal phasing of water transmission networks under fund constraint using Genetic Algorithm Technique” Journal of IWWA, April – June 2009</li> <li>4. Naik, U.S., Mahajan, M. M., and Gupta, R., (2009). “Thrust restraint design for above ground pipeline with Genetic Algorithm approach” Journal of IWWA, Oct – Dec 2009.</li> <li>5. Landge, H. C., Gupta, R., Katpatal, Y. B., (2010). "Regulation at local level for implementation of water supply projects through public-private partnership", Journal of IWWA, Jan – Mar 2010, 67-72.</li> <li>6. Gupta, R., Dhapade, S. and Bhavé, P. R. (2012). “Water quality based reliability analysis of water distribution networks”, Journal of ISH, August.</li> <li>7. Gupta, R., Vyas, J., Bhavé, P.R., (2012). “Comparison of looped water distribution network designs for various like flow distribution models”, Ingenieria Hydraulica y ambiental, Vol. 33, No. 3, 33-43.</li> </ol> <p style="text-align: center;"><b>(b) Research Publications in Internal Conferences/National Conference</b></p> <ol style="list-style-type: none"> <li>1. Gupta R., Dhapade S., Bhavé P. R. (2009). “Water Quality Reliability Analysis of Water Distribution Networks”, International Conference on “Water Engineering for Sustainable Environment” organized by IAHR, Vancouver, Canada, 5607-5613.</li> <li>2. Dongre S., Gupta, R, and Bhavé, P.R., (2009). “Uncertainty considerations in the design of water distribution network”, 41<sup>st</sup> Annual convention of IWWA, Hyderabad, Jan 5 – 10, 2009.</li> <li>3. Dongre S., Gupta, R, and Bhavé, P.R., (2010). “Optimal design of water distribution networks for uncertain demands”, Proc. of National Conference on Sustainable development of urban infrastructure, Editors R. Gupta, et al., 212-223, 2010.</li> <li>4. Dongre, S, Gupta, R., and Bhavé, P. R. (2010) “Optimal design of water distribution networks for uncertain demands”, National Conference on Sustainable Development of Urban Infrastructure, organized by VNIT, Nagpur.</li> <li>5. Landge, H.C., Gupta, R., and Bhavé, P.R., (2010) “Strategic model to implement Public Private Partnership in water sector in India” 11<sup>th</sup> International Conf. on “Improving Service Delivery in Water Supply”, Mumbai, India. Page no. 69 – 72.</li> <li>6. Kotharkar, R., Deshpande S.A., and Gupta, R., (2010) “Vernacular Housing Design In Central India: Issues And Concerns For Today” ICSAUD 2010 First International Conference Sustainable Architecture and Urban Design 2010, at School of Housing, Building and Planning, University Sains Malaysia, page no. 151 – 164.</li> <li>7. Dongre, S, Gupta, R., and Bhavé, P. R. (2011) “Elitism between successive runs for improving performance of GA based optimal design of water distribution networks”, International Conference on Sustainable Water Resource management and Treatment Technologies, organized by NEERI, Nagpur</li> <li>8. Dongre, S, Gupta, R., and Bhavé, P. R. (2011) “Least cost design of water distribution networks under uncertainty of nodal demands”, International Conference on Balance and Uncertainty, Brisbane, Australia.</li> <li>9. Rathi, S., and Gupta, R. (2011). “Identification of monitoring station in water</li> </ol>

	<p>distribution networks”, National conference Hydro 2011 organised by Indian Society for Hydraulics, Dec. 29-30, 2011.</p> <p>10. Gupta, R. and S. A. M., Abbas (2012). “Planning and Design of Large Regional Rural Water Supply Scheme”, Annual Convention of Indian Water Works Association, Raipur, Jan. 2012.</p> <p>11. Gupta, R., Hussain, A and Bhave, P. R.(2012) “Water Quality Reliability Based Design of Water Distribution Networks.”, EWRI &amp; ASCE, Albuquerque, New Mexico, 355.</p> <p>12. Gupta, R., Dongre, S and Aditya Tyagi. (2013). “ Optimal Design of Level –I Redundant Water Distribution Networks with Fuzzy Demands”, EWRI &amp; ASCE, Cincinnati, Ohio,1382-1391.</p>
<p><b>Y. B. Katpatal</b></p>	<p><b>(a) Research Publications in International /National Referred Journals</b></p> <p>1. Satapathy, D R, Salve Pradeep, Katpatal Y B (2009), Spatial distribution of metals in ground/surface waters in the Chandrapur district (Central India) and their plausible sources, Int. Journ. Environmental Geology (Feb. 2009), Vol.56, No.7, 1323-1352. (Springer)</p> <p>2. Vasudeo, A.D., Katpatal, Y.B., Ingle, R.N., (2009) “Uses of Dielectric Constant Reflection Coefficients for determination of groundwater using Ground-Penetrating Radar” World Applied Sciences Journal, 6(10): 1321-1325, 2009</p> <p>3. Katpatal, Y.B. and Patil, S.A. (2010), Spatial analysis on impacts of mining activities leading to flood disaster in the Eraiwatershed, India, J Flood Risk Management 3 (2010) 80–87.(Willy)</p> <p>4. Ranade P., Katpatal Y.B. (2007) GIS based qualitative analysis of Urban River Stream: A Case Study of Nag River Urban Watershed, District Nagpur, Maharashtra, India" URISA Journal online, Vol. 19,1,2007.</p> <p>5. Katpatal Yashwant B., Dube Y.A., (2010) Comparative Overlay Analysis through Analytical Hierarchical Process to Delineate Groundwater Potential Zones Using Satellite Data, International Journal of Earth Sciences and Engineering, ISSN 0974-5904 Volume 3, No. 5,October 2010, 638-653.</p> <p>6. Katpatal, Y.B., and Rama Rao, B.V.S., (2011). “Urban spatial decision support system for municipal solid waste management of Nagpur urban area using high resolution satellite data and Geographic Information System”, Journal of Urban Planning and Development. Vol. 137, Issue 1, 65-76, March 2011, doi:10.1061/(ASCE)UP.</p> <p>7. Roy, S. and Katpatal, Y. (2011). ”Cyclical Hierarchical Modeling for Water Quality Model–Based DSS Module in an Urban River System.” J. Environ. Eng., 137(12), 1176–1184. doi: 10.1061/(ASCE)EE.1943-7870.0000441</p> <p>8. Saklecha P.P., Katpatal Y.B., Rathore S.S., Agarawal D.K. (2011), ‘Correlation of Mechanical Properties of weathered Basaltic Terrain for strength Characterization of foundation using ANN’, International Journal of Computer Applications (0975 – 8887) Volume 33– No.10, November 2011, pp 7-12.</p> <p>9. Saklecha P.P., Katpatal Y.B., Rathore S.S., Agarawal D.K. (2011), ‘Spatial Correlation of Mechanical Properties of subgrade Soil for Foundation Characterization’, International Journal of Computer Applications (0975 – 8887) Volume 33– No.10, December 2011.</p> <p>10. Katpatal Y.B., Mhaisalkar V A, Mane Rohit ( 2012) “Conformal Analysis of Spatial shift in High Resolution Satellite Data (HRSD)” Int Journ of GIS April 2012, Journal of Geographic Information System, 2012, 4, 168-175.</p> <p>11. Katpatal Y. B, Chavan C. S (2012), ‘Study of groundwater level profile in an unconfined aquifer: Case study of Nagpur urban area, Central India’ ; International Journal of Civil, Engineering (IJCE), ISSN: 2278-9987, Vol.1, Issue 2, Nov 2012 pp 25-33, © IASET.</p> <p>12. Rajashree Vinod Bothale and Yashwant B. Katpatal ‘Response of rainfall and vegetation to ENSO events during 2001 – 2011 in Upper Wardha watershed,</p>

Maharashtra, India' Journal of Hydrologic Engineering. Submitted December 13, 2012; accepted April 4, 2013; posted ahead of print April 5, 2013. doi:10.1061/(ASCE)HE.1943-5584.0000

13. Landge H C, Gupta, R., Katpatal Y.B., (2009) "Operation And Maintenance Cost Model For Implementing Water Supply Services Through Public Private Partnership In Developing Countries" Journal of IWWA, Vol. XXXX, No.3-4, pp 344-354.
14. Ranade,P., Katpatal Y.B., (2009) Water Resource Assessment and preparation of Management Planning Strategy using Remote Sensing and GIS in Indian Himalayas – A case study for Sainj River watershed, Himachal Pradesh,. Himalayan Studies Jour, Vol. 2 No. 1, pp 59-64.
15. Katpatal, Y.B., Mane Rohit, (2009) ' Optimizing errors in regional pipe network alignments using DGPS' journal of IWW, Vol. XXXXI No. 1, pp 51-58. Jan-Mar 2009.
16. Landge H C, Gupta R., Katpatal Y B, (2010), Regulation at Local level for implementation of Water Supply projects through public private partnership, Vol. 42; 1, ISSN 0970-275X, pp 67-73.
17. Mane V.P., Katpatal Y.B., (2009) Morphometric analysis of Bor river basin, Nagpur District, Maharashtra, India. Am. University Research Journal Vol IV (1), pp. 62-67, 2009.

**(b) Research Publications in Internal Conferences/National Conference**

1. Katpatal Y.B., Agrawal, D.K., Maskey, Sachin. (2009) "Land Degradability Assessment Due To Emerging Multimodal International Industrial Hub: A Spatial Approach" International Conference On Food Security And Environment Sustainability, IIT Kharagpur 17-19 Dec. 2009.
2. Gude, T., Mane, V., Katpatal Y.B., (2009) "Comparative spatial modeling for calculation of Runoff within Micro- watersheds over basaltic terrain" International Conference On Food Security And Environment Sustainability, IIT Kharagpur 17-19 Dec. 2009.
3. Vasudeo, A. D., Katpatal, Y.B., Ingle, R.N., (2009) "Groundwater profile and level monitoring using Ground Penetrating Radar: Non-Invasive technique". International Conference On Food Security And Environment Sustainability, IIT Kharagpur 17-19 Dec. 2009.
4. Roy,Samapriya, Katpatal,Y.B (2010), Status Monitoring of Nag River in Nagpur Urban Area in Central India with relation to Waste Water Management. Third International Perspective on Current & Future State of Water Resources & the Environment, EWRI-ASCE at IITM, Jan 5-7, 2010.
5. Mane V.P., Katpatal Y. B., (2010),Study of lithological control over infiltration through water-level fluctuation and F-index in micro-watersheds Proceedings of ninth International Conference on Hydro-Science and Engineering (ICHE 2010), IIT Madras, Chennai, India. 2 – 5, August 2010.
6. Katpatal Y.B. (2010) " Application of remote sensing and GIS for ensuring suatanability of groundwater" Indo Italian Int. Workshop on 'Sustainable development of Groundwater resources' at NEERI Nagpur 20th October 2010, pp 147-160.
7. Roy, Samapriya, Katpatal, Y.B, (2011) Non Transitive Modelling for Generating Hierarchical Model for an urban river system in India. Fourth International Perspective on Current & Future State of Water Resources & the Environment, EWRI-ASCE at NUS, Singapore, Jan 5-8, 2011.
8. Saikiran Tharimena, Heena Gampawar, Katpatal Y. B(2011) Environmental Impact Assessment (EIA) Based Studies of a Thermal Power Plant on the Hydrologic Regime Using Remote Sensing, Geospatial World forum 2011, Int. Con. Centre, Hyderabad, 18-21 Jan. 2011.
9. Thiyam Tamphasana Devi, Katpatal Y. B. (2011), Identification of potential infiltration zones through overlay analysis in gis environment using reservoir

	<p>frequencies, spreads and other parameters, Geospatial World forum 2011, Int. Con. Centre, Hyderabad, 18-21 Jan. 2011.</p> <ol style="list-style-type: none"> <li>10. Thiyam Tamphasana Devi, Katpatal Y. B. 'Estimation of Infiltration Rate by SCS-CN and CWC method using Satellite Data: A case study of Bhandara District, Maharashtra' "International Conference on Sustainable Water Resource Management and Treatment Technologies". Water 2011, Jan 19-22, 2011, IWA/NEERI Nagpur India</li> <li>11. Saikiran Tharimena and Katpatal Y.B. (2011), Knowledge Dissemination for Ground Water Recharge in an Urban area using Spatial Decision Support System, 3rd International Geography Congress, Kozhikode, Kerala 5-6 May 201.</li> <li>12. Vasudeo, A. D., Katpatal, Y.B., Landge, V.S., (2011) "HYDROLOGICAL ANALYSIS FOR A MINING BLOCK IN CHHATTISGARH STATE OF INDIA", ICWEE 2011: International Conference on Water, Energy and Environment, Phuket, Thailand, December 2011, organized by WASET.</li> <li>13. Saklecha P.P., Katpatal Y.B., Rathore S.S., Agarawal D.K. (2012), Correlation of mechanical properties of foundation soil with CBR using regression analyses, International Conference on "ADVANCES IN MECHANICAL, MANUFACTURING AND BUILDING SCIENCES (ICAMB – 2012), School of Mechanical &amp; Building Sciences, VIT University, Vellore, TN, India, 2012.</li> <li>14. Saklecha P.P., Katpatal Y.B., Rathore S.S., Agarawal D.K. (2012), "ANN modeling for strength characterization of subgrade soil in a basaltic terrain", International Conference on "ADVANCES IN MECHANICAL, MANUFACTURING AND BUILDING SCIENCES (ICAMB – 2012), School of Mechanical &amp; Building Sciences, VIT University, Vellore, TN, India, 2012.</li> <li>15. Katpatal Y.B., Lamsoge B., Pophare A.M., Vijai P Nawale (2012), Ground water quality in shallow aquifer of overexploited WR-2 watershed, Maharashtra, India", International Workshop on "Mitigating Effects of Geogenic Contaminants", 22-23 Feb. 2012, Organised by Ministry of Drinking water and Sanitation ( MDWS), UNICEF, IWA UK and NEERI, at Nagpur.</li> <li>16. Thiyam Tamphasana Devi, Katpatal Y. B. (2012), 'Estimation of Infiltration Rate by SCS-CN and CWC method using Satellite Data: A case study of Bhandara District, Maharashtra' "International Conference on Water Resources Management Technologies". INSURE 2012, Feb 24-26, 2012, IIT Guwahati, India.</li> <li>17. Rajashree Vinod Bothale, Y B Katpatal, ( 2012), 'Satellite Remote Sensing in Monitoring the Impact of climatic variability', International Symposium on ' India Water Week' New Delhi, 2012.</li> <li>18. Shirkhedkar S.S. Yashwant B. Katpatal , S.S. Rathore. (2012) 'CRITICAL ANALYSIS OF PRESENT STATUS OF SEISMIC RISK ZONES IN INDIA'. International Conference on Earthquake resistant construction practices, ICEQRCP 2012, Department of Civil Engineering, Dr. M.G.R. EDUCATIONAL &amp; RESEARCH INSTITUTE UNIVERSITY, July 27th-28th, 2012, Chennai, INDIA.</li> <li>19. Katpatal Yashwant B., Shirkhedkar S.S., Dr. S.S. Rathore, (2012)' Analysis of Rock Seismicity and present Seismic risk zones within India', 2ND Int. Conf on Civil Engineering, Tirupati, India Sept 7-9, 2012.</li> <li>20. Bothale Rajashree Vinod and Katpatal Yashwant B. (2013) EL Nino and La Nina IMPACT on RESPONSE OF WATERSHED 35th International Symposium on Remote Sensing of Environment (ISRSE35) Theme Earth Observation and Global Environmental Change- 50 years of Remote Sensing, 22-26 April, 2013, Beijing China.</li> <li>21. Y.B. Katpatal , S.S. Rathore, S.S. Shirkhedkar , Influence of Engineering rock properties and historical ground shaking indicators on Seismic microzonation of India. 75th EAGE Conference &amp; Exhibition incorporating SPE EUROPEC 2013 London, UK, 10-13 June 2013.</li> <li>22. Katpatal Y.B., Lamsoge B., Pophare A.M., (2009), A review on Designing a restoration Model for an Over Exploited watershed, National Workshop on " Groundwater Resources Management in Maharashtra", 3-4 March 2009, Central</li> </ol>
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	<p>38. Rajashri V. Bothale, Katpatal Y B ( 2012), ‘Impact of Climate variability on Rainfall and vegetation in watershed’, National Symposium on Space Technology for Food and Environmental security, ISRS, Dec. 5-6, 2012, PUSA New Delhi.</p> <p>39. Tausif A. Ansari, Katpatal Y B ( 2012), ‘GIS based SCS CN runoff model of Nagpur Urban Area ’, National Conference on RS and GIS Applications, 13th ESRI India User Conference , Dec. 5-6, 2012, Radisson Blu, New Delhi.</p> <p>40. Katpatal Y.B., (2013)‘ Geoinformatics Applications in Watershed Studies’.UGC Sponsored National Conference on “Watershed Management for Sustainable Development, WMSD 2013” Organized by Department of Geology, Amravati University in Collaboration with Central Groundwater Board and Groundwater Survey and Development Agency. on 22nd- 23rd Feb 2013 at Amravati.</p>
<b>D.J.Katyanan</b>	
<b>A.R.Tembhurkar</b>	<p><b>(a) Research Publications in International /National Referred Journals</b></p> <ol style="list-style-type: none"> <li>1. Arti Prasad , Dr. A.R. Tembhurkar, “ Development of Software for Selection of Optimal Site for Wastewater Treatment Plant Using Concept of Dominance Matrix” Jour. IAEM Vol. 36(1) Feb. 2009, 21-26.</li> <li>2. A.R.Tembhurkar, Shilpa Dongre “Comparative Studies on Flouride Removal Using Natural Adsorbents viz. Azadirachta Indica(Neem) and Ficus Religiosa (Pipal)”. Journal of Institution of Engineers, Vol. 90, Sept. 2009.</li> <li>3. B. V. Khode, A. R. Tembhurkar, P. D. Porey and R. N. Ingle, “ Improving Discharge Capacity over Spillway by Labyrinth Weir” World Applied Science Journal 10(6), 709-714, 2010</li> <li>4. B.V. Khode, A. R. Tembhurkar. “Evaluation and Analysis of Crest Coefficient for Labyrinth weir,” Journal of World Applied Science 11 (7),835-839,(2010).</li> <li>5. B.V. Khode, A. R. Tembhurkar, P. D. Porey, R. N. Ingle. “Experimental Studies For Improvement In Discharge Capacity Of Open Spillway By Labyrinth Weir” Journal of Indian Water Work Association. 42 (1) Jan Feb 2010</li> <li>6. Kalpana Bhole, Rahul Muley, Mahendra Kadu, A. R. Tembhurkar S. V. Dahashastra, “ Enabling 24x7 water supply using Hydraulic Model for Indian Cities” Journal of Indian Water Work Association 42 (2), Apr-June 2010</li> <li>7. B.V. Khode, A. R. Tembhurkar, P. D. Porey, R. N. Ingle, “Determination of Crest Coefficient For Flow Over Trapezoidal Labyrinth Weir,” Journal of Water science &amp; Technology 12(3), 324 -329 , 2011.</li> <li>8. B.V. Khode, A. R. Tembhurkar, P. D. Porey, R. N. Ingle, “Experimental Studies On Determination Of Discharge Coefficient For Flow Over Trapezoidal Labyrinth Weir,” International Journal of Civil Engineering Research &amp; Technology. 4(1),47-54,(2011)</li> <li>9. R. Tembhurkar and A D Prasad, “ Faults Detection in Wastewater Treatment Process” Journal of the Institution of Public Health Engineers, Vol 2011-12, Number 1 Apr 2011,50-54</li> <li>10. Dr. A.R. Tembhurkar, Arti Prasad , “ Decision Making Software Effective Selection of Treatment Train Alternative for Wastewater Using AHP” Jour. IESE Vol. ( ) Feb. 2011, -(In Press)</li> <li>11. Shilpa Tiwari, Dr. A.R. Tembhurkar, “ Laboratory Studies on Filtrations Unit with Foam and Sand as Dual Media” International Research Journal of Lab to Land Vol 2(8) Oct 2010, ISSN 0975-282x.</li> <li>12. Dr. A.R.Tembhurkar, Radhika Deshpande “ Powdered Activated Lemon Peels as Adsorbent for Removal of Cutting Oil from Wastewater” Jour. of Hazardous, Toxic and Radioactive Waste, American Society for Civil Engineers, Vol 16, No 4 Oct 2012</li> <li>13. B.V. Khode, A. R. Tembhurkar, P. D. Porey, R. N. Ingle(2012) “ Experimental studies On Flow Over Labyrinth Weir”, American Society of Civil Engineering, Journal of Irrigation and Drainage Engineering ,138(6), 548-552</li> <li>14. Idris Ahmed and A. R. Tembhurkar, “Assessment of Noise Pollution in a School Building –A Case Study” International Research Journal of CBSS Vol II, issue 1(I),</li> </ol>



	<p>April 2013.</p> <p style="text-align: center;"><b>(b) Research Publications in Internal Conferences/National Conference</b></p> <ol style="list-style-type: none"> <li>1. Mrs. Kalpana Bhole Dr. Ajay Tembhurkar Dr. Sanjay Dahasahasra , “ 24x7 Water Supply for Amravati City- Transformation using Hydraulic Model’ 11th International Conference “ Improving Service Delivery in Water Supply” Thane 8-9 Jan 2010</li> <li>2. V. D. Salkar, A. R. Tembhurkar, S. V. Ranade, “Management of Typical Filtration Systems in Urban Water Treatment Plants”. National Conference on Case Studies in Environmental Management, VNIT, Nagpur, 5-6 March, 2011</li> <li>3. Kalpana Bhole, Ajay Tembhurkar, Sanjay Dahasahasra, V. N. Rathod, “ Rehabilitation Plan of Water Distribution Network of Operational Zone for Continuous Water Supply: A Case Study of VMV Zone”. National Conference on Case Studies in Environmental Management, VNIT, Nagpur, 5-6 March, 2011</li> <li>4. R. D. Jadhav, A. R. Tembhurkar, Rajesh Gupta, “Computer Aided Hydraulic Design Of Small Capacity Water Treatment Plant” International Conference on “Sustainable Water Resource Management and Treatment Technologies” NEERI, Nagpur, 19-22 Jan 2011</li> <li>5. Dr A. R. Tembhurkar, Ädil Mohammed, “ Drinking Water –Heath and Economy” at 24th National Convention of IPHE on ‘Water and Sanitation Utility Services in India and Their Heath Implications’ 12-13th Feb 2011, Bhubaneshwar</li> <li>6. V. D. Salkar, A. R. Tembhurkar, S. V. Ranade, “Significance of Flow and Head-loss measurements in Filtration Systems” flotekg-2012 (Global Conference and Exhibition) on Smarter &amp; Greener Flow Measurement and Control at FCRI, Palakkad, Kerala. jan 18-20th 2012</li> <li>7. Salkar V. D., Dr. A. R. Tembhurkar, S. V. Ramchandre, “Back Flushing Routine for Enhanced Performance of Upflow Gravity Filter” National Seminar on Recent Practises and Application in Civil Engineering at Walchand College of Engineering, Sangli 31st May – 1st June 2013</li> </ol>
<b>Dr. M.V.Latkar</b>	
<b>R V Ralegaonkar</b>	<p style="text-align: center;"><b>(a) Research Publications in International /National Referred Journals</b></p> <ol style="list-style-type: none"> <li>1. Rahul V Ralegaonkar, Vishakha V Sakhare (2013) <i>Development of multi-parametric functional index model for evaluating the indoor comfort in built environment</i>, International Journal of Indoor and Built Environment, Sage Publication, Accepted.</li> <li>2. Chetan S Dhanjode, Rahul V Ralegaonkar, Vaidehi A Dakwale (2013) <i>Design and development of sustainable construction strategy for residential buildings: a case study for composite climate</i>, International Journal of Sustainable Construction Engineering &amp; Technology, Volume 4, Issue 1, pp. 12-20.</li> <li>3. Mangesh V Madurwar, Rahul V Ralegaonkar, Sachin A. Mandavgane (2013) <i>Application of agro-waste for sustainable construction materials: A Review</i> International Journal of Construction &amp; Building Materials, Elsevier, Volume 38, pp. 872-878.</li> <li>4. S.P. Raut, R.V. Ralegaonkar and S.A. Mandavgane (2013) <i>Utilization of recycle paper mill residue and rice husk ash in production of light weight bricks</i> International Journal of Archives of Civil and Mechanical Engineering, Elsevier, Volume I 3, pp. 269-275.</li> <li>5. D. Rajput; S. S. Bhagade; S P Raut, R.V. Ralegaonkar; Sachin A. Mandavgane (2012) <i>Reuse of cotton and recycle paper mill waste as building material</i> International Journal of Construction &amp; Building Materials, Elsevier, International Journal of Construction &amp; Building Materials, Elsevier, Volume 34, pp. 470-475.</li> <li>6. S.P. Raut, Rohant Sedmake, Sunil Dhunde, R.V. Ralegaonkar and S.A. Mandavgane (2012) <i>Reuse of Recycle Paper Mill Waste in Energy Absorbing Light Weight Bricks</i> International Journal of Construction &amp; Building Materials, Elsevier, Volume 27, pp. 247-251.</li> </ol>

7. Vaidehi Dakwale and Rahul Ralegaonkar (2012) *Review of Carbon Emission through Buildings: Threats, Causes and Solution* International Journal of Low-Carbon Technologies, Oxford Journals, Volume 7 (2), pp. 143-148.
8. Vaidehi Dakwale, Rahul Ralegaonkar and S.A. Mandavgane (2011) *Improving environmental performance of buildings using energy efficiency approach: A review*, Sustainable Cities and Society, Elsevier, Issue 1, pp. 211-218.
9. Ralegaonkar R. V. (2011) *Spatial Indexing of Buildings for Disaster Management*, International Journal of Civil Engineering and Architecture, David Publishing, USA, July 2011, Volume 5, No. 7 (Serial No. 44), pp. 655-659
10. Gireedhari Patle, Vaidehi Dakwale & Rahul Ralegaonkar (2011) *Design of Green Building: A Case Study for Composite Climate* International Journal of Engineering Research and Applications, Vol. 1, Issue 2, pp.388-395.
11. Ralegaonkar R. V. & Gupta R. (2011) *Evaluation of a New Static Sunshade for Composite Climate using Experimentation*, International Journal of Engineering Research and Applications, Vol. 1, Issue 2, pp.251-258.
12. S.P. Raut, R.V. Ralegaonkar and S.A. Mandavgane (2011) *Development of Sustainable Construction Material Using Industrial and Agricultural Solid Waste: A Review of Waste-Create Brick*, International Journal of Construction & Building Materials, Elsevier, 25, 10 :4037-4042.
13. Rahul V. Ralegaonkar and Rajiv Gupta (2010) *Performance Evaluation of A Climate Responsive Static Sunshade using Experimentation*. Built Environment Journal, 7, 2: 21-40.
14. Ralegaonkar R. V. & Gupta R. (2010). *Review of Intelligent Building Construction: A Passive Solar Architecture Approach*. International Journal of Renewable and Sustainable Reviews, Elsevier, 14:2238-2242.
15. Rahul V. Ralegaonkar, Rajiv Gupta (2010) *Application of Passive Solar Architecture for Intelligent Building Construction: A Review*. International Journal of Energy, Education, Science and Technology, Turkey, 26(1): 75-85.
16. Bapat R S, Ralegaonkar R. V. & Mhaisalkar V. A. (2012) Energy Management in Educational Buildings using Sustainable Technology. Journal of Energy and Fuel user's Association of India, LXII-1, 1-4.
17. Bambawale R., Nathane P., Ahmad Z. Dakwale V A & Ralegaonkar R V (2011) Improving Thermal Performance & Energy Efficiency of Building System by Simulation Approach Journal of Energy and Fuel user's Association of India, LXI-2, 1-5.
18. Ralegaonkar R. V. (2010) Thermal Performance Assessment of Building System by Software Approach Architectural Engineering Journal, Institution of Engineers, India,91 (Pt: AR/2), 19-23.
19. Ghuge V., Bharat A. & Ralegaonkar R V (2010) Understanding thermal comfort in Urban Outdoor Spaces: a literature review Architecture Time Space & People; The Magazine of the Council of Architecture, India 20-22.
20. Ralegaonkar R. V. & Ghuge V. (2010) Policies and Tools for Shadow Analysis of a Green Neighbourhood. Journal of Energy and Fuel user's Association of India, LX-1, 35-37.

**(b) Research Publications in Internal Conferences/National Conference**

1. R V Ralegaonkar (2012) Renewable Energy Sources & Prospective, International Conference on Novel Horizons & Prospects of Industry Institute Interaction, 5-6 February, Agnihotri College of Engineering, Wardha, India
2. S. P. Raut, R V Ralegaonkar & Sachin A. Mandavgane (2011) Application of Industrial Waste for Developing Energy Efficient False Ceiling Panels, International Congress on Environmental Research, 15-17 December, SVNIT, Surat, India.
3. Rahul V Ralegaonkar, Sachin A Mandavgane, Divya Kalakuri, Raveesh Jaiswal, Samta Kubde & Ankur Kurmi (2011). Application of Reflecting cum Insulating Material for Energy Conservation in the Built environment. IIIrd International

	<p>Conference on "Advances in Energy Research, 9-11 December, Indian Institute of Technology Bombay, Powai, Mumbai, India</p> <ol style="list-style-type: none"> <li>4. Rahul V Ralegaonkar, Prateek, Vishakha, Murlidhar &amp; Anant Lal (2011). Quality Assessment for Climate Responsive Built Environment. International Conference on Advances in Materials and Techniques for Infrastructure Development, 28-30 September, NIT Calicut, India.</li> <li>5. Vidya Ghuge, Alka Bharat &amp; Rahul V Ralegaonkar (2011). Proposing a Methodology for Working out Thermal Sensation in an Urban Outdoor Space, Nagpur. International conference on Healthy Cities: Perspective on Asian Concerns, 3rd-5th February, Dr B N College of Architecture for Women Pune, India</li> <li>6. Rahul V Ralegaonkar, Sachin A Mandavgane, Vaidehi A. Dakwale &amp; S P Raut (2011) Review of Sustainable Construction Materials using Nanotechnology. India International Energy Summit, 28-30 January, VNIT, Nagpur, India</li> <li>7. Rahul V Ralegaonkar, Sachin A Mandavgane, Vaidehi A. Dakwale &amp; S P Raut (2011) Performance Evaluation of Energy Efficient Waste-create Bricks India International Energy Summit, 28-30 January, VNIT, Nagpur, India</li> <li>8. Rahul V Ralegaonkar &amp; A D Ghare (2011). Flood-proof assessment of buildings using spatial indexing approach. International Perspective on Water and Environment, 4-6 January, NUS, Singapore.</li> <li>9. Ashwini Yelchatwar; Anup Jangada; Rahul Ralegaonkar; Vasant A. Mhaisalkar (2011). Cost Minimization Approach for Solid Waste Collection Using Network Analysis. International Perspective on Water and Environment, 4-6 January, NUS, Singapore.</li> <li>10. Rahul V. Ralegaonkar (2010). Assessment of buildings using spatial indexing approach for earthquake risk management. RICS, COBRA 2010, London, 2010. ISBN: 9781842196199</li> <li>11. Mandavgane S. A. &amp; Ralegaonkar R. V. (2009). Application of Industrial Waste in making High Performance Bricks. International Conference on Waste to Wealth, BMTPC, New Delhi. 12-13 Nov. 2009</li> <li>12. S. P. Raut, R V Ralegaonkar &amp; S. A. Mandavgane (2012) Strength Study of Light-Weight Recycle Paper Mill Waste Bricks- National conference on recent advances in chemical and environmental engineering, 20-21 January, NIT, Rourkela.</li> <li>13. Madurwar M V, Ralegaonkar R V &amp; Mandavgane S. A. (2011) Application of Agro-waste for Eco-friendly Construction Materials- National Seminar on Modern Construction Management Practice- Challenges faced by Mega Projects, , December 17-18, Institution of Engineers, Pune.</li> <li>14. Bapat R S, Ralegaonkar R V &amp; Mhaisalkar V A (2011) Application of Energy Efficient Techniques for Mega Projects- National Seminar on Modern Construction Management Practice- Challenges faced by Mega Projects, , December 17-18, Institution of Engineers, Pune.</li> <li>15. Bhagat M., Ghare A. D. &amp; Ralegaonkar R. V. (2011) Long Term Strategy for Flood Hazard Managemement- National Conference on Water for Future 25-26 Feb. 11, SGGS IET, Nanded.</li> <li>16. Ralegaonkar R. V., Ghare A. D. &amp; Bhagat M. (2009) Spatial Planning of Buildings &amp; Infrastructure for Disaster Management. National Conference on RESEARCH ACTIVITIES IN DISASTER MITIGATION FOR HOUSING IN INDIA (HDMR-2009), 22-23 August, IIT, Roorkee.</li> <li>17. Ralegaonkar R. V (2009) Performance Evaluation of Building System with the aid of TRANSYS Software. National Conference on Recent Trends &amp; Challenges in Civil Engineering, 18-19 December, KITS, Ramtek.</li> </ol>
<b>D H Lataye</b>	<p><b>1. International Peer Reviewed Journals:</b></p> <ol style="list-style-type: none"> <li>1. Lakshmi U. R., Mall I. D., Srivastava V. C., <b>Lataye D. H.</b> Rice husk ash as an effective adsorbent: Evaluation of adsorptive characteristics for Indigo Carmine Dye. <i>J. Environ. Manage.</i>, 90(2) (2009) 710-720.</li> <li>2. <b>Lataye D. H.</b>, Mishra, Indra M., Mall, Indra D. Adsorption of <math>\alpha</math>-picoline on granular activated carbon and rice husk ash from aqueous solution: equilibrium and</li> </ol>

	<p>thermodynamic study, <i>Che. Eng. J.</i> 157 (2009) 139-149.</p> <ol style="list-style-type: none"> <li>3. <b>Lataye D. H.</b>, Mishra, Indra M., Mall, Indra D. Multicomponent Sorption of Pyridine and its Derivatives from Aqueous Solution onto Rice Husk Ash and Granular Activated Carbon. <i>ASCE: Practice Periodical of Hazardous, Toxic, and Radioactive Waste Management</i>, 18(4) (2009) 218-228.</li> <li>4. <b>Lataye D. H.</b>, Mishra, Indra M., Mall, Indra D. Removal of 4-Picoline from Aqueous Solution by Adsorption onto Bagasse Fly Ash and Rice Husk Ash: Equilibrium, Thermodynamic and Desorption Study. <i>ASCE: Journal of Environmental Engineering</i>, 137 [11] (2011) 1048-1057.</li> <li>5. Rai S., Wasewar K.L., <b>Lataye D.H.</b>, Mishra R.S., Puttewar S.P., Chaddha M.J., Mahindran P., Mukhopadhyay J. Neutralization of red mud with pickling waste liquor using Taguchi's design of experimental methodology. <i>Waste Manag Res.</i> (June 29, 2012), doi: 10.1177/0734242X12448518.</li> <li>6. Rai S., Wasewar K.L., <b>Lataye D.H.</b>, Mukhopadhyay J., Yoo C.K. Feasibility of red mud neutralization with sweater using Taguchi's methodology. <i>Int. J Environ. Sci. Technology</i>. DOI: 10.1007/s13762.012.0118.7.</li> <li>7. Singh Kalpana, <b>Lataye Dilip H.</b>, Wasewar Kailas, Chang Kyoo Yoo. Removal of fluoride from aqueous solution: status and techniques. <i>Desalination and Water Treatment</i>. DOI: 10.1080/19443994.2012.749036.</li> </ol> <p><b>2. Conferences/Seminars (Paper Presented/Attended)</b></p> <p style="text-align: center;"><b>A) INTERNATIONAL</b></p> <ol style="list-style-type: none"> <li>1) Keerty Praveena, <b>Lataye D.H.</b>, Latkar M.V. Utilisation of Fly Ash in Treatment of Leachate. International Conference on “<i>Environmental Pollution, Water Conservation and Health (ICEPWCH-2010)</i> ” Organized by the Department of Zoology, Bangalore University, Jnana Bharathi, Bangalore-560 056, India <b>In Association with Indian Society of Comparative Animal Physiology (ISCAP)</b>, Tirupati-517 502, Andhra Pradesh, India during July 29-31, 2010, Bangalore, India.</li> <li>2) <b>Lataye D. H.</b>, Mishra, Indra M., Mall, Indra D. Application of Taguchi design of experiment technique for adsorption of pyridine onto bagasse fly ash. <i>Colloids and Materials 2011</i>, The 1<sup>st</sup> International Symposium on Colloids and Materials: New Scientific Horizons Amsterdam, The Netherlands, May 8-11, 2011.</li> <li>3) Waghmare S.S., Manwar Nilesh, Lunge Sneha, Labhsetwar Nitin, <b>Lataye Dilip H.</b>, Rayalu Sadhna. Composite type adsorbent materials for defluoridation of water, International Conference on <i>New Age Science &amp; Technology for Sustainable Development</i> Organised by NEERI in Association with Indian JSPS (Japan Society for the Promotion of Science) Alumni Association at Nagpur, August 7-8, 2012.</li> <li>4) Rai S., Wasewar K.L., <b>Lataye D.H.</b>, Mishra R.S., Chaddha M.J., Mukhopadhyay J. Intensifying approaches for neutralization of red mud. International Symposium – Bauxite, Alumina and Aluminium Industry of Asia, IBAAS-2012, Hotel Blu Radisson Nagpur, December 3-5, 2012.</li> <li>5) Varhade R.P., <b>Lataye D.H.</b> Comparative Study on the Performance of Various Electrodes for Removal of COD from Sugar Mill Wastewater. International Conference on Advances in Chemical Engineering organized by Department of Chemical Engineering, NIT Raipur, India, April 5-6, 2013.</li> <li>6) Varhade R.P., <b>Lataye D.H.</b> Effect of current density on removal of COD from Sugar mill waste water using SS and Al Electrodes. International Conference On Future Trends In Structural, Civil, Environmental and Mechanical Engineering FTSCEM – 2013, Bangkok, Thailand, July 13-14, 2013.</li> </ol> <p><b>B) NATIONAL</b></p> <ol style="list-style-type: none"> <li>1) Singh K., <b>Lataye D. H.</b>, Wasewar K. L. A need of fluoride free water in rural water National Conference on Green Chemistry &amp; Engineering (NCGCE-2013), Organized by Chemical Engineering, VNIT, Nagpur, India, March 22, 2013.</li> </ol>
<b>S R Dongre</b>	<p><b>(a) Research Publications in International /National Referred Journals</b></p> <ol style="list-style-type: none"> <li>1. Tembhurkar A. R. and Dongre Shilpa, “Comparative studies on fluoride removal using natural adsorbents, viz. Azadirachta Indica (Neem) and Ficus religiosa (Pipal)”, <i>Journal of Institute of Engineers</i>, Vol. 90, 18-23, 2009.</li> </ol>

	<p>2. Shilpa R. Dongre and Rajesh Gupta, “Optimal design of level-one redundant water distribution networks with fuzzy demands”, J. of Indian Water Works Association, 2012 (Accepted for publication).</p> <p><b>(b) Research Publications in Internal Conferences/National Conference</b></p> <p>1. Shilpa R. Dongre, Rajesh Gupta and P. R. Bhave, “Elitism between successive runs for improving performance of GA-based optimal design of water distribution networks”, International Conference on Sustainable Water Resources Management and Treatment Technologies on 19th-22nd January 2011 at NEERI, Nagpur.</p> <p>2. S. R. Dongre, Rajesh Gupta and P. R. Bhave, “Least-cost design of water distribution networks under uncertainty of nodal demands” International Conference on “Balance and Uncertainty-Water in a changing world” from June 26- July 1, 2011 at Brisbane, Australia.</p> <p>3. Shilpa R. Dongre and Rajesh Gupta, “Optimal design of water distribution networks under uncertain parameters”, International Conference on World Environmental and Water Resources Congress- 2013 scheduled from 19th-23rd May 2013 at Cincinnati, Ohio, USA.</p> <p>4. Rajesh Gupta, Shilpa Dongre and Aditya Tyagi, “Optimal design of level-one redundant networks with fuzzy demands”, International Conference on World Environmental and Water Resources Congress- 2013 scheduled from 19th-23rd May 2013 at Cincinnati, Ohio, USA.</p> <p>5. Shilpa R. Dongre, Dr. Rajesh Gupta and Dr. Pramod R. Bhave, “Uncertainty considerations in the design of water distribution networks”, 41st Annual Convention on Water Utility and Security Management, 8-10th January 2009, IWWA, Hyderabad.</p> <p>6. Shilpa R. Dongre, Dr. Rajesh Gupta and Dr. Pramod R. Bhave, “Optimal design of water distribution networks for uncertain demands”, National Conference on Sustainable Development of Urban Infrastructure, 18-19th June, 2010, V.N.I.T., Nagpur.</p>
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### 5.8 Faculty Intellectual Property Rights (FIPR) (10)

Assessment of FIPR =  $2 \times (\text{Sum of the FIPR points scored by each faculty member})/N$  (Instruction: A faculty member scores a maximum of five FIPR points. FIPR includes awarded national/international patents, design, and copyrights.)

Name of faculty (contributing to FIPR)	FRP points (Max. 5 per faculty)		
	CAYm2	CAYm1	CAY
V.A.Mhaisalkar *	0	5	0
Y. B. Kapatal *	5	5	5
R V Ralegaonkar *	0	5	0
Sum	5	15	5
N	15	17	17
Assessment FIPR = $2x \text{ Sum}/N$	0.67	1.76	0.58
Average assessment			1.00

### 5.9 Funded R&D Projects and Consultancy (FRDC) Work (30)

Assessment of R&D and consultancy projects =  $6 \times (\text{Sum of FRDC by each faculty member})/N$

(Instruction: A faculty member scores maximum 5 points, depending upon the amount.) A suggested scheme is given below for a minimum amount of Rs. 1 lakh:

Five points for funding by national agency, Four points for funding by state agency, Four points for funding by private sector, and Two points for funding by the sponsoring trust/society.

Name of Funding Agency	Title of Project	Name of PI	Amount (Lacs)	Status of the Project	Publications IRPs
Maharashtra Pollution Control Board (MPCB), Mumbai	National Ambient Air Quality Monitoring Project	Dr. V. A. Mhaisalkar	8.1	Ongoing	-
Maharashtra Pollution Control Board (MPCB), Mumbai	State Ambient Air Quality Monitoring Project	Dr. V. A. Mhaisalkar	8.1	Ongoing	-
UGC	Water quality reliability-based optimal design of water distribution networks	Dr. Rajesh Gupta	6.55	Completed	5 papers (1 Journal + 2 International Conference + 2 National Conferences)
Maharashtra Pradhikaran Jeevan	Performance evaluation of few regional rural water supply schemes and development of guidelines for their planning, design, operation and management	Dr. Rajesh Gupta	6.75	Work completed	3 papers in national conferences
Deptt. of Science & Technology, Delhi	Design Development of decision support tool for sustainable construction	Dr. R V Ralegaonkar	15.5	Ongoing	-
Deptt. of Science & Technology, Delhi	Development of Low cost adsorbents for the removal of fluoride from drinking water	Dr. Dilip H. Lataye	15.6	completed	02
MHRD	Micromodel for Groundwater Recharge Through Characterization of the Parameters Using Remote Sensing Data and GIS.	Dr. Y.B. Katpatal	5.0	Completed	3

MHRD	Environmental Impact Assessment studies for the Mining Areas of Vidarbha region using Multidate Multisensor Remote Sensing data.	Dr. Y.B. Katpatal	10.0	Completed	2
NRR DA New Delhi, M of Rural Dev.	Rural Roads Pavement performance study	Prof. D. J. Katyayan	10.0	Data collection complete Final report under preparation	

Name of the Organization Funding the Consultancy Projects	Name of the Coordinator	Starting Date & Duration	Amount (Lacs)	Status	Publication / IPRs
NMC, Nagpur	Dr. V. A. Mhaisalkar	2007 -2009	8.9	Completed	-
Irrigation Department	Rajesh Gupta and A. D. Ghare	2011	2.46	Completed	
MJP	Rajesh Gupta	2011	0.4412	Completed	
MJP	Rajesh Gupta	2011	3.45	ongoing	
PHED, Raipur, CG	Dr. R V Ralegaonkar	21 <sup>st</sup> Oct.2011, 12 Weeks	2.0	Ongoing	-
Prasar Bharti, All India Radio & Doordarshan, Mumbai	Dr. R V Ralegaonkar	25 <sup>th</sup> Oct. 2011 2 Weeks	0.6618	Completed	-
Chief Engineer, Gosi khurd Project , Nagpur	D J Katyayan	19-11-2011	0.22	Completed	-

Name of faculty (contributing to FRDC)	FRDC points (Max. 5 per faculty)		
	CAYm2	CAYm1	CAY
V.A.Mhaisalkar	5	5	5
A. D. Pofale	4	4	4
Rajesh Gupta	5	5	5
Y. B. Kapatal	5	4	4
D.J.Katyayan	5	5	5
A.R.Tembhurkar	4	4	0
Dr. M.V.Latkar	0	0	0

V.S.Landge	5	5	5
A.D. Ghare	5	5	0
R V Ralegaonkar	5	5	5
A Mondal	0	4	4
D H Lataye	5	5	0
A D Vasudeo	4	4	5
S R Dongre	0	0	0
S.P Wanzari	0	0	0
A G Tawalare	4	4	4
A. Patel	0	5	5
Sum	56	64	51
N	15	17	17
Assessment FPPC = 4x Sum/N	14.93	15.05	12.00
Average assessment			13.99

### 5.10 Faculty Interaction with Outside World (15)

FIP = Faculty interaction points

Assessment =  $3 \times (\text{Sum of FIP by each faculty member})/N$

Five points for interaction with a reputed institution abroad, institution of eminence in India, or national research laboratories, Three points for interaction with institution/industry (not covered earlier). Points to be awarded, for those activities, which result in joint efforts in publication of books/research paper, pursuing externally funded R&D / consultancy projects and/or development of semester-long course / teaching modules.

Name of faculty (contributing to FIP)	FIP points		
	CAYm2	CAYm1	CAY
V.A.Mhaisalkar	5	5	5
A. D. Pofale	3	3	3
Rajesh Gupta	5	5	5
Y. B. Kapatal	5	5	5
D.J.Katyanan	5	5	5
A.R.Tembhurkar	5	5	5
V.S.Landge	3	3	5
A.D. Ghare	5	5	5
R V Ralegaonkar	5	5	5
A Mondal	0	3	3
D H Lataye	5	5	0
A D Vasudeo	3	3	5
S R Dongre	3	3	0
S.P Wanzari	0	3	3



A G Tawalare	3	3	3
A. Patel	0	5	5
Sum	55	66	62
N	15	17	17
Assessment FIP = $2x \text{ Sum}/N$	7.33	7.76	7.29
Average assessment			7.46

## B-6 Facilities and Technical Support

### 6. Facilities and Technical Support (75)

Description of classrooms, faculty rooms, seminar, and conference halls:

(Entries in the following table are sampler entries)

Room description	Usage	Shared/ exclusive	Capacity	Rooms equipped with PC, Internet, Book rack, meeting
No. of Classrooms 02	For 1st and 2nd year	Exclusive	40	Yes
Tutorial rooms 02	For 1st and 2nd year	Exclusive	40	Yes
No. of Seminar rooms 01	For 1st and 2nd year	Exclusive	40	Yes
No. of Meeting rooms 01	For meeting	Exclusive	40	yes
No. of Faculty rooms	09	Exclusive	01	yes

#### 6.1. Classrooms in the Department (15)

6.1.1. Adequate number of rooms for lectures (core/electives), seminars, tutorials, etc., for the programme (5): YES

6.1.2. Teaching aids multimedia projectors, etc. (5)

Each room is equipped with LCD projector, internet connection etc.

6.1.3. Acoustics, classroom size, conditions of chairs/benches, air circulation, lighting, exits, ambience, and such other amenities/facilities (5)

Class room are spacious, well ventilated and clean.

#### 6.2. Faculty Rooms in the Department (15)

6.2.1. Availability of individual faculty rooms (5)

Each faculty is having separate room.

(Instruction: Assessment based on the information provided in the preceding table.)

Sr. No.	Faculty Room	Shared/ Exclusive	Area (sq.m.)	Rooms Equipped with PC, Internet, Book rack, meeting space
1.	V.A.Mhaisalkar	Exclusive	26.18	PC & Internet
2.	A. D. Pofale	Exclusive	15.00	PC & Internet
3.	Rajesh Gupta	Exclusive	13.50	PC & Internet
4.	Y. B. Kapatal	Exclusive	16.56	PC & Internet
5.	D.J.Katyanan	Exclusive	14.00	PC & Internet
6.	A.R.Tembhurkar	Exclusive	18.00	PC & Internet
7.	V.S.Landge	Exclusive	16.00	PC & Internet
8.	A.D. Ghare	Exclusive	18.055	PC & Internet
9.	R V Ralegaonkar	Exclusive	15.00	PC & Internet
10.	A Mondal	Exclusive	23.10	PC & Internet
11.	D H Lataye	Exclusive	18.00	PC & Internet
12.	A D Vasudeo	Exclusive	17.94	PC & Internet
13.	S R Dongre	Exclusive	18.00	PC & Internet
14.	S.P Wanzari	Exclusive	15.00	PC & Internet
15.	A G Tawalare	Exclusive	16.00	PC & Internet
16.	A. Patel	Exclusive	23.10	PC & Internet

**6.2.2. Room equipped with white/black board, computer, Internet, and such other amenities/facilities (5) YES**

**6.2.3. Usage of room for counselling / discussion with students (5)**

The following table is required for the subsequent criteria.

**6.3 Laboratories in the Department to meet the programme curriculum requirements and the POs (30)**

**6.3.1. Adequate, well-equipped laboratories to meet the curriculum requirements and the POs (10): YES**

Laboratory description in the curriculum	Exclusive use/ shared	Space, number of students	Number of experiments	Quality of instruments	Laboratory manuals
Environmental Chemistry Laboratory	Exclusive	25	10	Good	Yes
Air Pollution Control Laboratory	Exclusive	25	10	Good	Yes

Environmental Microbiology Laboratory	Exclusive	25	10	Good	Yes
Environmental Engineering Laboratory	Shared	25	10	Good	Yes

**6.3.2. Availability of computing facilities in the department (5) YES**

**6.3.3. Availability of research facilities to conduct project works / thesis work (5) YES**

Laboratories are beyond regular hours for experimentations specially for project based work and testing and consultancy assignments.

Laboratories are available to any student for his project work or lab exercise as per his requirement with permission of lab in charge.

Instruction: Assessment based on the information provided in the preceding table.)

**6.3.4. Availability of laboratories with technical support within and beyond working hours (5) YES**

**6.3.5. Equipment to run experiments and their maintenance, number of students per experimental setup, size of the laboratories, overall ambience, etc. (5) YES**

**6.4. Technical Manpower Support in the Department (15)**

Name of the Technical Staff	Designation (pay-scale)	Exclusive/ shared work	Date of Joining	Qualification		Other Technical skills granted	Responsibility
				At Joining	Now		
A. Nagdive	Assistant 5200-20000 (on Contract basis)	Assists in whole official work	15.5.1990	B. Com D. In Lib. Sc., Govt. Cert. in English/ Hindi Typing 40 w.p.m	M S-CIT, Computer Course	Gov. Cert. in Electric Motor Repairing, Gov. Certificate in Motor & Armatures winding	All types of official work.

**6.4.1. Availability of adequate and qualified technical supporting staff for programme- specific laboratories (10)**

<b>Laboratory description in the curriculum</b>	<b>Technical Supporting Staff</b>
Environmental Chemistry Laboratory	Mr. K.C. Chimote
Air Pollution Control Laboratory	Mr. K.C. Chimote
Environmental Microbiology Laboratory	Mr. K.C. Chimote
Environmental Engineering Laboratory	Mr. K.C. Chimote

**6.4.2. Incentives, skill-upgrade, and professional advancement (5)**

**Skill-upgrade and professional advancement**

- Professional/Technical Training
- Skill Development program organised by Government of India
- Workshop: Knowledge about insulation and overall up-keep of electrical equipments
- Incentives
- Bonus
- Advances: Festival, Cycle
- Allowances: Clothes and washing

## 7. Teaching-Learning Process (75)

### 7.1. Evaluation process: course work (25)

7.1.1. Evaluation Process – Class test / mid-term test schedules and procedures for systematic evaluation, internal assessments. (10)

#### (i) Evaluation Process:

Sr.No	Examination	Marks
01	First Sessional Exam	15
02	Second Sessional Exam	15
03	Assignment/class test/Surprise Test/Quiz	10
04	End Semester Exam	60
Total		100

Assessment is based upon the efficacy of the evaluation process being followed. Relevant data may be inserted here.

Assessment = 25

#### 7.1.2. Seminar and Presentation Evaluation (10)

For PG project six monthly open seminars are carried out. A committee consisting of supervisor, one expert; Head of the Department and one external member/Directors nominee evaluate the performance of the project final seminar to evaluate the project.

Assessment is based upon the methodology being followed and its effectiveness  
Assessment = 10

#### 7.1.3. Performance and Feedback [3]

- This Institute is following open evaluation system. The valued answer books are shown to the entire student within short time after their test and final examination.
- There is provision for engaging extra classes for academically poor student
- Written handouts and power point presentations are distributed to the Student

- Since internal evaluation and final examination evaluation is done 'In House' there is no need for comparison.
- Midterm and post semester Feedback of students are taken for every semester

Assessment is based upon effective implementation of the following activities:

- Post-semester feedback to students on their performance
- Extra care for poor performers and remedial classes
- Comparison of mid and end semester performance

Relevant data may be inserted here

Assessment = 03

#### **7.1.4. Mechanism for addressing evaluation related grievances [2]**

- Since it is an open evaluation system, valued answer books of all exams are shown to all the students by concerned evaluating teacher.
- If in case the student feels dissatisfied, he/she can approach grievance redressal committee .The concerned answer book is re-evaluated by an expert, in consultation with concerned teacher

Assessment is based upon the efficacy of the mechanism being followed. Relevant data may be inserted here.

Assessment = 02

#### **7.2. Evaluation Process: Project Work/ THESIS (25)**

For PG project six monthly open seminars are carried out. A committee consisting of supervisor, one expert; Head of the Department and one external member/Directors nominee evaluate the performance of the project final seminar to evaluate the project.

##### **1.2.1. Allocation of Students to Eligible Faculty Members (supervisors) [10]**

- List of supervisor and project offered is displayed. The students submit their choices in preferential order to PG coordinator.
- The PG coordinator allocates the students based on their performance in exam/( first two semester) and their preferences to the guides.

Assessment = 10

##### **7.2.2. Constitution of Evaluation Committee with at least One External Member [10]**

By statute the evaluation committee consist of one external examiner, Director's nominee from other department and the supervisor.

Assessment = 10

**7.2.3. Schedule Showing Thesis Presentation at least twice during the semester [5]**

Assessment =

**7.3. Teaching Evaluation and Feedback System [10]**

**7.3.1. Guidelines for Student Feedback System [3]**

Regularly twice in a system student feedback (oral and writing) is taken.

Assessment is based upon the effectiveness of the guidelines for student feedback system. The design and effective implementation of the guidelines are essential for student feedback system.

Assessment = 10

**7.3.2. Analysis of Feedback by HOD and the Faculty [2]**

This feedback is analysed be feedback committee and HOD and reports are formed.

Assessment is based upon the methodology being followed for analysis of feedback and its effectiveness.

Assessment = 02

**7.3.3. Corrective Measures and Implementation Followed [5]**

This feedback is conveyed to faculty members in the departmental meeting. According to the student suggestions, the necessary action is taken by the faculty member.

Assessment is based upon the effectiveness of the implementation of the corrective measures and subsequent follow-up.

Assessment = 05

**7.4. Self-learning beyond syllabus and outreach activities [15]**

**7.4.1. Scope for self-learning (5)**

**7.4.2. Generation of self-learning facilities, and availability of materials for learning beyond syllabus (5)**



- NPTEL
- CDs from IITs on course material
- Expert Lectures
- Involvement in demonstration of newly purchased electrical equipments
- Visit to substation

**7.4.3. Career Guidance, Training, Placement, and Entrepreneurship Cell (5)**

- T&P Cell
- Axis programme
- Industrial visits

## B-8 Governance, Institutional Support and Financial Resources

### 8. Governance, Institutional Support and Financial Resources (75)

#### 8.1. Campus Infrastructure and Facility (10)

##### 8.1. A Campus



#### *New 1000 Seat Boys Hostel*

The VNIT Campus is spread over an area of 214 acres near Ambazari lake. It presents a spectacle of harmony in architecture and natural beauty. The campus has been organized in three functional sectors;

- Hostels.
- Academic area: Departments, Administrative Buildings, Library and Information
- Center and various central facilities.
- Residential Sector for staff and faculty.

The academic buildings are located fairly close to both, the hostels and the staff quarters. The campus has a full-fledged computerized branch of State Bank of India with ATM facility, Canara Bank, and a Post Office.

The Institute has its own well equipped Health Center with a residential Medical Officer. The specialized services of Psychiatric & Psychological Counsellor, Dietician, Physiotherapist, Pathology lab, Yoga centre. Also medical consultants in Ayurveda and Homeopathy are available. Patients suffering from serious illness / requiring intensive care are referred to the Govt. Medical College and other Hospital nearby and other Health Care Centers duly approved under the CGHS.

An adequately equipped canteen is close to the instruction zone and hostels. Two more cafeterias exist on the campus. The Institute has a well-equipped Gymkhana apart from various playgrounds for Tennis, Badminton, Volleyball, Football, Hockey, and Cricket. NCC unit is also located on campus.

Institute is gearing up its infrastructure over the years and is improving its infrastructure. This year, Institute has finished construction of 1000 seat boys hostel. Construction of classroom complex is in place.

### **8.1.B Administration**

As per the provisions of the NIT Act, the Board of Governors (BoG) is responsible for superintendence, direction, and control of the Institute. Thus, the BoG is vested with full powers of the affairs of administration / management and finances of the Institute. Members of the Board represent Government of India, Government of Maharashtra, Industries, and faculty of the Institute. The Director is the principal academic and executive officer of the Institute. Besides the BoG, the Senate, the Finance Committee (FC) and the Building and Works Committee (BWC) are statutory committees and therefore important authorities of the Institute.

Apart from the above statutory committees, the Board has the power to constitute various sub-committees for smooth and efficient administration. Thus, the Board has constituted the Stores Purchase Committee (SPC), Grievance Committee (GC), and Special Cell. The SPC administers the centralized procurement of equipment and material whereas the GC provides a platform to hear the views of staff and faculty on grievances. The Special Cell functions to protect the interest of backward-class candidates through procedural, institutional, and other safeguards.

### **8.1. C Academic Programmes**

The Institute offers 9 Under-Graduate programs viz., B. Tech. in Chemical, Civil, Computer Science, Electrical and Electronics, Electronics and Communication, Mechanical, Metallurgical and Materials and Mining Engineering and Bachelor of Architecture.

The Institute also offers 16 Post-Graduate Full time programs (2 years duration) viz., M. Tech. in Industrial Engg., Heat Power Engg, CAD-CAM,

Materials Engg, VLSI Design, Communication System Engineering, Computer Science Engg., Industrial Engg., Integrated Power System, Power Electronics and Drives, Structural Engineering, Structural Dynamics and Earthquake Engineering, Environmental Engineering, Water Resources Engineering., Construction Technology and Management, Transportation Engineering and Urban Planning. The Institute also offers M.Tech. by research program in all engineering departments, Ph D (Full/Part Time).

Institute has started M.Sc. programs in Chemistry, Mathematics and Physics from current year.

The Doctoral Research is done in all Engineering and Sciences departments. Institute is a recognized centre under QIP scheme for Ph.D. program in Electrical and Metallurgical & Materials Engineering department and for M. Tech. program in Electrical and Civil Engineering departments.

**8.1.1. Maintenance of academic infrastructure and facilities (4)**  
(Instruction: Specify distinct features)

**Maintenance of Infrastructure & facilities:**

The college has an extensive Infrastructure spread over 214 acres comprising of Academic Buildings, Departments, Lecture Theatres, Auditorium, Food outlets, student Residences, faculty and staff quarters, Guest House, sport fields, stadia, roads, power supply systems, Roads, Water supply, selvage disposal Network etc. A full fledged Estate Maintenance section is operational since the inception of the college. For civil maintenance as well as the supervision of new construction, Electrical Maintenance including Back up generation by Diesel Generator Telecom and Data network (ISDN & Optical Fibre) is taken care by independent units. A security section supervises the maintenance of Law & order on the campus and vicinity.

Annual Maintenance contract for academic infrastructures including computing facility, UPS and air-conditioning (facility management at Institute level)

Annual maintenance contract or on-call basis maintenance service is affected for critical level laboratory equipment. Many of the critical equipment are procured with 3 years warranty.

Assistant Engineer has the responsibility to maintain the Institute campus under the supervision of Dean (Planning & Development). Assistant Estate Engineer coordinates and oversees the functions of the buildings, water supply and electrical wings.

**8.1.2. Hostel (boys and girls), transportation facility, and canteen (2)**

Hostels	No,	No. of Rooms	No. of Students accommodated
Hostel for Boys	9	1876	2358
Hostel for Girls	4	515	573

**8.1.3. Electricity, power backup, telecom facility, drinking water, and security (4)**

**8.1.3. A Electricity:**

As a self sufficient campus which is also a minor township, the entire energy requirements are under own control of the Institute. The Institute is an HT consumer getting supply from the State Electricity Board at 11 kv by UG cable/as a high priority express Feeder and is exempt from load shedding interruptions. The current maximum load demand is of the order of 1000 KVA while the total connected load is estimated at 1500 Kw at substantially unity power factor. The 200 acre Campus is served by three substation having 3 transformers of 400 KVA each and a smaller transformer of 250 KVA. The Internal distribution to various units of the campus such as Hostel, Academic Bldgs. Residential area is entirely by underground LT cabling. As a backup to the Electricity Board supply due to unforeseen reasons beyond institute's control, a set of 2 Diesel Generators each of 250 KVA capacity is available for serving essential load such as computer/Network center Library/Administration Bldg. etc.

The entire Electrical Installation is maintained in house under the supervision of coordinator – Electrical maintenance who is usually a senior Professor in Electrical Engg. Deptt. The Campus roads are also having energy efficient lighting which under automatic timer control device. The entire installation is annually checked by the statutory authority of Electrical Inspector for safety, reliability and Earthing etc. The average Electrical consumption of the campus is around 112000 KWh units over one calendar year with hostels being significant part of the overall load. As a part of the modernisation solar water heaters are installed in all hostels and plan are underway to introduce solar PV as well LED lights to significantly reduce Main Power from Electric supply utility.

### **8.1.3.B Water Supply Details:**

The college campus gets its water supply from Nagpur Municipal Corporation as well as from its own wells. To ensure regular and uninterrupted supply to all users a network of 9 underground sumps (reservoirs) are created having total storage capacity of 12-85 lakh litres of Potable Drinking Water. The average daily consumption is 6.50 lakh litres, mains water supply is limited to daytime hours from 7.45 am to 11.00 a.m. to individual Buildings overhead tanks.

### **8.1.4 C Campus Security Section:**

The VNIT campus has a full fledged security section having 12 permanent employees. The section is headed by Security Officer assisted by Asstt. Security Officer and 10 permanent cadre service guards. This is supplemented by designated guard units provided by a private security agency supervised by college security personal. All Major Installations such as Entry gates, Hostels (Boys & girls), Library and other sections are provided round the clock security supplemented by walkie-talkie phone system.

## **8.2. Organisation, Governance, and Transparency (10)**

### **8.2.1. Governing body, administrative setup, and functions of various bodies (2)**

- |                                 |    |              |
|---------------------------------|----|--------------|
| (i) Board of Governors          | -- | Annexure - A |
| (ii) Senate                     | -- | Annexure - B |
| (iii) Finance Committee         | -- | Annexure - C |
| (iv) Building & Works Committee | -- | Annexure - D |

(A) **Board of Governors**

SN	Name	Designation
1	Dr. S. K. Joshi, Distiguished Scientist, New Dellhi	Chairman
2	Smt. Amita Sharma (IAS), New Delhi	Member
3	Shri A. N. Jha, Jr. Secretary & F., HRD, New Delhi.	Member
4	Prof. (Mrs.) Joyshree Roy, Prof. DOE, Kolkata	Member
5	Shri. Pramod Chaudhary, Executive Chairman, PUNE	Member
6	Prof. S.C . Sahasrabudhe, Director, D.A.I.I.C.T. Gandhinagar	Member
7	Pfor. A. G. Kothari, Prof. EED, NGPUR	Member
8	Mr. I. L. Muthreja, Assott. Prof. M.E.D., Nagpur	Member
9	Dr. Narendra S. Chaudhari, Director, VNIT, Nagpur	Member
10	Dr. R.R.Yerpude, Registrar (I/C), VNIT, Nagpur.	Member Secretary

(B) **Senate**

1.	Dr. N. S. Chaudhari, Director, VNIT, Nagpur	Chairman
2.	Prof. S. V. Bhat, Deptt. of Physics, IIS, Bangalore – 560 012	Member
3.	Dr. T. S. Sampath Kumar, Asso. Prof., Deptt. of M.M.S.	Member
4.	Prof. (Ms.) R. B. Nair, HD,. H & S.S.,IIT, Delhi	Member
5.	Dr. S. R. Sathe, Dean (Planning & Development), VNIT, Nagpur	Member
6.	Dr. R. K. Ingle, Dean (Faculty Welfare), VNIT, Nagpur	Member
7.	Dr. H.M.Suryawanshi, Dean (Research & Consultancy), VNIT, Nagpur	Member
8.	Dr. O.R.Jaiswal, Dean (Academics), VNIT, Nagpur	Member
9.	Dr. G. P. Singh, Dean (Students Welfare), VNIT, Nagpur	Member

10.	Dr. S. V. Bakre, Head, Deptt. of Applied Mechanics, VNIT, Nagpur	Member
11.	Prof. L. M. Gupta, Professor of Structural Engineering, VNIT, Nagpur	Member
12.	Dr. M. M. Mahajan, Professor of Structural Engineering, VNIT, Nagpur	Member
13.	Dr. G. N. Ronghe, Professor of Structural Engineering, VNIT, Nagpur	Member
14.	Dr. K.L.Wasewar, Head, Chemical Engg. Deptt., VNIT, Nagpur	Member
15.	Dr. A.R.Tembhurkar, Head, Civil Engg. Deptt. , VNIT, Nagpur	Member
16.	Dr. V. A. Mhaisalkar, Professor of Civil Engg., VNIT, Nagpur	
17.	Dr. A. D. Pophale, Professor of Civil Engg., VNIT, Nagpur	Member
18.	Dr. Rajesh Gupta, Professor of Civil Engg., VNIT, Nagpur	Member
19.	Dr. Y. B. Katpatal, Professor of Civil Engg., VNIT, Nagpur	Member
20.	Dr. M. V. Aware, Professor and Head, Electrical Engg., VNIT, Nagpur	Member
21.	Dr. K. D. Kulat, Head, Deptt. of Electronics Engg., VNIT, Nagpur	Member
22.	Dr. A. G. Keskar, Professor of Electronics & Comm., VNIT, Nagpur	Member
23.	Dr. R. B. Deshmukh, Professor of Electronics Engineering, VNIT, Nagpur	Member
24.	Dr. A. S. Gandhi, Professor of Electronics Engineering, VNIT, Nagpur	Member
25.	Prof. R.M.Patrikar, Professor, Deptt. of Electronics Engg., VNIT, Nagpur	Member
26.	Dr. P.S.Deshpande, Head, Deptt. of Computer Sc. & Engg., VNIT, Nagpur	Member
27.	Dr. I. K. Chopde, Head, Deptt. of Mechanical Engg., VNIT, Nagpur	Member
28.	Dr. Animesh Chaterjee, Professor of Mechanical Engg., VNIT, Nagpur	Member
29.	Dr. P. M. Padole, Professor of Mechanical Engg., VNIT, Nagpur	Member



30.	Dr. A. M. Kuthe, Professor of Mechanical Engg., VNIT, Nagpur	Member
31.	Dr. S. G. Sapate, Head, Deptt. of Met. & Mat. Engg., VNIT, Nagpur	Member
32.	Dr. R. K. Paretkar, Professor of Met. & Mat. Engg., VNIT, Nagpur	Member
33.	Dr. S. U. Pathak, Professor of Met. & Mat. Engg., VNIT, Nagpur	Member
34.	Dr. D. R. Peshwe, Professor of Met. & Mat. Engg., VNIT, Nagpur	Member
35.	Dr. R. R. Yerpude, Head, Deptt. of Mining Engg., VNIT, Nagpur	Member
36.	Prof. S. Shringarputale, Professor of Mining Engg., VNIT, Nagpur	Member
37.	Ms. Alpana Dongre, Head, Deptt. of Architecture, VNIT, Nagpur	Member
38.	Dr. V. S. Adane, Professor of Architecture, VNIT, Nagpur	Member
39.	Dr. (Mrs.) Sujata Patrikar, Head, Deptt. of Appl. Physics, VNIT, Nagpur	Member
40.	Dr. V. K. Deshpande, Professor of Applied Physics, VNIT, Nagpur	Member
41.	Dr. (Mrs.) Anupama Kumar, Head, Deptt. of Chemistry, VNIT, Nagpur	Member
42.	Dr. S. S. Umare, Professor of Chemistry, VNIT, Nagpur	Member
43.	Dr. Pramod Chakravarty P., Head, Deptt. of Mathematics, VNIT, Nagpur	Member
44.	Dr. (Ms) M. Ghoshal, Head, Deptt. of Humanities, VNIT, Nagpur	Member
45.	Dr. S. B. Thombre, Professor of Mech. Engg & i/c T&P, VNIT, Nagpur	Member
46.	Dr. D. H. Lataye, Chief Warden, VNIT, Nagpur	Member
47.	Dr. R.R.Yerpude, Registrar (I/C), VNIT, Nagpur	Secretary

(C) **Finance Committee**

- |    |   |                  |
|----|---|------------------|
| 2. | <b>Dr. S. K. Joshi</b> , Distinguished Scientist (CSIR) & Vikram Sarabhai Professor of JNCASR, New Delhi. | Chairman         |
| 3. | Shri Rajesh Singh, Director Deptt. Higher Education, New Delhi  | Member           |
| 4. | Shri Navin Soi, Director, Ministry HRD, New Delhi.  | Member           |
| 5. | Prof. S. C. Sahasrabudhe, Director D.A.I.I.C.T., Gandhinagar  | Member           |
| 6. | Prof. A. G. Kothari, Professor, Electrical Engineering Department, VNIT, Nagpur                           | Member           |
| 7. | Dr. N. S. Chaudhari, Director, VNIT, Nagpur   | Member           |
| 8. | Dr. R.R.Yerpude<br>Registrar, VNIT, Nagpur  | Member-Secretary |

(D) **Building & Works Committee**

- |    |  |          |
|----|--|----------|
| 1. | Dr. N. S. Chaudhari, Director, VNIT, Nagpur  | Chairman |
| 2. | Shri Rajesh Singh, Director Director HMHRD, New Delhi                                | Member   |
| 3. | Shri Navin Soi, Director IFD, New Delhi  | Member   |
| 4. | Prof. S. C. Sahasrabudhe, Director D.A.I.T, Gandinagar                               | Member   |
| 5. | Dr. S.R.Sathe<br>Dean (P&D), V.N.I.T., Nagpur  | Member   |
| 6. | Mr. R. K. Naik, Superintending Engineer (Civil),<br>Central P.W.D., , Nagpur-440 006 | Member   |
| 7. | Shri Arvind Garg, Suptd. Engineer (Electrical)<br>NAGPUR – 440006                    | Member   |
| 8. | Chief Engineer, Public Works Department,<br>NAGPUR – 440001                          | Member   |
| 9. | Suptd. Engineer (Electrical), Public Works   | Member   |

Department,  
NAGPUR – 440001

10. Dr. R.R.Yerpude Registrar, VNIT, Nagpur Member-  
Secretary

**Other information is as under -**

Statutory Committees -

<b>Name of the Committee</b>	<b>Frequency of the meetings</b>	<b>Attendance</b>
Board of Governors	4 in a year	Average 70%
Finance Committee	3 in a year	Average 80%
Building & Works Committee	4 in a year	Average 80%
Senate	4 in a year	Average 90%

Other than the above Committees, there is also the Staff Selection Committee (Statutory) for Selection of faculty and non-faculty employees which meets as and when necessary. This is a standard composition of the committee which includes official & Non official members.

The last Staff Selection Committee for recruitment of faculty posts was held in 2012 and for non-faculty posts in 2008.

In addition the board has Constituted following Committees for compliance with rules & regulations.

- 1) Special Cell : To ascertain the Goal reservation policy is observed scrupulously. No meeting of Special Cell held during current year i.e. 2013.
- 2) Stores Purchase Committee: To assist the Director in procurement of item/equipment/material costing beyond 10 Lakhs. Total 3 meetings are held during current year i.e. 2013
- 3) Grievance Cell : To address the Grievances of all the employees. No meeting was held during current year 2013.
- 4) Women's Cell: To address the Grievances of working women. Two meetings held during 2013.

**8.2.2. Defined rules, procedures, recruitment, and promotional policies, etc. (2)**

(Instruction: List the published rules, policies, and procedures; year of publications; and state the extent of awareness among the employees/students. Also comment on its availability on Internet, etc.)

8.2.3, 8.2.4 Most of the information viz.. Act, Statutes, constitution of various

Committees, Academic Programmes, grievance mechanism, and minutes of all Statutory Committees are placed on Institute web-site and updated from time to time.

**8.2.3. Decentralisation in working including delegation of financial power and grievance redressal system (3)**

(Instruction: List the names of the faculty members who are administrators/decision makers for various responsibilities. Specify the mechanism and composition of grievance redressal system, including faculty association, staff-union, if any.)

**LIST OF DELEGATION OF FINANCIAL POWERS**

<b>Sr.No.</b>	<b>Particulars</b>	<b>Functionaries</b>	<b>Proposed Financial Power</b>
01.	All kinds of expenditure under plan and non plan budget	Director	Up to 8 Crores
02.	All kinds of expenditure under plan and non plan budget	Deputy Director	Upto 50 Lakhs
03.	All kinds of purchases & other expenditure from Sponsor Research, Projects, Schemes and Consultancy Funds	Dean (R&C)	Upto 10 Lakhs
04.	For Purchase of Consumables from Projects, Schemes and Consultancy Fund	Principal Investigator	Upto 2 Lakhs (for Consumables only)
05.	1. Stores, spares, accessories under allotted operating grant (Non Plan) 2. Purchases under allotted Plan Grant,	Heads of Deptts. Prof-in-Charge (T&P), Librarian	Upto 2 Lakhs
06.	All Expenditure related to student's activities, including sports.	Dean (St. Welfare)	Upto 2 Lakhs
07.	Purchases, Payments of scholarship & other allied expenditure within approved & allotted grant of the year. All related expenditure of PG students & research scholars within approved budget.	Dean (Academics)	Upto 10 Lakhs
08.	Expenditure related to their operational expenses (Office, small equipment, consumables etc.	All Deans	Upto Rs. 2 Lakhs

09.	Expenditure for campus development, minor repairs, cleaning, minor repair of roads, parks, convocation and miscellaneous for which the administrative approval is accorded and fund is allotted for the purpose.	Dean (P&D)	Upto Rs. 2 Lakhs
10.	Purchases of Journals, consumables, spares and accessories etc. form budgetary allocation of the year	Chairman, Library Committee	Upto Rs. 2 Lakhs
11.	Expenditure for medicine/consumables/equipments directly related to Health Service expense.	Medical Officer	MO: upto Rs. 1 Lakhs in each case, with Ceiling of Rs. 5 lakhs per year
12.	[i] Payment of Telephone bill FAX, Bill Electricity/bill, Water bill etc., [ii] Purchases of equipment, uniform, consumables, stationeries, spares & accessories. for registry/requirement for departments not covered above within allotted grant of the year.	Registrar	Full power of [i] and Upto Rs. 2 Lakh
13.	For contingency expenditure	Dy. Registrar, Ass. Registrar (Independent Charges)	Up to Rs. 10000

List of faculty members who are administrators/decision makers for various jobs –

**Deans**

- \* Dean (Planning and Development) -- Dr. S. R. Sathe
- \* Dean (Faculty Welfare) -- Dr. R. K. Ingle
- \* Dean (Research and consultancy) -- Dr. H. M. Surywanshi
- \* Dean (Academics) -- Dr. O. R. Jaiswal
- \* Dean (Students Welfare) -- Dr. G. P. Singh

The Institute Grievance Redressal Committee is constituted with the following members:-

- \* Dr. M. M. Mahajan, Prof. of Structural Engg. – Chairman
- \* Dr. Aniket M. Deshmukh, Assoc Prof. of Architecture -- Member
- \* Shri Askok Thakur, Senior Assistant -- Member
- \* Shri C. V. Chalpati Rao -- Member
- \* Shri V. S. Kapse, Liaison Officer, SC/ST -- Member
- \* Dr. A. Andhare, Associate Prof. of Mech. Engg. -- Member-

Secretary

#### 8.2.4. Transparency and availability of correct/unambiguous information (3)

(Instruction: Availability and dissemination of information through the Internet. Information provisioning in accordance with the Right to Information Act, 2005).

All relevant information are made available through website.

Information is made available through emails and circulars.

The RTI Cell is constituted in accordance with the provisions of Right to Information Act, 2005 as follows-

Public Information Officer: Dr. R.R.Yerpude, Registrar  
First Appellate Authority: Dr. S. R. Sathe, Dean, (P&D)  
Second Appellate Authority: Dr. N. S. Choudhary, Director

#### 8.3. Budget Allocation, Utilisation, and Public Accounting (10)

Summary of current financial year's budget and the actual expenditure incurred (exclusively for the institution) for three previous financial years.

Item	In Rupees			
	Budgeted in CFY (2013-14)	Expenses in CFY (till 30-09-2013)	Expenses in (2012-13)	Expenses in (2011-12)
Infrastructural built-up	2,65,54,000	36,13,35,022	2,81,64,291	15,95,93,770
Library	1,50,00,000	36,13,208	1,90,18,807	1,29,71,122
Laboratory equipment	7,40,50,000	1,72,15,522	4,32,85,956	3,99,33,386
Laboratory consumables	9,00,000	3,28,380	34,54,624	14,68,336
Teaching and non teaching staff salary	18,68,00,000	24,03,26,847	44,34,60,400	30,58,08,851
R&D				
Training & travel	3,00,000	8,25,317	11,52,857	12,93,657
Other, specify	2,76,52,000	3,35,20,388	7,88,07,806	6,16,68,294
Total	30,47,02,000	65,71,64,684	61,7340,741	58,27,37,416

(Instruction: The preceding list of items is not exhaustive. One may add other relevant items if applicable.)

#### 8.3.1. Adequacy of budget allocation (4)

(Instruction: Here the institution needs to justify that the budget allocated over the years was adequate.)

The Institute receives grant-in-aid from the Government of India based on the budget formulated by it. There is enough fund made available by the Government of India for Plan and Non-Plan activities. Infrastructure facilities are created on priority basis based on the available fund from the Government of India.

**8.3.2. Utilisation of allocated funds (5)**

(Instruction: Here the institution needs to state how the budget was utilised during the last three years.)

**8.3.3. Availability of the audited statements on the institute's website (1)**

(Instruction: Here the institution needs to state whether the audited statements are available on its website.)

The account of the Institute is audited by a team of auditors from the Comptroller & Auditor General of India and the Audit Report is prepared by the CAG Office. A copy of the Report is given to the Institute. Under the provision of the National Institutes of Technology Act 2007, the Audit Report of the Institute account is placed before the Parliament every year. Till its placement before both the Houses of Parliament and its considerations, the Report remains confidential.

**8.4. Programme Specific Budget Allocation, Utilisation (10)**

Summary of budget for the CFY and the actual expenditure incurred in the CFYm1 and CFYm2 (exclusively for this programme in the department):

Items	Budget in CFY	Actual expenses in CFY *	Budgeted in CFYm1	Actual Expenses in CFYm1*	Budgeted in CFYm2	Actual Expenses in CFYm2
	Budgeted in 2012-13 in INR	Actual expenses in 2012-13 in INR	Budgeted in 2011-2012 in INR	Actual Expenses in 2011-2012	Budgeted in 2010-2011	Actual Expenses In 2010-2011
Laboratory Equipments	20 lacs	1902851	20 lacs	2278164	18 lacs	1723760
Software purchase	40 lacs	3846628	5 lacs	490819	2 lacs	206000
Laboratory consumables	6 lacs	654252	1 lacs	49297	1 lacs	116620
R&D	0	0	0	0	0	0
Maintenance and spares	1 lacs	-	1 lacs	88258	1 lacs	79888
Travel	0 lacs		0 lacs		0 lacs	
Miscellaneous expenses for academic activities	10 lacs	1236184	1 lacs		0.5 lacs	
<b>Total</b>	<b>77 lacs</b>	<b>7639915</b>	<b>28 lacs</b>	<b>2906538</b>	<b>22.5 lacs</b>	<b>2126268</b>

\*The amounts shown under expenditure does not include many items of routine expenses met from Centralised Institutional Source 'such as AMC/Computer Consumables and student related travel expenditure which, however, are aggregated in The Institutionla Income Expenditure statement in Part I - item I-10.

**8.4.1. Adequacy of budget allocation (5)**

(Instruction: Here the institution needs to justify that the budget allocated over the years was adequate.)

**8.4.2. Utilisation of allocated funds (5)**

(Instruction: Here the institution needs to state how the budget was utilised during the last three years.)

Fund provided to the department is properly used to develop the infrastructure of the department to achieve a better programme outcome.

**8.5. Library (20)**

**8.5.1. Library space and ambience, timings and usage, availability of a qualified librarian and other staff, library automation, online access, networking, etc. (5)**

(Instruction: Provide information on the following items.).

Carpet area of library (in m2) Reading space (in m2) = 6400 m<sup>2</sup>  
 Number of seats in reading space = 150 (Night Reading)+ 200 (Library) = 300  
 Number of users (issue book) per day = 512  
 Number of users (reading space) per day =468  
 Timings: During working day, weekend, and vacation = 360 days, timings 8:30 a.m. to 9:30 p.m.  
 Number of library staff = 23 (08 permanent)  
 Number of library staff with degree in Library Management = 21,  
 Computerisation for search = 21  
 indexing, issue/return records Bar coding used = yes  
 Library services on Internet/Intranet INDEST or other similar membership Archives

**8.5.2. Titles and volumes per title (4)**

	Number of new titles added	Number of new editions added	Number of new volumes added
CAYm2 2010-11	1050	4,365	1,08,694
CAYm1 2011-12	2,226	4,034	1,13,806
CAYm 2012-13	1060	6,049	1,27,383



SUBJECT WISE TITLES (TILL 31<sup>ST</sup> MARCH 2011)

<b>Sr.No.</b>	<b>Subject</b>	<b>Title</b>	<b>Volume</b>
01.	A. M.	281	416
02.	Archi.	5019	8728
03.	Chemical	2386	3989
04.	Che.	3085	6138
05.	Civil	8529	7741
06.	ComSc	7741	10748
07.	Electro	5022	8094
08.	Clectri	6133	13254
09.	Hum	1223	1782
10.	Math	2982	5497
11.	Mech.	6960	13449
12.	Met.	6007	9179
13.	Min.	4648	6422
14.	Phy.	1616	6270
15.	L.S. & H.	99	99
<b>TOTAL</b>		<b>61711</b>	<b>108694</b>

SUBJECT WISE TITLE (TILL 31<sup>ST</sup> MARCH 2012)

<b>Sr.No.</b>	<b>Subject</b>	<b>Title</b>	<b>Volume</b>
01.	A. M.	355	605
02.	Archi.	5154	8937
03.	Chemical	2512	4352
04.	Che.	3182	6398
05.	Civil	8667	15016
06.	ComSc	7990	11286
07.	Electro	5093	8347
08.	Electri.	6475	14130
09.	Hum	1476	2307
10.	Math	3176	5911
11.	Mech.	7055	13710
12.	Met.	6193	9526
13.	Min.	4661	6461
14.	Phy.	1793	6665
15.	L.S. & H.	155	155
<b>TOTAL</b>		<b>63937</b>	<b>113806</b>

SUBJECT WISE TITLES (TILL 31<sup>ST</sup> MARCH 2013)

<b>Sr.No.</b>	<b>Subject</b>	<b>Title</b>	<b>Volume</b>
01.	A. M.	440	2176
02.	Archi.	5265	9350
03.	Chemical	2634	4986
04.	Che.	3261	8079
05.	Civil	8780	15730
06.	ComSc	8079	14130
07.	Electro	5267	9962
08.	Clectri	6531	15165
09.	Hum	1488	2744
10.	Math	3236	6548
11.	Mech.	7118	14449
12.	Met.	6239	10114
13.	Min.	4676	6856
14.	Phy.	1806	7145
15.	L.S. & H.	177	177
<b>TOTAL</b>		<b>64997</b>	<b>127311</b>

**8.5.3. Scholarly journal subscription (3)**

Details		CFY 2013	CFYm1 2012	CFYm2 2011	CFYm3 2010
Science	As soft copy	00	02	02	01
	As hard copy	18	21	20	17
Engg. And Tech.	As soft copy	736	00	04	01
	As hard copy	51	86	106	110
Pharmacy	As soft copy	x			
	As hard copy				
Architecture	As soft copy	00	00	00	00
	As hard copy	16	18	24	24
Hotel Management	As soft copy				
	As hard copy				

- (1) 05 Subject collection with 694 title of Elsevier.
- (2) ACS 41 title of Chemical Engg. Web editions for the year 2013.

#### 8.5.4. Digital Library (3)

Availability of digital library contents: Available

If available, then mention number of courses, number of e-books, etc. Availability of an exclusive server: Yes

Availability over Intranet/Internet: Yes

Availability of exclusive space/room: Yes

Number of users per day: (1) Issue counter 512 (2) Reference section 245 (3) Periodical section 167 (4) Reading Room section 468 (5) Stock Room section 182 (6) Reprography section 376 (7) CD-ROM use 098

#### 8.5.5. Library expenditure on books, magazines/journals, and miscellaneous contents (5)

Year	Expenditure				Comments, if any
	Book	Magazines/journals (for hard copy subscription)	Magazines/journals (for soft copy subscription)	Misc. Contents	
CFYm 2011	41.42 Lacs (4813)	48,49,686.00	2,31,158.00		
CFYm 2012	53.32 Lacs (5112)	49,73,906.00	1,56,054.00		
CFY 2013	77.67 Lacs (13505)	21,61,376.00	60,62,510.00		

#### **Virtual Class Room:**

DETAILS :-

Money Given By National Informatics Center (NIC):-

- Total Project Cost of Virtual Class-Room -- Rs. 32,26,524/-
- Civil Work for Virtual Class Room -- Rs.10,00,000/-
- Technical Assistant for Virtual Class Room -- Rs. 1,80,000/-
- Bandwith:-
  - Speed for Video only 50 mbps
  - Speed for net only 50 mbps
  - Total Bandwidth 100 mbps
- Portal of NKH <http://www.nkn.in/>

- IP Address for NKN;-
  - 10.119.19.194
  - 10.119.19.192/27 such Range is also allocated

Contact Details;- 1] VNIT Co-ordinator;- Prof. V. J. Abhyankar,  
 2] VNIT Technical Assistant;- Mr. Rahul Hepat,  
 Mr. A.A. Hardas

### 8.5.5.1 Layout of Virtual Classroom

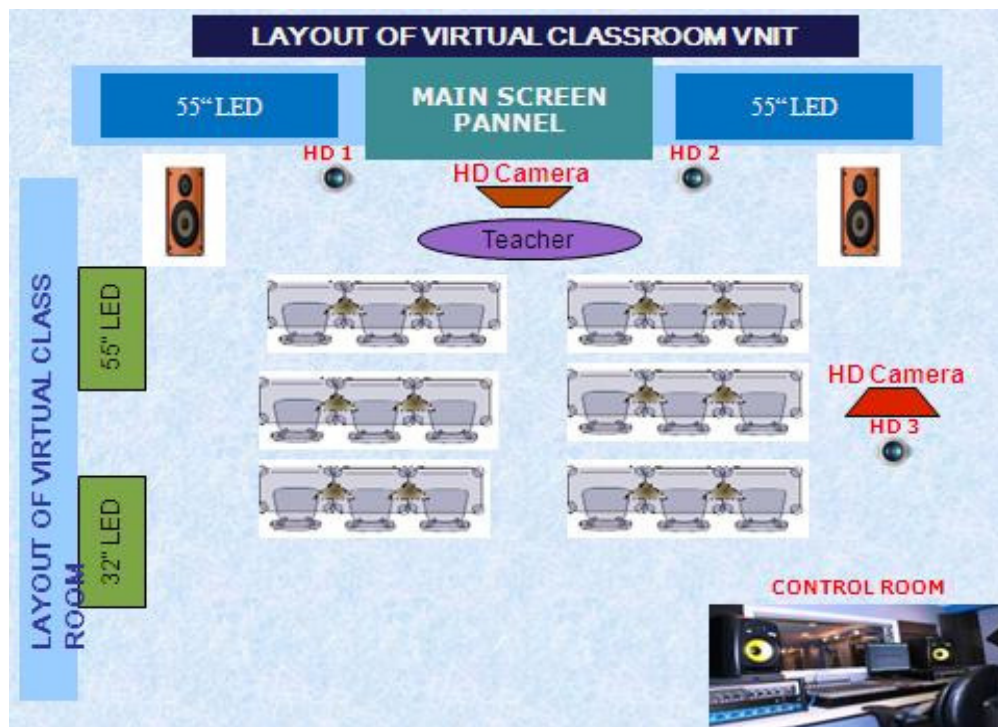


Figure I

### 8.6. Internet (5)

Name of the Internet provider: BSNL  
 Available bandwidth: Broadband  
 Access speed: Gbps and 16 Mbps: Good Access Speed  
 Availability of Internet in an exclusive lab: Yes  
 Availability in most computing labs: Yes  
 Availability in departments and other units: Yes  
 Availability in faculty rooms: Yes  
 Institute's own e-mail facility to faculty/students: Yes  
 Security/privacy to e-mail/Internet users: Yes

(Instruction: The institute may report the availability of Internet in the campus and its quality of service.)

#### **8.6.1 Network Center Information;-**

- Network Center provides a variety of Services. Network Center administers and manages the entire Campus Computer Network which includes departments, sections computer center, administrative building, library, Guest house, health center, NCC Section and Auditorium along with Network Center and quarters.
- Network Center has three leased line (LL) connections 10 Mbps 75 Mbps and 42 Mbps which is distributed all over campus like departments, sections, computer center, administrative building. Guest house, health center, NCC Section, Auditorium and quarters along with Network Center, Currently NKN LL provided by NMEICT for Internet is 50 Mbps.
- Network Centre monitors bandwidth usage continuously and any problems in usage are rectified with the help of ISP (Internet Service Provider).
- Network Center has in-house web server, mail server, proxies and application server along with oracle server. We provide Web-based Email open source that enables all the users to access their mailbox from anywhere (inside or outside VNIT Nagpur) via the Internet, an institute wide. We mostly encourage use of free and open software like GNU/Linux distributions.
- Network Center provides advanced and special purpose softwares such as ANSYS, MATLAB, EXATA and AUTOCAD as well as NPTEL Videos for all the inside users in campus. Microsoft OS Software License for servers. Network Center also host mirrors of freeware softwares for all campus users. The documentation is also provided for special purpose software regarding installation on end user computer. Powerlingo language software is available for the benefit of students.
- The centralized installation of quick Heal Antivirus software is

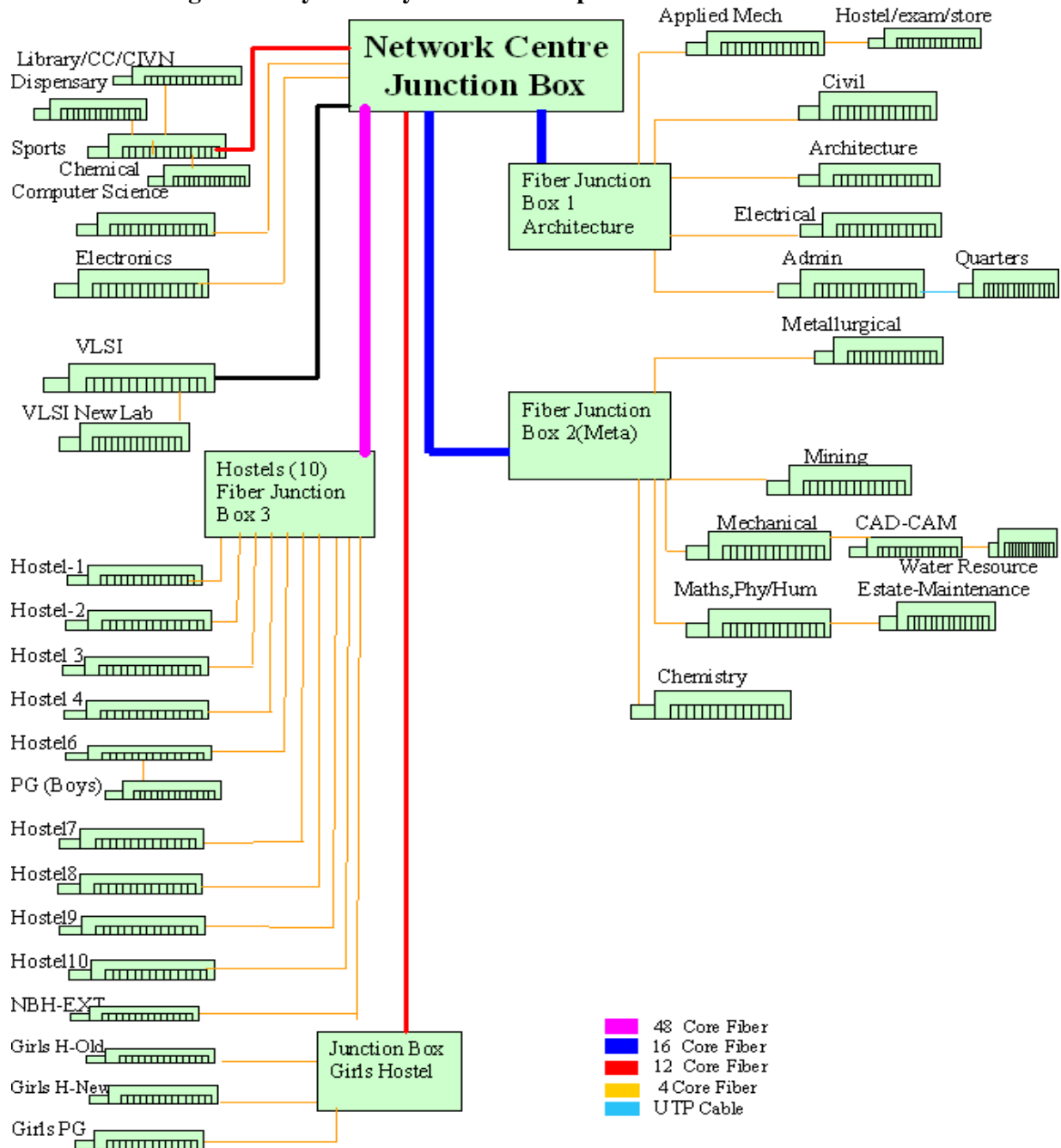
provided for all campus users. Network center has hardware such as core switch, blade chasis, Blade server, Rack mount server, SAN Storage, Lenovo All in one Desktops, HP Laserjet M 1536 DNF Printer, Lenovo MAKE Desktop, HP Dual CPU Server, Netscreen Firewall, Check Point UTM, HP-ML-370 G4 Server Dual Processor.

- The approximate cost of hardware is around 1 crore 60 lakhs only (Rs. 1,60,00,000/-) The approximate cost of software is rupees Two Lakh eighty thousand only (Rs. 280000/-) Computer Hardware AMC is outsourced. The cost of annual maintenance charges on computer hardware is approximately two lakhs (Rs. 2,00,000).
- The annual charges of Reliance LL is approximately twenty five lakhs (Rs. 25,00,000) and that of BSNL LL is around ten lakhs (Rs. 10,00,000/-).
- Network Center has one permanent staff and three adhoc staff - 11 and recurring charges is as under –

AMC	--	2.0 L
Reliance LL	--	25.0 L
BSNL	--	10.0 L

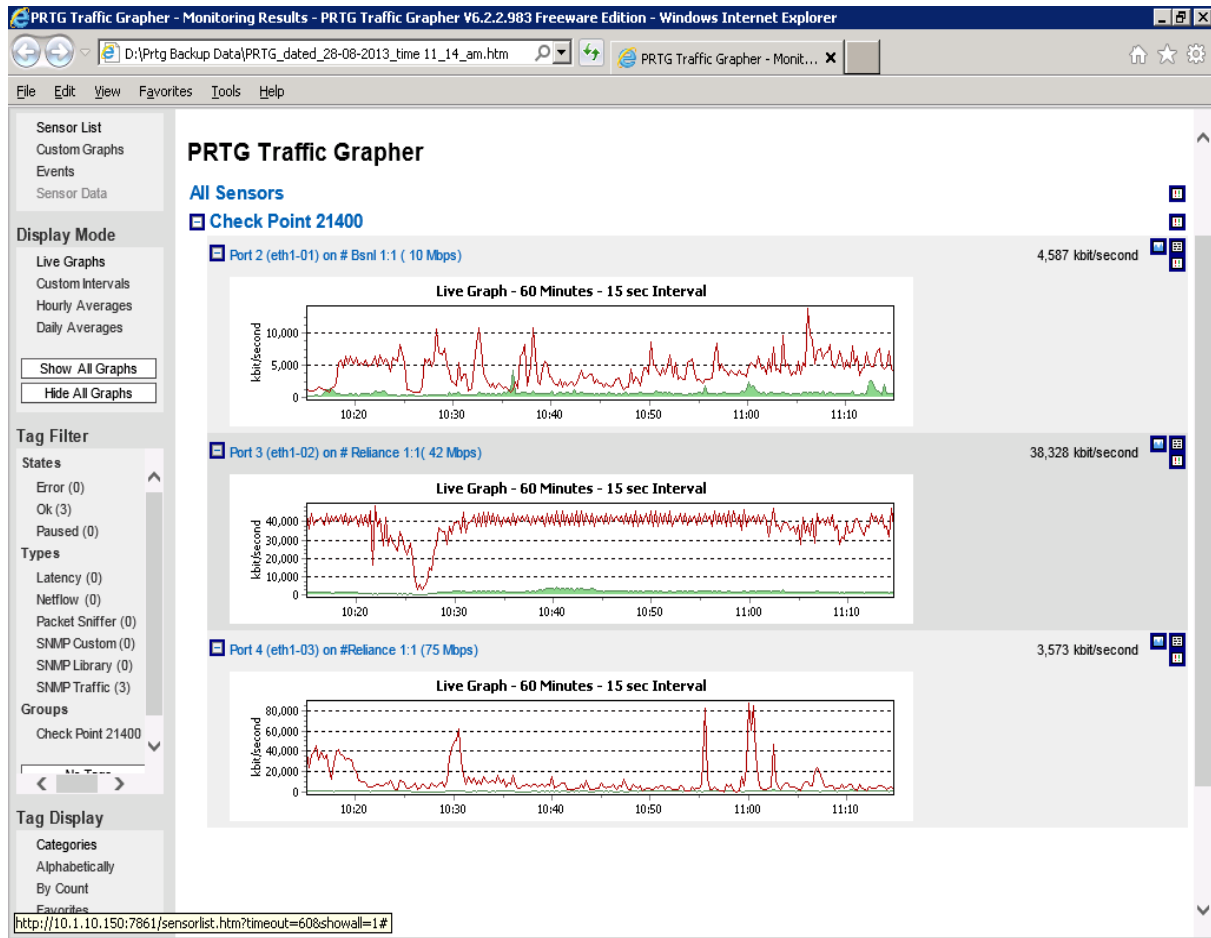
### 8.6.2 Physical Layout of Fiber Optic Cable of VNIT

Figure I: Physical Layout of Fiber Optic Cable of VNIT



Physical Layout of Fiber Optic Cable of VNIT

## 8.6.3 PRTG Traffic Grapher Figure II



## 8.7. Safety Norms and Checks (5)

### 8.7.1. Checks for wiring and electrical installations for leakage and earthing (1)

Sr.No.	Particulars	No. of Exits
1	Auditorium	7.00
2	Large Classrooms/Laboratories	2.00
3	Library	2.00

**8.7.2. Fire fighting measurements:** Effective safety arrangements with emergency multiple exits and ventilation/exhausts in auditoriums and large classrooms/laboratories, fire-fighting equipment and training, availability of water,



and such other facilities (1)

**Adequate ventilations and multiple exits are provided in all academic buildings, laboratories.**

**Adequate ventilations and multiple exits are provided in all academic buildings, laboratories.**

**Fire Fighting Measures:**

- 1] We have fire extinguishers (mega mess, hostel blocks, in CAD/CAM, Department, some are still in propose)
- 2] As per chief advisor of fire audit committee S.T. Chaudhari's advice we have DCP, CO2 pressure extinguishers are placed (fire hydride system is not there)
- 3] Emergency safety arrangements: No
- 4] Multiple exits and ventilation/exhausts in auditorium and large labs/classrooms: Yes
- 5] A number of fire extinguishers are located at various sensitive locations throughout the campus. A total of 16 stations containing different types of Fire fighting media such as Foam, Coz, W/C and DCP are functional and under continuous surveillance for dealing with any fire related emergency.

**8.7.3. Safety of civil structure (1)**

Being a publicity funded Institution (Central Govt.), all Infrastructure/construction has to follow CPWD/VNIT. Norms and all buildings are supervised by qualified Engineers during construction. Before the buildings are accepted for use from the construction contractors all checks are done for stability of civil structure. Each structure is specifically certified by the Incharge Engineer from Estate Maintenance section after physical verification. The latest certificate is reproduced below:

VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY,  
NAGPUR  
PHYSICAL VERFICIATION CERTIFICATE  
TO WHOM SO EVER IT MAY CONCERN

This is to certify that the physical and structural verification of all buildings and connected ancillaries has been carried out during the year 2012-13 and found in order.

Date : 10/07/2013

sd/-

ENGINEER  
ESTATE MAINTENANCE SECTION  
V.N.I.T. NAGPUR

**8.7.4.** Handling of hazardous chemicals and such other activities (2) (Instruction: The institution may provide evidence that it is taking enough measures for the safety of the civil structures, fire, electrical installations, wiring, and safety of handling and disposal of hazardous substances. Moreover, the institution needs to show the effectiveness of the measures that it has developed to accomplish these tasks.)

### **8.8. Counselling and Emergency Medical Care and First aid (5)**

Availability of counselling facility (1)

Arrangement for emergency medical care (2) Availability of first-aid unit (2)

(Instruction: The institution needs to report the availability of the facilities discussed here.)

#### **8.8.1 Medical Care:**

##### **Availability of medical care and emergency, first-aid facility:**

Institute through its health centre provides preventive, promotive & curative health services to the students, employees & their families. Resident doctor on campus & 24 x 7 availability of ambulance services take care of emergency needs.

Holistic health services available at health centre include family physician, counsellors, lady doctor, Paediatrician & dental services. Alternative health services like omeopathy & yoga are available. Referral for Ayurvedic services is available. hysiotherapy services promote fitness & address sports related problems.

Speciality Clinics for eyes & skin problems is available. Mental health services are provides though counsellors & Psychiatrist. Availability of dietician addresses menu planning for balanced diet in the mess besides giving dietary advice for modern epidemic of obesity, diabetes & cardiovascular problem. First aid facility is provided at all hostels.

#### **8.8.2 Physical Education facilities:**

Sports and Games are essentials components of Human Resource Development, helping to promote good health, comradeship and spirit of healthy competition, which in turn, has positive and deep impact on the holistic development of the personality of the youth who is a potential source of energy, enthusiasm and inspiration for development, progress and prosperity of the nation.

The Institute aims at all round development of the students. This can be seen from the importance given to the Physical Education. Classes for Physical Education have been included in regular Time Table so as to ensure development of Physical Fitness of the students. Physical Education programs also include general health and safety

information in addition to providing opportunities for students to learn how to cooperate with one another in a team setting.

### **Participation of students in different games**

The Institute encourages the students by exposing them to various Inter University Tournaments such as West Zone Inter University, All India Interuniversity, Inter-NIT tournaments and also in local inter-collegiate tournaments. The institute has won many championships in Football, Cricket, Badminton, Table Tennis, Chess, Volleyball and Kho-Kho events in All India Inter NIT Tournaments since 2009.

### **Krik Mania:**

This is an Invitational Cricket Tournament being organized since last 20 years by the Institute students under the guidance of the Department of Physical Education at local level.

### **Intramural and Krida Diwas:**

This is a unique program of event inter-section tournaments for different games conducted for first year B.Tech./B.Arch. students which goes round the year. The department celebrates the birth anniversary of the great Hockey legend Major Dhyanchand on 29<sup>th</sup> of August every year and on the same day the intramural program is also inaugurated.

### **Medical examination:**

The Department of Physical Education coordinates for compulsory Medical Examination for all the first year B. Tech. /B. Arch. students with our Medical Officer Dr. S. Batra. and his team.

### **Physical Efficiency Test:**

Compulsory for every first year B. Tech./B.Arch. Components of physical fitness such as abdominal strength, respiratory endurance, flexibility of hip joint and hamstring muscles and speed are measured by applying suitable tests of fitness.

### **Felicitation of the students:**

The department of Physical Education recognizes the efforts taken by first year students and felicitates them during the valedictory function of the intramural tournament.

### **Sports facilities currently available on the Campus**

- One Cricket Ground with six Turf wickets.
- One Football Ground with flood light arrangement.
- Two Volleyball Courts with flood light
- One Badminton Court.
- A Table Tennis Hall
- Three Lawn Tennis Courts.
- One Flood light Basketball Court.
- Well equipped Gymnasium
- Cricket pavilion with the seating capacity of 500 students

**Planned Sports Infrastructure in near future:**

Indoor Badminton Stadium with four Wooden sprung Surfaced Badminton courts, Table Tennis hall, Yoga hall, Class room, Sports Medicine Research Lab

## 9- Continuous Improvement

### 9. Continuous Improvement (75)

This criterion essentially evaluates the improvement of the different indices that have already been discussed in earlier sections.

From 9.1 to 9.5 the assessment calculation can be done as follows:

If a, b, c are improvements in percentage during three successive years, assessment can be calculated as:

$$\text{Assessment} = (\mathbf{b-a}) + (\mathbf{c-b}) + (\mathbf{a +b+c}) * (\mathbf{5/3})$$

#### 9.1. Improvement in Success Index of Students (5)

From 4. 1

Items	LYG (c)	LYGm1 (b)	LYGm2 (a)	Assessment
Success Index	0.94	1.00	1.00	<b>4.84</b>

#### 9.2. Improvement in Academic Performance Index of Students (5)

From 4. 2

Items	LYG (c)	LYGm1 (b)	LYGm2 (a)	Assessment
API	7.76	7.94	8.17	<b>39.37</b>

#### 9.3. Improvement in Student - Teacher Ratio (5)

From 5. 1

Items	CAY (c)	CAY m1 (b)	CAY m2 (a)	Average
STR	18.00	20.19	17.06	<b>18.42</b>

#### 9.4. Enhancement of Faculty Qualification Index (5)

From 5. 3

Items	CAY (c)	CAY m1 (b)	CAY m2 (a)	Average
FQI	9.11	9.11	9.56	<b>9.26</b>

### 9.5. Improvement in Faculty Research Publications, R&D Work and Consultancy Work (10)

From 5.7 and 5.9

Items	CAY (c)	CAY m1 (b)	CAY m2 (a)	Assessment
FRC	10.55	14.44	10.48	<b>59.18</b>
FPPC	12.00	14.12	14.93	<b>65.48</b>

### 9.6. Continuing Education (10)

In this criterion, the institution needs to specify the contributory efforts made by the faculty members by developing the course/laboratory modules, conducting short-term courses/workshops, etc., for continuing education during the last three years.

Module description	Any other contributory institute / industry	Developed/organized	Duration	Resource persons	Target audience	Usage and citation etc.
Quality Assurance and Quality Control of Air Quality Monitoring	MPCB, Mumbai	Civil Engg. Deptt. VNIT, Nagpur	July 9-10, 2009	Faculty of Civil Engg. Deptt. VNIT, Nagpur	Industry & Government Organisation Executives	
Planning and management of Urban Infrastructure	AICTE	Civil Engg. Deptt. VNIT, Nagpur	July 20-25, 2009	Faculty of Civil Engg. Deptt. VNIT, Nagpur	Industry & Government Organisation Executives & Faculty	
Water Treatment Plant Design	CPHEEO, New Delhi	Civil Engg. Deptt. VNIT, Nagpur	Oct. 27 to Nov. 2, 2009	Faculty of Civil Engg. Deptt. VNIT, Nagpur	Industry & Government Organisation Executives	
“Computer aided design of pipelines and pipe networks for water supply and sewerage	CPHEEO, New Delhi	Civil Engg. Deptt. VNIT, Nagpur	November 12 – 18, 2009	Faculty of Civil Engg. Deptt. VNIT, Nagpur	Industry & Government Organisation Executives	

systems”						
“Environmental Engineering Systems Optimization”	CPHEEO, New Delhi	Civil Engg. Deptt. VNIT, Nagpur	Nov 23 – Dec 6, 2009	Faculty of Civil Engg. Deptt. VNIT, Nagpur	Industry & Government Organisation Executives	
Quality Assurance and Quality Control in Water Quality Monitoring & Analysis (NWMP/SWMP)	MPCB, Mumbai	Civil Engg. Deptt. VNIT, Nagpur	October 21 – 22, 2010	Faculty of Civil Engg. Deptt. VNIT, Nagpur	Industry & Government Organisation Executives	
“Computer aided design of pipelines and pipe networks for water supply and sewerage systems”	CPHEEO, New Delhi	Civil Engg. Deptt. VNIT, Nagpur	November 18-24, 2010	Faculty of Civil Engg. Deptt. VNIT, Nagpur	Industry & Government Organisation Executives	
Water Treatment Plant Design”	CPHEEO, New Delhi	Civil Engg. Deptt. VNIT, Nagpur	Jan. 7 to Jan. 13, 2011	Faculty of Civil Engg. Deptt. VNIT, Nagpur	Industry & Government Organisation Executives	
Bio-Medical Waste Management	MPCB, Mumbai	Civil Engg. Deptt. VNIT, Nagpur	October 13 -14, 2011	Faculty of Civil Engg. Deptt. VNIT, Nagpur	Industry & Government Organisation Executives	
Orientation Program on ‘Green Building Design Concepts & Application’	Nil	Civil Engg. Deptt. VNIT, Nagpur	16 <sup>th</sup> December 2011	Faculty of Civil Engg. Deptt. VNIT, Nagpur	Industry & Government Organisation Executives	
Water Treatment Plant Design”	CPHEEO, New Delhi	Civil Engg. Deptt. VNIT, Nagpur	Jan. 6 to Jan. 12, 2012	Faculty of Civil Engg. Deptt. VNIT, Nagpur	Industry & Government Organisation Executives	
“Computer aided design of pipelines and pipe networks	CPHEEO, New Delhi	Civil Engg. Deptt. VNIT, Nagpur	November 17-23, 2012	Faculty of Civil Engg. Deptt.	Industry & Government Organisation Executives	

for water supply and sewerage systems				VNIT, Nagpur		
Green Construction Project Management	Nil	Civil Engg. Deptt. VNIT, Nagpur	23-24 <sup>th</sup> June 2012	Faculty of Civil Engg. Deptt. VNIT, Nagpur	Industry & Government Organisation Executives	
Water Treatment Plant Design”	CPHEEO, New Delhi	Civil Engg. Deptt. VNIT, Nagpur	Jan. 3, to 9, 2013	Faculty of Civil Engg. Deptt. VNIT, Nagpur	Industry & Government Organisation Executives	
“Water Quality Issues”	MPCB, Mumbai	Civil Engg. Deptt. VNIT, Nagpur	Jan. 24 & 25, 2013	Faculty of Civil Engg. Deptt. VNIT, Nagpur	Industry & Government Organisation Executives	

Assessment =

### 9.7. New Facility Created (15)

Specify new facilities created during the last three years for strengthening the curriculum and/or meeting the POs:

- Facility Created in the area of Green Building Technology in the form of Built Environment Test Room Laboratory. This Facility was created by the support of our Institute and on-going DST Project.
- This Laboratory facility contains analytical equipments for building functional performance measurement (Temperature, Humidity, Light, CO<sub>2</sub>, Thermal conductivity of materials, energy audit kit, etc.) as well as software simulation facility (HevaComp-Bentley Product for lighting and thermal simulation).
- It is being used by PhD scholars as well as B Tech/ M Tech students for project work as well as assignments (Course- Energy Efficient Buildings)
- Two New Class Rooms of capacity 120 students and one Class Room Of capacity 40 students were constructed over Water Resources Engineering Laboratory during the year 2011.
- Two New Class Rooms of capacity 120 students and three new staff rooms are under construction at main block of civil engineering department and likely to be completed in December 2013.



- New computer lab for UG & PG students of capacity 40 students was developed during the year 2013.
- LCD projectors were installed in all the class Rooms for teaching aid during the year 2012.
- All the laboratories were updated by procuring new instruments continuously during past three years and many new procurements are in pipeline.

**9.8. Overall Improvements since last accreditation, if any, otherwise, since the commencement of the programme (20)**

Specify the overall improvement:

Specify the strength / weakness	Improvement brought in	Contributed by	List of PO(s), which are strengthened	Comments, if any
<ul style="list-style-type: none"> <li>• There are no hostels for M.Tech and Ph.D male students.</li> <li>• Only 50% of the faculty has PhD degrees.</li> <li>• Although faculty is encouraged to register for PhD, the registration being largely in VNIT, it will lead to inbreeding of faculty. Also, the number of PG and research students is rather small.</li> <li>• Only senior faculty is involved in research and publishes reasonably good papers. Overall no. of Ph.D.s produced and no. of publications are not good enough for an NIT.</li> <li>• A lot of obsolete and useless equipment is lying in various departments.</li> </ul>	<ul style="list-style-type: none"> <li>• Hostel facility is provided for PG and Ph.D.</li> <li>• Almost &gt; 90% faculty have Ph.D.</li> <li>• Faculty is pursuing Ph.D. in IIT (01)</li> <li>• Number of Ph.D. and PG students are increased.</li> <li>• New and advanced equipment have been procured in various laboratories</li> </ul>	Department	<ul style="list-style-type: none"> <li>• To develop specialised manpower for Environmental management.</li> <li>• To enhance analytical skills so as to enable to solve complex industrial and social problems.</li> <li>• To augment the students' capacity in pursuing research in emerging areas of Environmental Engineering.</li> <li>• To improve students' perspective towards environmental issues by sensitising and building the awareness of green technologies.</li> <li>• To inculcate the culture of research oriented projects with state-of-art facility laboratories in Environmental Engineering.</li> </ul>	

## **Declaration**

The head of the institution needs to make a declaration as per the format given below:

This Self-Assessment Report (SAR) is prepared for the current academic year (2013-2014) and the current financial year (2013-2014) on behalf of the institution.

I certify that the information provided in this SAR is extracted from the records and to the best of my knowledge, is correct and complete.

I understand that any false statement/information of consequence may lead to rejection of the application for the accreditation for a period of two or more years. I also understand that the National Board of Accreditation (NBA) or its sub-committees will have the right to decide on the basis of the submitted SAR whether the institution should be considered for an accreditation visit.

If the information provided in the SAR is found to be wrong during the visit or subsequent to grant of accreditation, the NBA has right to withdraw the grant of accreditation and no accreditation will be allowed for a period of next two years or more and the fee will be forfeited.

I undertake that the institution shall co-operate the visiting accreditation team, shall provide all desired information during the visit and arrange for the meeting as required for accreditation as per the NBA's provision.

I undertake that, the institution is well aware about the provisions in the NBA's accreditation manual concerned for this application, rules, regulations and notifications in force as on date and the institute shall fully abide to them.

**Signature, Name, and Designation of  
the Head of the Institution with seal**

Place: Nagpur

Date: