

**NATIONAL BOARD OF ACCREDITATION**

**SELF ASSESSMENT REPORT (SAR)  
FOR ACCREDITATION OF  
PG ENGINEERING PROGRAMME  
in  
Materials Engineering**

**(TIER- I)**



**NATIONAL BOARD OF ACCREDITATION**

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**(January, 2013)**

# Contents

	<b>Title</b>	<b>Page No.</b>
<b>PART A</b>		
1.	<b>Institutional Information</b>	
2.	<b>Departmental Information</b>	
3.	<b>Programme Specific Information</b>	
<b>PART B</b>		
1.	<b>Vision, Mission and Programme Educational Objectives</b>	
2.	<b>Programme Outcomes</b>	
3.	<b>Programme Curriculum</b>	
4.	<b>Students' Performance</b>	
5.	<b>Faculty Contributions</b>	
6.	<b>Facilities and Technical Support</b>	
7.	<b>Academic Support Units and Teaching-Learning Process</b>	
8.	<b>Governance, Institutional Support and Financial Resources</b>	
9.	<b>Continuous Improvement</b>	
<b>Declaration</b>		

# Self Assessment Report (SAR)

## 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.**  
**Email : [director@vnit.ac.in](mailto:director@vnit.ac.in)**  
**Dr. K D Kulat, Professor, Department of Electronics Engineering**  
**Ph : 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 15th August 2007. VNIT Nagpur was conferred the Deemed to be University status (under University Grants Commission Act, 1956 (3 of 1956)) with effect from 26th 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 the 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 13th most populous city and 13th 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 center of the country with the Zero Mile marker indicating the geographical center 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 in 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, 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.

<b>Sr.No.</b>	<b>Program Name</b>	<b>Year</b>	<b>Intake Capacity</b>
<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.	Metallurgical and Materials Engineering	1965	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	20
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.	Materials Engineering	2006	20
14.	Structural Dynamics and Earthquake Engineering	2003	20
15.	Structural Engineering	1991	20
16.	Excavation Engineering	2012	
17.	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:

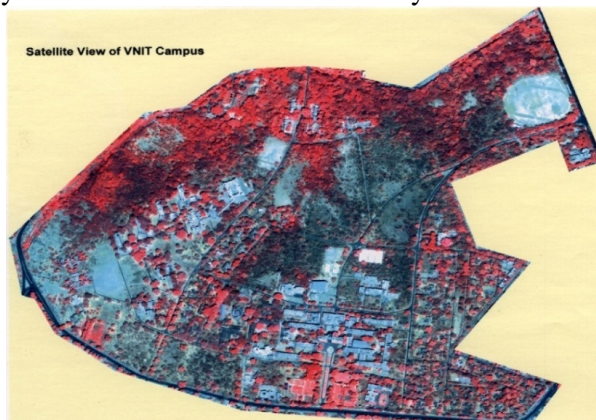
Sr.No	Name of UG & PG Programme(s)	Accreditation Status	Period of validity w.e.f. 10.02.2009
01.	B.Tech. Electronics & Comm. Engg.	Accredited	3 Years
02.	B.Tech. Mechanical Engg.	Accredited	3 Years
03.	B.Tech. Civil Engg.	Accredited	3 Years
04.	B.Tech. Computer Science & Engg.	Accredited	3 Years
05.	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	

### 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
	Total Increased Intake	<b>60</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 fully 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 dispensary.

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. There are very well used by students and campus residents of quarters.

**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. 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**

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**

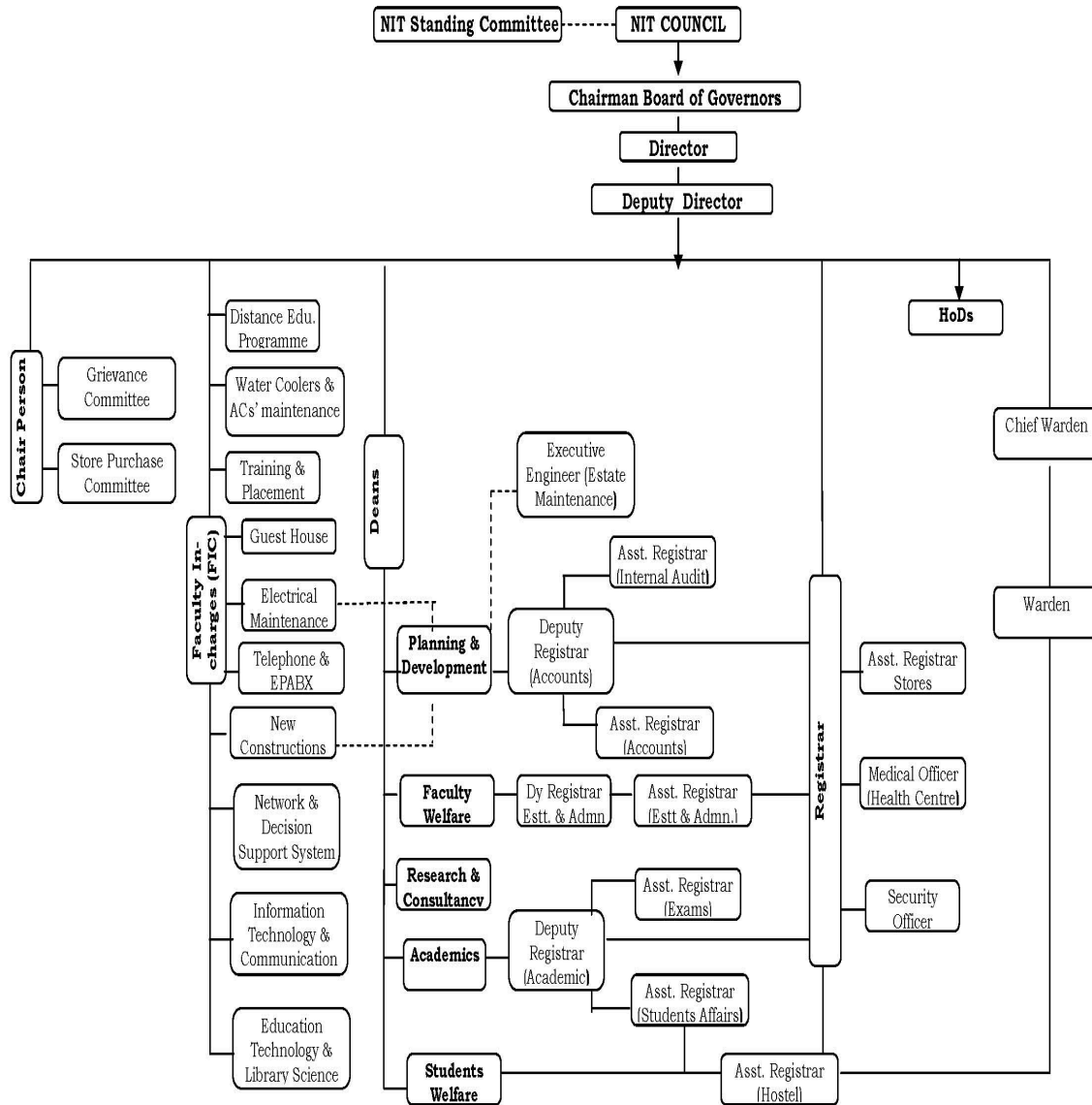
As per the provisions of the NIT Act, the Board of Governors (BoG) is responsible for superintendence, direction, and control of the Institute. Thus, the BoG is vested with full powers of the affairs of administration / management and finances of the Institute. Members of the Board represent Government 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

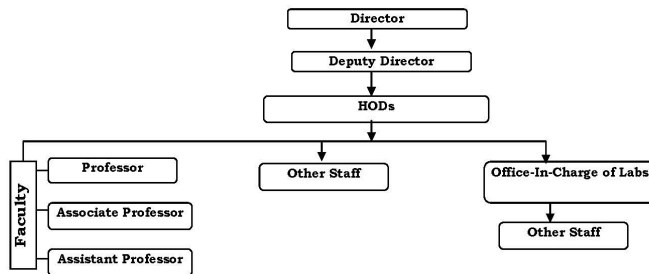
Figure - 1



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

Figure - 2

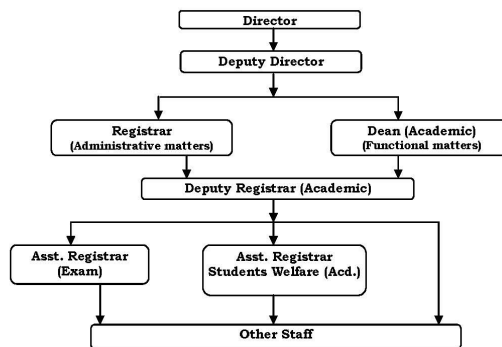
#### 1. ACADEMIC DEPARTMENTS



	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 it's 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.Pharm. Students AICTE PG Scholarship 2013 for M.E./M.Tech/ M.Pharm. 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
Scholarship Assistance	Various sources given in 1.11			
Amount	<b>3,28,05,922</b>	<b>1,74,86,164</b>	<b>1,77,64,254</b>	<b>2,37,27,156</b>

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

**All India entrance** / state- level entrance/ university entrance/12th 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

**1.14** Total number of employees:

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

### A. Regular Staff

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

### 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

## II. Departmental Information

- II.1 Name and address of the Department:  
**Department of Metallurgical & Materials Engineering,  
 Visvesvaraya National Institute of Technology,  
 South Ambazari Road, Nagpur – 440 010 (Maharashtra State), India.**
- II.2 Name, designation, telephone number, and e-mail address of the contact person for the NBA:  
**Dr. R.K. Paretkar, Professor & Head  
 Telephone – 91 – 712 – 280 1324, 280 1351  
 ravindraparetkar@gmail.com**
- II.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:

Programme	Description
UG in Metallurgical Engg.	Started with 20 seats in 1965 Intake increased to 30 in 1966 Intake increased to 40 in 1980 Intake increased to 70 in 2007 Intake increased to 80 in 2009 Intake increased to 90 in 2010
PG in Materials Engg.	Started with 25 seats in 2006

### II.4 Mission and Vision of the Department

**VISION:** A department, growing at pace matching with global trends, emerging as a world's one of the leading academic organizations for its advanced knowledge base and cutting edge research contributions.

**MISSION:** The mission of the department is:

- To link the human resource with the knowledge base in the field of metallurgical and materials engineering in such a way that the challenges faced by the mankind in optimum utilization of the materials resources are successfully met with.
- To stride on every front of knowledge dissemination through teaching learning process, research and development and offering expert solutions to technological problems.
- To integrate human resource with highest attainable level of knowledge on materials with various channels functioning for its efficient dissemination for welfare of mankind.

### II.5 List of the programmes/departments which share human resources and/or the facilities of this department/ programmes (in %):

- Mechanical Engg. – Theory and Lab course on Metallurgy shared by faculty
- Mining Engg. – Theory course on Mineral Dressing shared by faculty member
- Chemical engg., Applied Physics, Applied Chemistry utilize various testing and characterization facilities of this department

II.6 Total number of students

UG: 247

PG: 25

II.7 Minimum and Maximum number of staff on roll during the current and three previous academic years (1<sup>st</sup> July to 30<sup>th</sup> June ) in the department:

Item	CAY		CAYm1		CAYm2		CAYm3	
	Min.	Max.	Min.	Max.	Min.	Max.	Min	Max.
Teaching Staff in the department	15	15	17	17	17	17	17	17
Non-teaching Staff	9	9	9	9	9	9	9	9
Total	24		26		26		26	

II.7.1 Summary of budget for the CFY and the actual expenditure incurred in the CFYm1, CFYm2, CFYm3(for the department):

Item	Budgeted in CFY	Actual expenses in CFY (till September*2013) *	Budgeted in CFYm1	Actual Expenses in CFYm1 *	Budgeted in CFYm2	Actual Expenses in CFYm2 *	Budgeted in CFYm3	Actual Expenses in CFYm3
Laboratory equipment	40.0 L	29.0 L	30 L	46.0 L	25.0 L	23.0 L	10	
Software	NA	NA	NA	NA	NA	NA		
Laboratory consumables	3.5 L	1.64 L	3.0 L	2.60 L	3.0 L	2.95 L		
Maintenance and spares	NA	NA	NA	NA	NA	NA		
Training and Travel	NA	NA	NA	NA	NA	NA		
Miscellaneous expenses for academic activities	NA	NA	NA	NA	NA	NA		
Total	43.5 L	30.64 L	33 L	48.6 L	28 L	25.95 L		

\* 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 Institutional Income Expenditure statement in Part I - item I-10.

### III Programme Specific information

III.1 Name of the Programme

PG in Materials Engineering

III.2 Title of the Degree

Master of Technology in Materials Engineering

III.3 Name, designation, telephone number, and e-mail address of the programme coordinator for the NBA:

Dr. R.K. Paretkar, Professor & Head  
Telephone – 91 – 712 – 280 1324, 280 1351  
ravindraparetkar@gmail.com

III.4 History of the programme along with the NBA accreditation, if any:

Programme	Description
PG in Materials Engineering	Started with 25 seats in 2006

III.5 Deficiencies, weaknesses / concerns from previous accreditations:

Programme is due for first accreditation.

III.6 Total number of students in the programme:

35



III.7 Minimum and maximum number of staff for the current and there previous academic year (1<sup>st</sup> July to 30<sup>th</sup> June) in the programme:

Item	CAY		CAYm1		CAYm2		CAYm3	
	Min.	Max.	Min.	Max.	Min.	Max.	Min	Max.
Teaching Staff with the program	15	15	17	17	16	16	16	16
Non-teaching Staff	9	9	9	9	9	9	9	9

III.8 Summary of budget for the CFY and the actual expenditure incurred in the CFYm1, CFYm2, CFYm3 (exclusively for this programme in the department):

(in Rs. Lacs)

Item	Budgeted in CFY	*Actual expenses in CFY (till Sept.)	Budgeted in CFYm1	*Actual Expenses in CFYm1	Budgeted in CFYm2	*Actual Expenses in CFYm2	Actual Expenses in CFYm3	Budgeted in CFYm3
Laboratory equipment	40.0	29.0	30 L	46.0	25.0	23.0		
Software	NA	NA	NA	NA	NA	NA		
Laboratory consumables	3.5	1.64	3.0	2.60	3.0	2.95		
Maintenance and spares	NA	NA	NA	NA	NA	NA		
Travel	NA	NA	NA	NA	NA	NA		
Miscellaneous expenses for academic activities	NA	NA	NA	NA	NA	NA		
Total	43.5	30.64	33	48.6	28	25.95		

(\* Department total expenditure. The expenditure for PG programme is approximately 60% of the total expenditure of the department)

## 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 (Institute)**

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 (Institute)**

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: (Department) :

A department, growing at pace matching with global trends, emerging as a world's one of the leading academic organizations for its advanced knowledge base and cutting edge research contributions.

#### MISSION (Department) :

The mission of the department is:

- To link the human resource with the knowledge base in the field of metallurgical and materials engineering in such a way that the challenges faced by the mankind in optimum utilization of the materials resources are successfully met with.
- To stride on every front of knowledge dissemination through teaching learning process, research and development and offering expert solutions to technological problems.
- To integrate human resource with highest attainable level of knowledge on materials with various channels functioning for its efficient dissemination for welfare of mankind.

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

Department website ([www.mme.vnit.ac.in](http://www.mme.vnit.ac.in)) and Notice boards.

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

In tune with institute mission, the mission of the department is focused on the linkage between human resource and highest attainable levels of knowledge in the area materials to be utilized for facing the challenges in the field at National and International level.

Both the institute and departmental vision and mission have been carefully worked out on the past experience of five decades and the constructive and creative feedback from the stake holders.

## 1.2 Programme Educational Objectives (10)

### 1.2.1 Describe the Programme Educational Objectives (PEOs)(1)

The educational objectives of PG programme in Materials Engineering are set to enable students:

- To understand the facets of advanced technologies/processes/ materials necessary in the engineering field
- To apply the concepts to solve the engineering problems in a scientific and systematic way
- For professional and research careers in the field of metallurgical and materials engineering
- To appreciate the significance of team work and collaborations in designing, planning, and implementing solutions for practical problems and facilitate the networking with national research and academic organizations

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

The PEO are published at:

1. Department website <http://www.mme.vnit.ac.in>
2. Curriculum books
3. Notice boards

Apart from this, Program outcomes are made reachable to all the stakeholders of the program through education, faculty workshops, student awareness workshops, programs, student induction programs and faculty meetings.

### 1.2.3 List the stakeholders of the programme (1)

(a) Students (b) Alumni (c) Employers (Government and Private) (d) Higher educational institutions (e) Parents of Students (f) Various research funding agencies.

### 1.2.4 State the process for establishing the PEOs (3)

- (a) Feedback from students of current batch.
- (b) Feedback and discussion session with Alumni.
- (c) Suggestions received from companies regularly coming for campus placements.
- (d) Discussions at various forum of research funding (DST, AR&DB, NRB, DRDO, BRNS)
- (e) Interaction with national level organization like IGCAR, NAL, NML, ARCI on M.Tech projects/ research leading to Ph.D. degree

### 1.2.5 Establish consistency of the PEs with the Mission of the institute (4)

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.

The PEOs of this program contribute to this mission by providing quality education to its students and preparing them for the professional careers in industry as well as research at the same time making them appreciate the significance of networking and collaborations.

### 1.3 Achievement of Programme Educational Objectives (20)

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

Theory courses (Core and Electives) have been designed to give detailed knowledge of basics as well as advances in materials engineering and technology to the graduates	PEO 2
Lab courses and modules are designed to give hands on experience of various testing and characterization tools required in materials engineering	PEO 1, PEO 2, PEO 3
Research projects (1 yr. duration) , specially in collaboration, help students appreciate, design, and approach the engineering problems related to materials	PEO 2, PEO 3, PEO 4

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

- Board of Studies (BoS) regulates the curriculum, scheme of examinations as per the norms set by Dean (Academics) on approval from Senate of the institute
- Class Working Committee (CWC) monitors the conduct and evaluation of the courses
- Panel of experts from academia and industry evaluate the project work by the students
- Training and Placement (T&P) Cell facilitates placement of PG students

### 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)

- 1) BoS Meetings – At least one every year
- 2) Evaluation by experts – Once every year
- 3) CWC Meetings – Twice a semester

In addition to this, feedback from the students and faculty members from IITs where the graduates of this programme are pursuing Ph.D. help in assessing the PEOs.

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

- Majority of the graduates are pursuing research in various academic organization
- The graduates of this programme are getting recruited in industries working in materials engineering

#### 1.5 Indicate how the PEOs have been Redefined in the past (5)

The programme has been initiated recently. System is in place to review the achievement of the PEOs as per #1.4.1 above and accordingly the PEOs may suitably be redefined every 5 years.

## 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)

General Course Outcomes:

- CO1 - Understanding of STRUCTURE of materials of all classes at various levels
- CO2 - Knowledge of various tools and techniques of CHARACTERIZATION of materials
- CO3 – Understanding various routes of PROCESSING of various materials
- CO4 – Establish the STRUCTURE-PROPERTY-PROCESSING co-relationship
- CO5 – Understanding the INTERACTION of various environments with materials

Programme Outcomes:

- PO1 – Gain knowledge of the concepts of materials engineering
- PO2 – Ability to analyse the problem correctly
- PO3 – Apply the knowledge to design and development of possible solutions
- PO4 – Ability for a systematic investigation of complex problems in engineering
- PO5 – Should be able to handle and use modern tools in materials engineering
- PO6 – Foster a strong bonding with the human society
- PO7 – Appreciate the implications of environment for sustainable solutions
- PO8 – Understand and practice the profession in ethical manner
- PO9 – Ability to work as an individual and in team
- PO10 – Ability to communicate effectively in oral as well as written manner
- PO11 – Develop an approach for lifelong learning in profession
- PO12 – Ability to manage and finance the engineering projects

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

Department website ([www.mme.vnit.ac.in](http://www.mme.vnit.ac.in)) and Notice boards.

Apart from this, Program outcomes are made reachable to all the stakeholders of the program through education, faculty workshops, student awareness workshops, programs, student induction programs and faculty meetings.

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

The main constituents for the program are current students, alumni, and the industry, having representation in different departmental meetings. Input from current students is obtained on all aspects of the program. The forum is held during academic year and is attended by students representative, key faculty members.

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

The Graduate Attributes of NBA and the Program Outcomes defined for the program are aligned to each other as shown below

Graduate Attributes prescribed by NBA:

- i. Engineering Knowledge
- ii. Problem Analysis



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

PO PEO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	√	√	√	√	√	√	√	√	√	√	√	√
PEO2	√	√	√	√	√	√	√	√	√	√	√	√
PEO3	√	√	√	√	√	√	√	√	√	√	√	√
PEO4	√	√	√	√	√	√	√	√	√	√	√	√

## 2.2. Attainment of Programme Outcomes (75)

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

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√			√	√		√	√	
CO2	√	√	√	√	√	√	√	√	√	√	√	√
CO3	√	√	√	√	√	√	√	√	√	√	√	√
CO4	√	√	√	√	√	√	√	√	√	√	√	√
CO5	√	√	√	√	√	√	√	√	√	√	√	√

The mapping indicates strong contribution of COs to achieve Pos.

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

The following are the various delivery methods used:

M1: Lecture interspersed with discussions

M2: Quizzes

M3: Tutorial

M4: Demonstration (Such as model, laboratory, field visit, by sophisticated equipment suppliers )

M5: Group Assignment/ Project

M6: Presentations

M8: Discussion on live problems in R&D

In addition to the syllabus mentioned in the curriculum, the students are provided with the e-content through national and international portals such as: NPTEL <http://nptel.iitm.ac.in>

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)

(A) In-sem Quizzes/Assignments -Each and every student is assigned with course related tasks during every course work once or twice and assessment will be done based on their performance. Grades are assigned depending on their innovation in solving/deriving the problems.

(B) Sessional examinations-This type of performance assessment is carried out during the examination sessions which are held twice a semester. Each and every sessional is focused in attaining the course outcomes.

(C) Seminars/ Project presentations – Presentations are held atleast once a semester to help the student present results and communicate effectively.

2.2.4. Indicate the extent to which project work / thesis contributes towards attainment of POs (50)

Many project/thesis work are in collaboration with leading organizations involved in R&D. The experimental work needs co-ordination with other groups as the resources are to be shared at times.

### **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)

- The assessments are done during annual BoS meeting.
- The placement results of the programme also help in evaluation of attainment of POs.
- The selection of the graduates of this programme in renowned institutes for PhD programs is used as an assessment tool.

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

The exercise has not yet been taken extensively as this programme has been initiated recently

### **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)

Revision of course work.

Continuous evaluation of projects has been introduced.

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

Course seminars have been introduced.

PG students are encouraged for industrial visits organized by department.

2.4.2. State the process used for revising/redefining the POs (15)

This is the maiden exercise of this department. It is planned to revise/redefine the PO every 5 years.



### 3. Programme Curriculum (75)

#### 3.1. Curriculum (15)

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

Curricular Composition	Credits
Theory courses (20 courses)	6 credits each (7 core, 5 electives out of 13)
Laboratory courses (2 courses)	3 credits each
Seminars (1)	2 credits
Project works (Phase I and II)	24
Total	104

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

Basics and advanced topics in material engineering are covered in the specially designed courses and scheme of examinations.

Availability of plenty of electives help students to develop the specialization of their choice..

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

- Industrial visits organized
- Projects/thesis work in collaboration with R&D organizations

#### 3.3. Curriculum Development (15)

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

The curriculum is designed after the brainstorming sessions before the BoS meetings. The final shape is given during BoS meetings which involve people from IITs as well as industry.

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

- Students' feedback system is in place
- Class working committee meetings are held twice a semester
- Board of Study meetings are held once an year for review

#### 3.4. Course Syllabi (5)

- Attached as Annexure 1

#### 4. Student 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 Student with valid GATE Score/PG entrance of State
CAY	20	18	90	18	100
CAYm1	20	18	90	18	100
CAYm2	20	17	85	16	94
CAYm3	20	9	45	9	100

Average percentage of seats filled through approved procedure = 98

Average percentage of students admitted with valid GATE Score/PG entrance of state = 98%

YEAR	Number of Students Admitted	API = Academic Performance Index = Average CGPA or Average Marks on a scale of 10 (Compiled from the Graduation Records)
CAY	18	6.9
CAYm1	18	6.9
CAYm2	17	6.6
CAYm3	9	6.7

Average API = 6.7

##### 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.

Assessment =

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

Assessment = 1.5 X Average API

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

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

#### 4.2. Success Rate (20)

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 Programme	GI
LYG	16	17	0.94
LYGm1	9	9	1
LYGm2	14	14	1

Average GI = 0.98

Assessment = 20 x Average GI = 19.6

#### 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	17	7.7
LYGm1	9	8.4
LYGm2	14	8.1

Assessment = 2 x Average API = 16

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

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 to maximum assessment points = 20.

Item	LYG	LYGm1	LYGm2
Number of admitted students corresponding to LYG(N)	17	9	14
Number of Students who obtained jobs as per the record in the industry/ academia	12	0	4
Number of Students who opted for higher studies with valid qualifying scores/ranks (y)	1	4	7
Assessment points	17.6	20	20

Average assessment points = 19

**4.5. Professional Activities (25)**

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

- Students are encouraged to enrol for professional societies like Indian Institute of Metals
- Students participate in engineering events within and outside Institute

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

- Students have presented papers in various conferences.
- Several awards have been achieved by the students

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

- Rahul Unnikrishnan, K.S.N Satish Idury, T.P. Ismail, Alok Bhadauria, S.G. Sapate and Rajesh K. Khatirkar, "Effect of Heat Input on the Microstructure, Residual Stresses and Corrosion Resistance of 304L Austenitic Stainless Steel Weldments", Materials Characterization (under review).
- Avishkar B. Rathod, Sanjay G. Sapate and Rajesh K. Khatirkar, " Abrasive wear characterization of heat treated En24 steel using silica sand, iron ore and limestone slurries", ISIJ International (under review).
- Abin Baburaj, K.B. Shishupal Singh Chaudhary, Rajesh K. Khatirkar and S.G. Sapate, "Abrasive wear behaviour of heat treated En31 steel", ISIJ International, 53, No. 8, (2013) pp. 1471-1478.
- Kiran Kumar Surthi, Rajesh K. Khatirkar and Sanjay G. Sapate, "Effect of mode of rolling on recrystallization kinetics and microstructure evolution in interstitial free high strength steel sheet", ISIJ International, 53, No. 2, (2013) pp. 356-364.
- Sunil Kumar Comparison of recrystallization textures in interstitial free and interstitial free high strength steels, Materials Chemistry and Physics, 2011

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

Visits have been organized to Anandvan to make students appreciate innovations in rural technology

## B-5 Faculty Contributions

### 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(%)			Number of research publication in journals and conferences since joining	I P R S	R & D and consultancy work with amount	Holdin g an incuba tion unit	Interacti on with outside world
			1 <sup>st</sup> year	UG	PG					
R.K. Paretkar	B.Tech (Nagpur Univ.) 1970 M.Tech. (Nagpur Univ.) Ph.D. (VNIT, Nagpur)	Asso. Lect. 1972 Professor	-	60%	40%	Journal-20 Conferen ces-20	-	MHRD 10 Lacs MHRD 5 lacs MHRD 10 lacs KVIC 60 lacs MHRD 40 lacs ADOR 12 lacs AR & DB 6.14 lacs AR & DB 7.45 lacs NRB 27 lacs DST 50 lacs BRNS 82.14 lacs ACECOST 167.3 lacs UGCDAE 4 lacs UGCDAE 4 lacs	-	SHU Manch ester univers ity, MUS, IIT Chenna i, Kanpur , Bomba y, Delhi. NIT Raurke la, Surat, Trichy, Waran gal. COEP, MIT, SJS Plastibl ends, Aurang abad, Nelcost , ACC- Nihon casting, ICCAR , ARCI, NAL, ADA, BARC, DMR, DRDO, JNAR DDC, CPRI.
D.R.Peshwe	B.Tech (Nagpur Univ.)1983 M.Tech. (Nagpur Univ.) Ph.D.	Lecturer: 3 July 1984 Professor		50% 2L	50% 2L	Journal-70 Conferen ces-85	-	MHRD 10 Lacs MHRD 5 lacs MHRD 10 lacs KVIC 60 lacs MHRD 40	-	SHU Manch ester univers ity, MUS, IIT

	(VNIT, Nagpur)							lacs ADOR 12 lacs AR & DB 6.14 lacs AR & DB 7.45 lacs NRB 27 lacs DST 50 lacs BRNS 82.14 lacs ACECOST 167.3 lacs UGCDAE 4 lacs UGCDAE 4 lacs		Chennai, Kanpur, Bombay, Delhi. NIT Raurkela, Surat, Trichy, Waranagal. COEP, MIT, SJS Plastiblends, Aurangabad, Nelcost, ACC-Nihon casting, ICCAR, ARCI, NAL, ADA, BARC, DMR, DRDO, JNAR DDC, CPRI.
A.P.Patil	B.Tech (Nagpur Univ.)1983 M.Tech. (Nagpur Univ.)1985 Ph.D. (VNIT, Nagpur)2005	Lecture 19 <sup>th</sup> Sept. 1985 Assist. Prof. 1/07/1996 Prof. 1/07/2008	-	80	20	Journals- 17 Conferences-28	-	1) PI of NMD sponsored R&D project Rs.10lacs (2005-2008) 2) Co-I of NRB sponsored R&D project Rs.20lacs (2008-2010) 3) Many small consultancy assignment worth Rs2.8 lacs(all together )	-	1)Common wealth fellow ship at Manchester Univ. Oct.20 08- March 2009 2) Visiting researcher at Sheffield Hallom Univ. May- June 2010 3) Research fellowship at Sheffield

										Id Hallom Univ. July 2005. 4) Technical training at Sheffield Hallom Univ. Feb.1996-July1996.
S.G. Sapate	B.E. (Nagpur Univ.)1987 M.Tech. (Nagpur Univ.)1989 Ph.D. (VNIT, Nagpur)2001	Prof. 01/07/1991	-	80	20	Journals-20 Conferences- 10	-	Consultancy work in wear behavior of materials. PhD supervision – 01 MTech supervision-25	-	DMRL, Hyderabad
V.K. Didolkar	B.E. (Nagpur Univ.)1974 Ph.D.(Nagpur) 1996	Lecturer 01/01/1977	-	60	40	Journals-10 Conferences- 30	-	GoI schemes – 5 lakhs	-	1) SHU, UK 2) IIT 3) HSS, NY 4) IIT BHU, Varanasi 5) IISc Bangalore, 6) ISM Dhanbad
D.V.Moghe	B.E.(Nagpur Univ.)1979 M.Tech (IIT Bombay)1981	Associate Professor July 1984	-	100%	-	06	-	-	-	1) Joint projects with Institutes & Industry. 2) Training programmes for Industry 3) Training visits to Industr

S.N.Paul	B.E. (Kolkata) M.Tech- IIT Kanpur Ph.D.-IIT, Bombay	Associate Professor 3 <sup>rd</sup> July 1984	-		30	40	-	1) Material Technology & Development Centre (MHRD/ - 10Lacs(1988) 2) development of Polymers (5lacs) 3) (10lacs) 4) Imprument in Technology Education - 22lacs		y- 1) Membe r-ASM Internat ional 2) Life membe r –IIM 3) Internat ional confere nce\ 4) Membe r-
Jatin Bhatt	B.E (NIT Raipur) 1996 M.Tech. (IIT BHU)2003 PhD. (IITM) 2008	25 <sup>th</sup> May 2009, Asso. Professor	-	50% 2L	50 % 2L	Journal-25 Conferen ces-45	-	Completed (1.51 Cr.)  ACECOST 167.00 lacs	-	IITM, IITK,I GCAR, AMES Lab USA, Dalian Univer sity, China. NAL, Bangal ore
Ajay Likhite	B.E.(Nagpur Univ.)1983 M.Tech(Nagpur Univ.) 1985 Ph.D. (VNIT)2008	Asso. Professor 25 <sup>th</sup> May 2009		100 %		Journal – 10 Conferen ce-01	-	DST sponsors project for Rs.50 lakhs	Nil	MIT Aurang abad
R.C.Rathod	B.E. (Pune Univ.) 1996	Asst. Professor 3 <sup>rd</sup> Oct. 1998	-	60%	40 %	J+C = 15	-	-	-	IIT, Bomba y
Atul Ballal	Ph.D.(IIT Bombay) 2011	Assistant Professor 26/5/2006		66 (2 Core cours es)	34 Ele cti ve)	Journals – 5 Conferen ces - 8	-	1) BRNS – 82Lakhs 2) UGC-DAE 2 projects (20lakhs)	-	Active collabo ration with 1)JGC AR 2) ARCI 3) BARC
Rajesh Khatirkar	B.Tech (Nagpur Univ.)1998 M.Tech. (VNIT)2004 Ph.D. (IIT Bombay)201 2	Assistant Professor 24 <sup>th</sup> May 2006	-	66	34	Journals - 18 Conferen ces - 02	-	R&D Projects-Nil Failure Analysis consultancy 2 lakhs	-	IIT Bomba y, ISPAT Sunflag Industri es, IIT Madras , IISc Bangal



										ore, Ghent univers ity, Belgiu m
Yogesh Mahajan	B.Tech (Nagpur Univ.) 1993 M.Tech (VNIT)2013	Assistant Professor 16 <sup>th</sup> June 2006	-	100 %	-	Conferen ce -02	-	1)Retrogressi on & Reasing of 7010 Al (27.6 lakhs) 2) consultancy work for BCL, KTPS, Power Grid CSIR, etc (6 lakhs)	-	IIT Chenna i, ADA, NRB, Industri al - WCL, Aryan Power, BCL Spring, Power KTPS
R.V. Taiwade	B.Tech (Nagpur Univ.)1997 M.Tech. (Nagpur Univ.)2001 Ph.D. (VNIT, Nagpur)2013	Assistant Professor 8 <sup>th</sup> July 2008	-	5 <sup>th</sup> Sem B.Te ch ORT Th- 03 5 <sup>th</sup> Sem B.Te ch Mini ng Engg . Th- 03 & ED Pract. -04	1 <sup>st</sup> Se m M. Te ch IM A Pra ct.- 02	10	-	Testing of Welded Joint M.S.Pipe, Pipri Meghe (Wardha) 9,500/-	-	-
Manjusha Thawre	B.E 2000 M.Tech. 2007	23/06/2009 Assist. Professor		50% 2L	50 % 2L	J+C = 08		ACECOST 167.00 lacs	-	NAL, Bangal ore

### 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	U1	U2	U3	P1	P2	S	F	STR	Assessment
CAY	87	83	77	15	18	280	15	18.8	13.83
CAYm1	90	78	65	18	17	267	17	15.7	16.56
CAYm2	85	68	59	17	09	237	17	13.9	18.7
CAYm3	71	56	62	09	14	212	17	12.5	20.8

Average Assessment = 17.47

### 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
CAY	12	15	16
CAYm1	11	17	12.94
CAYm2	09	17	10.58

Assessment = 20 x [X/Y]

Average Assessment = 13.17

### 5.3. Faculty Qualifications (30)

Assessment	=	4 x 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/ B. Tech/ M. Sc			
	X	Y	N	FQI	Assessment
CAYm2	10	6	16	8.75	35
CAYm1	11	6	17	8.6	34.3
CAY	12	3	19	6.3	25.3
Average Assessment					30

5.4. Faculty Competencies correlation to Programme Curriculum (15)

Name of faculty	Specialization
Ballal A R	Ceramic engineering, Mechanical Metallurgy
Chopde A D	Physical Metallurgy, Structural & Chemical Characterization
Didolkar V K	Mineral Dressing & Processing
Khatirkar R K	Deformation, Texture
Mahajan Y Y	Physical Metallurgy, Welding
Moghe D V	Iron & Steelmaking, Direct Reduction, Clean Steelmaking
Paretkar R K	Ferro-alloy Technology, Mechanical & Wear Behavior
Pathak S U	Failure Analysis, Foundry Technology, Extractive Metallurgy.
Patil A P	Corrosion Engineering
Paul S N	Polymer Engineering
Peshwe D R	Physical Metallurgy, Composites & Solidification processing
Rathod R C	Corrosion Engineering
Sapate S G	Wear, Heat Transfer
Taiwade R V	Corrosion, Modeling & Simulation
Thaware M.M.	Composites, Testing of Materials

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 the faculty	Max. 5 per faculty		
	CAYm2	CAYm1	CAY
RK Paretkar	5	5	5
SU Pathak	5	5	-
DR Peshwe	5	5	5
DV Moghe	5	5	5
JG Bhatt	5	5	5
SG Sapate	5	5	-
AP Patil	3	3	-
SN Paul	-	-	-
RC Rathod	-	-	-

AR Ballal	5	5	5
AA Likhite	5	-	-
YY Mahajan	5	5	5
RK Khatirkar	-	5	-
RV Taiwade	5	5	5
MM Thaware	3	3	3
Sum	56	51	30
N(Number of faculty positions required for an STR of 15)	16	17	19
Assessment = 3 x Sum/N	10.5	9	4.7
Average Assessments			8.1

### 5.6. Faculty Retention (15)

Assessment =  $3 \times \text{RPI}/N$   
 where RPI = Retention point 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( $x_0$ )	Nil	Nil	Nil
Number of faculty members with 1 to 2 years experience	3	Nil	Nil
Number of faculty members with 2 to 3 years experience	1	3	Nil
Number of faculty members with 3 to 4 years experience	Nil	1	3
Number of faculty members with 4 to 5 years experience	3	Nil	1
Number of faculty members with more than years experience( $x_5$ )	10	13	15
N	17	17	15
$\text{RPI} = x_1 + 2x_2 + 3x_3 + 4x_4 + 5x_5$	67	61	68
Assessment	11.82	10.76	13.6
Average Assessment			12.1

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

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

(Instruction: A faculty member scores maximum five research publication points depending upon the *quality* of the research papers and books published in the past three years.)

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 faculty (controlling to FRP)	FRP points (max. 5 per faculty)		
	CAYm2	CAYm1	CAY
RK Paretkar	3	4	5
SU Pathak	5	5	5
DR Peshwe	5	5	5
JG Bhatt	5	5	5
SG Sapate	5	-	5
AP Patil	3	3	5
SN Paul	3	-	-
RC Rathod	3	-	-
AR Ballal	-	4	3
AA Likhite	3	3	5
YY Mahajan	-	3	4
RK Khatirkar	5	5	-
RV Taiwade	-	3	3
MM Thaware	-	3	3
Sum	40	43	48
N(Number of faculty positions required for an STR of 15)	16	17	19
Assessment of FRP = 6 x Sum/N	15	15.2	15.2
<b>Average Assessment</b>			<b>15.1</b>

### 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 (controlling to FIPR)	FRP points (max. 5 per faculty)		
	CAYm2	CAYm1	CAY
Sum			
N			
Assessment of FRP = $2 \times \text{Sum}/N$			
Average Assessment			

### 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 faculty (controlling to FIPR)	FRP points (max. 5 per faculty)		
	CAYm2	CAYm1	CAY
RK PARETKAR	5	5	5
SU PATHAK	5	5	5
DR PESHWE	5	5	5
JG BHATT	5	5	5
AR BALLAL	5	5	5
AA LIKHITE	5	5	5
YY MAHAJAN	5	5	5
MM THAWARE	5	5	5
Sum	40	40	40
N	16	17	19
Assessment of FRP = $6 \times \text{Sum}/N$	15	14	12.6
Average Assessment			14

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

FIP = Faculty interaction points

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

(Instruction: A faculty member gets a maximum of five interaction points, depending upon the type of institution or R&D laboratory or industry, as follows)

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 (controlling to FIP)	FIP points (max. 5 per faculty)		
	CAYm2	CAYm1	CAY
RK Paretkar	5	5	5
SU Pathak	5	-	-
DR Peshwe	5	5	5
DV Moghe	5	5	5
JG Bhatt	5	5	5
SG Sapate	5	5	5
AP Patil	5	5	5
SN Paul	3	-	-
RC Rathod	5	-	-
AR Ballal	5	5	5
AA Likhite	5	5	5
YY Mahajan	5	5	5
RK Khatirkar	5	5	-
RV Taiwade	5	5	5
MM Thaware	5	5	3
Sum	73	60	55
N	16	17	19
Assessment of FRP = 3 x Sum/N	13.7	10.6	8.7
Average Assessment			11

## 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 space...
No. of Class Rooms (05)	Second Year Room	Exclusive	100	Equipped with OHP, PA System
	Third Year Room	Exclusive	100	As Above
	Final Year room			As Above
	M. Tech Room	Exclusive	90	Equipped with OHP
	M. Tech. Room	Exclusive	30	As Above
		Exclusive	30	
Tutorial Rooms (02)	Tutorial/Elective Room	Exclusive	70	Equipped with OHP
	Tutorial Room	Exclusive	70	As above
No. of Seminar Rooms (01)	Seminar Room	Shared	30	OHP & Multi Media Facility
No. of Meeting Rooms (01)	Meeting Room	Shared	30	As Above
No. of Faculty Rooms (18)	Faculty rooms	Exclusive		All Rooms equipped with P C & Internet & LAN



## **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)

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

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

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

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

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

6.2.1. Availability of individual faculty rooms (5)

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

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

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

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

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

The following table is required for the subsequent criteria.

Lab Description in the Curriculum	Exclusive use/ Shared	Space, Number of Students	Number of Experiments	Qualify of Instruments	Lab Manuals
Materials Characterization Techniques	Exclusive	20 Students per batch	9 / 10	Good	Manuals ready
Introduction to Metals & Alloys	Shared	20 Students per batch	8 / 9	OK	As above

**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)

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

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

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

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

(Articulate the facilities provided to carry out the project works/thesis).

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

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

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

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

**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 gained	Responsibility
				At joining	Now		
Mrs M D Jawale	Senior Lab. Assistant Rs 2400 / Grade Pay	Shared	02/ 02/ 1994	SSC	SSC	Training in the areas of Physical Metallurgy & Heat Treatment	Conduct of Laboratory experiments, UG / PG & Research students, R & D projects, Testing & Consultancy work, maintenance of Lab.
Mrs V A Patankar	Laboratory Assistant SG II Rs 2400/	Shared	02/ 07 / 1991	Diploma in Met.	Diploma in Met.	Advanced Training in the areas of Testing,	As Above

	Grade Pay					Heat Treatment, Failure Analysis, Electrical Engg., Workshop practice.	
Shri S L Gadge	Senior Technical Assistant Rs 4800/ Grade Pay	Shared	16 / 07 / 1984	Diploma in Met.	Diploma in Met.	Advanced Training in the areas of Corrosion, Testing, Heat Treatment, Rural Engineering, Failure Analysis.	As above
Mrs S R Naikwade	Laboratory Assistant Rs 2400 / Grade Pay	Shared	02 / 08 1999	B.Sc., PGD (Comp)	B.Sc., PGD (Comp)	ITI Training in Electrical Engg., C++ Language & Networking.	As Above

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

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

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

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

## 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)

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

Assessment =

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

Assessment is based upon the methodology being followed and its effectiveness

Assessment =

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

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 =

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

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

Assessment =

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

Details of Thesis Allocation, Evaluation and Presentation:

Year	Name of Candidate	Name of Supervisor	Title of Thesis	Whether Evaluation Committee was Constituted (Yes/No)	Name of the External Member	Thesis Presentation Dates
2013	A Baburaj	AD Chopde	Abrasive Wear Behaviour of Heat Treated En 31 Steel	Yes	Vijay Hiwarkar	14/06/2013
2013	KV Reddy	RK Khatirkar	Structural and Wear Characterization of Heat Treated Martensitic Stainless Steels	Yes	Vijay Hiwarkar	14/06/2013
2013	N. Lanjewar	SG Sapate	Recrystallization Behaviour of Cross Rolled Interstitial Free Steel	Yes	Vijay Hiwarkar	14/06/2013
2013	S. Bhimanathuni	MM Thaware	Effect of Stress Ratio on the Fatigue Behavior of Composites	Yes	PJ Bhonde	18/06/2013
2013	Md. Irshad Khan	AP Patil	Effect of pH, Cl <sup>-</sup> and Dissolve Oxygen on Corrosion of AISI 304 Stainless Steel	Yes	PJ Bhonde	18/06/2013
2013	A Kumar	SG Sapate	Studies on Slurry Abrasion Behaviour of Some Alloy Steels	Yes	PJ Bhonde	18/06/2013
2013	S Hadke	RC Rathod	Processable Poly-aniline for Anticorrosion Application in Acidic Solutions.	Yes	PJ Bhonde	18/06/2013
2013	A Choube	RV Taiwade	Effect of Sensitization and Welding on Intergranular Corrosion Behaviour of Chrome-Mn SS	Yes	PJ Bhonde	18/06/2013
2013	A Vaidya	RK Paretkar	High Temperature Fatigue Behavior of Power Plant Material	Yes	RC Sinvhal	20/06/2013
2013	S Kokate	DR Peshwe	To Study the Effect of Annealing and Aspect Ratio of Talc on Properties of Talc-PP Composites	Yes	RC Sinvhal	20/06/2013
2013	S Chaudhary	AA Likhite	Structure – Property Correlations in Carbide Austempered Ductile Irons (CADI).	Yes	RC Sinvhal	20/06/2013
2012	Devender K.	JG Bhatt	Mechanical Properties Evaluation of Al-AlN Metal Matrix	Yes	RC Sinvhal	07/06/2012

			composites			
2012	S Shende	AA Likhite	Cryogenic treatment of cast iron	Yes	RC Sinvhal	07/06/2012
2012	B. S. Kumar	DR Peshwe	Microstructure Evolution During Heat Treatment of Grade 92 Steel	Yes	SA Paranjape	07/06/2012
2012	K.Kiran Kumar	AR.Ballal	Effects of Heat treatments on High Temperature Tensile Properties of Power Plant Material	Yes	SA Paranjape	07/06/2012
2012	G.S. Reddy	RK.Paretkar	Effect of Notch on High Temperature Behavior of Grade 92 Steel	Yes	SA Paranjape	07/06/2012
2012	P Yadav	SG.Sapate	Investigations on Slurry Abrasion Behavior of Stainless Steels	Yes	RC Sinvhal	07/06/2012
2012	G. Venkanna	SN Paul	Computer Simulation of melt spinning process of polyester filament	Yes	PJ Bhonde	14/06/2012
2012	R Ghugal	RV Taiwade	Studies on Welding and Sensitization of Austenitic Stainless Steels	Yes	PJ Bhonde	14/06/2012
2012	P Gupta	RC.Rathod	Preparation and Characterization of Polyaniline Polycarbonate Composite	Yes	PJ Bhonde	14/06/2012
2011	A Uke	AP Patil	Corrosion Behaviour of Lean Duplex Stainless Steel in Chloride Containing Solution	Yes	MN Mungole	13/06/2011
2011	V Dakre	MM Thaware	Fatigue Behaviour of Composite Material.	Yes	RC Sinvhal	13/06/2011
2011	A Rathod	RC Rathod	Studies on Corrosion Behaviour of Polyaniline Coated Aluminium Alloys	Yes	MN Mungole	13/06/2011
2011	B Kumar K.	SU Pathak	Co-relation Microstructure with Machinability and Wear of Low Carbon Equivalent Iron and Austempered Ductile Iron	Yes	RC Sinvhal	13/06/2011
2011	D Barbadikar	JG Bhatt	Optimization of Process Parameters in Chemical Vapor Deposition (CVD) for the Synthesis of Silicon	Yes	S. Buty	13/06/2011

			Quantum Dots			
2011	G Srinivas	AD Chopde	The Effect of Nitrogen Content and Heat Treatment on the Tensile, Pitting Corrosion and Corrosion Fatigue Properties of AISI type 316 LN stainless Steel	Yes	MN Mungole	13/06/2011
2011	L Maddi	AR Ballal	High Temperature Behaviour of Nuclear Grade Steel	Yes	RC Sinval	13/06/2011
2011	V Kumar S.	JG Bhatt	Thermodynamic Basis for Composition Optimization and Nano-Crystallization Study of Metallic Glasses	Yes	S. Buty	13/06/2011
2011	P Rao	SN Paul	Impact of MTA Blend on Melt Spinning Process and Properties of Polyester	Yes	PJ Bhonde	13/06/2011
2011	S. Kumar	RK Khatirkar	Recrystallization Behavior of Uni-directionally and Cross Rolled Interstitial Free High Strength (IF-HS) Steel	Yes	PJ Bhonde	13/06/2011
2011	S Pandey	VK Didolkar	To Study the Abrasiveness of Different Ore Slurry	Yes	PJ Bhonde	13/06/2011
2011	S Ahmed	SG Sapate	Studies on Wear by Slurry Abrasion of Martensitic Steel	Yes	PJ Bhonde	13/06/2011
2011	S Pinninti	RV Taiwade	Influence of Grain Size and Prior Deformation on the Intergranular and Pitting Corrosion Resistance of Austenitic Stainless Steels.	Yes	MN Mungole	13/06/2011
2011	S Dongare	SU Pathak	Evaluation And Study of Different types of Degradation of Polymers and Polymer Blends	Yes	S. Buty	13/06/2011

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

Assessment =

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

Assessment =

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]

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 =

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

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

Assessment =

7.3.3. Corrective Measures and Implementation Followed [5]

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

Assessment =

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

7.4.1. Scope for self-learning (5)

(Instruction: The institution needs to specify the scope for self learning / learning beyond syllabus and creation of facilities for self learning / learning beyond syllabus.)

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

(Instruction: The institution needs to specify the facilities for self-learning / learning beyond syllabus.)

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

(Instruction: The institution may specify the facility and management to facilitate career guidance including counselling for higher studies, industry interaction for training/internship/placement, Entrepreneurship cell and incubation facility and impact of such systems.)



## 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	3508	2986
Hostel for Girls	2	522	555

### **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 expresses 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., and 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 capacities 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)

#### (A) **Board of Governors**

Sr. No	Name	Designation
1.	Dr. S. K. Joshi, Distinguished Scientist, New Delhi-	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., Ngpur	Member
9.	Dr. T. Srinivasa Rao, Director, VNIT, Nagpur	Member
10.	Dr. R.R. Yerpude, Registrar, VNIT, Nagpur.	Secretary

(B) **Senate**

- |   |          |
|---|----------|
| 1. Dr. N. S. Chaudhari, Director, VNIT, Nagpur                                | Chairman |
| 2. Prof. S. V. Bhat, Deptt. of Physics, IIS,<br>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. Rajesh Gupta, Dean (Planning & Development), VNIT, Nagpur              | Member   |
| 6. Dr. R. K. Ingle, Dean (Faculty Welfare), VNIT, Nagpur                      | Member   |
| 7. Dr. Animesh Chatterjee, Dean (Research & Consultancy), VNIT,<br>Nagpur     | Member   |
| 8. Dr. R. M. Patrikar, Dean (Academics), VNIT, Nagpur                         | Member   |
| 9. Dr. A. P. Patil, 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. Prof. O. R. Jaiswal, Professor of Structural Engineering, VNIT, Nagpur    | Member   |
| 13. Dr. M. M. Mahajan, Professor of Structural Engineering, VNIT, Nagpur      | Member   |
| 14. Dr. G. N. Ronghe, Professor of Structural Engineering, VNIT, Nagpur       | Member   |
| 15. Dr. S. A. Mandavgane, Head, Chemical Engg. Deptt. , VNIT,<br>Nagpur       | Member   |
| 16. Dr. V. A. Mhaisalkar, Head, Civil Engg. Deptt. , VNIT, Nagpur             | Member   |
| 17. Dr. A. D. Pophale, Professor of Civil Engg., VNIT, Nagpur                 | Member   |
| 18. Dr. Y. B. Katpatal, Professor of Civil Engg., VNIT, Nagpur                | Member   |
| 19. Dr. H. M. Suryawanshi, Head, Deptt. of Electrical Engg., VNIT, Nagpur     | Member   |
| 20. Dr. A. G. Kothari, Professor of Electrical Engg., VNIT, Nagpur            | Member   |
| 21. Dr. M. V. Aware, Professor of Electrical Engg., VNIT, Nagpur              | Member   |
| 22. Dr. K. L. Thakre, Professor of Electrical Engg., VNIT, Nagpur             | Member   |
| 23. Dr. K. D. Kulat, Head, Deptt. of Electronics Engg., VNIT, Nagpur          | Member   |
| 24. Dr. A. G. Keskar, Professor of Electronics & Comm., VNIT, Nagpur          | Member   |
| 25. Dr. R. B. Deshmukh, Professor of Electronics Engineering, VNIT,<br>Nagpur | Member   |

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

(C) **Finance Committee**

1. <b>Dr. S. K. Joshi</b> , Distinguished Scientist (CSIR) & Vikram Sarabhai Professor of JNCASR, New Delhi.	Chairman
2. Shri Rajesh Singh, Director Deptt. Higher Education, New Delhi	Member
3. Shri Navin Soi, Director, Ministry HRD, New Delhi.	Member

- |    |   |                  |
|----|---|------------------|
| 4. | Prof. S. C. Sahasrabudhe, Director D.A.I.I.C.T., Gandhinagar                            | Member           |
| 5. | <b>Prof. A. G. Kothari</b> , Professor, Electrical Engineering Department, VNIT, Nagpur | Member           |
| 6. | Dr. N. S. Chaudhari, Director, VNIT, Nagpur   | Member           |
| 7. | <b>Dr. R. Yerpude</b><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.  | <b>Prof. S. C. Sahasrabudhe, Director D.A.I.T, Gandinagar</b>                                | Member           |
| 5.  | <b>Dr. Rajesh Gupta</b><br>Dean (P&D), V.N.I.T., Nagpur                                      | Member           |
| 6.  | <b>Mr. R. K. Naik</b> , Superintending Engineer (Civil),<br>Central P.W.D., , Nagpur-440 006 | Member           |
| 7.  | <b>Shri Arvind Garg</b> , Suptd. Engineer (Electrical)<br>NAGPUR – 440006                    | Member           |
| 8.  | <b>Chief Engineer</b> , Public Works Department,<br>NAGPUR – 440001                          | Member           |
| 9.  | <b>Supdt. Engineer (Electrical)</b> , Public Works Department,<br>NAGPUR – 440001            | Member           |
| 10. | <b>Dr. R. Yerpude</b> , Registrar, VNIT, Nagpur  | Member-Secretary |

**Other information is as under -**

**Statutory Committees -**

Name of the Committee	Frequency of the meetings	Attendance
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,		Full power of [i] and Upto Rs. 2 Lakh

	consumables, stationeries, spares & accessories. for registry/requirement for departments not covered above within allotted grant of the year.	Registrar	
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. 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.

In Rupees

Item	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

#### 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.)

The utilization of allocated fund is satisfactory as can be seen from above table no. 8.3

### 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):

Item	Budgeted in CFY	Actual Expenses in CFY (till Sept.'13) *	Budgeted in CFYm1	Actual Expenses in CFYm1 *	Budgeted in CFYm1	Actual Expenses in CFYm1
Laboratory equipment	40.0 L	29.0 L	30 L	46.0 L	25.0 L	23.0 L
Software	NA	NA	NA	NA	NA	NA
R&D	NA	NA	NA	NA	NA	NA
Laboratory consumables	3.5 L	1.64 L	3.0 L	2.60 L	3.0 L	2.95 L
Maintenance and spares	NA	NA	NA	NA	NA	NA
Training & travel	NA	NA	NA	NA	NA	NA
Miscellaneous expenses for academic activities	NA	NA	NA	NA	NA	NA
Total	43.5 L	30.64 L	33 L	48.6 L	28 L	25.95 L

\* 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 Institutional Income Expenditure statement in Part I - item I-10.

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

#### 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.)

The utilization of allocated fund is satisfactory as can be seen from above table no. 8.4

### 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 m<sup>2</sup>) Reading space (in m<sup>2</sup>) = 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, 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.	Applied Mech.	281	416
02.	Architecture	5019	8728
03.	Chemical	2386	3989
04.	Chemistry	3085	6138
05.	Civil	8529	7741
06.	Computer Sci.	7741	10748
07.	Electronics	5022	8094
08.	Electrical	6133	13254
09.	Humanities	1223	1782
10.	Maths	2982	5497
11.	Mechanical	6960	13449
12.	Metallurgy	6007	9179
13.	Mining	4648	6422
14.	Physics	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.	Applied Mech.	355	605
02.	Architecture	5154	8937
03.	Chemical	2512	4352
04.	Chemistry	3182	6398
05.	Civil	8667	15016
06.	Computer Sci.	7990	11286
07.	Electronics	5093	8347
08.	Electrical	6475	14130
09.	Humanities	1476	2307
10.	Maths	3176	5911
11.	Mechanical	7055	13710
12.	Metallurgy	6193	9526
13.	Mining	4661	6461
14.	Physics	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)

Sr.No.	Subject	Title	Volume
01.	Applied Mech.	440	2176
02.	Architecture	5265	9350
03.	Chemical	2634	4986
04.	Chemistry	3261	8079
05.	Civil	8780	15730
06.	Computer Sci.	8079	14130
07.	Electronics	5267	9962
08.	Electrical	6531	15165
09.	Humanities	1488	2744
10.	Maths	3236	6548
11.	Mechanical	7118	14449
12.	Metallurgy	6239	10114
13.	Mining	4676	6856
14.	Physics	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
Architecture	As soft copy	00	00	00	00
	As hard copy	16	18	24	24

(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	
CFYm2 2011	41.42 Lacs (4813)	48,49,686.00	2,31,158.00		
CFYm1 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

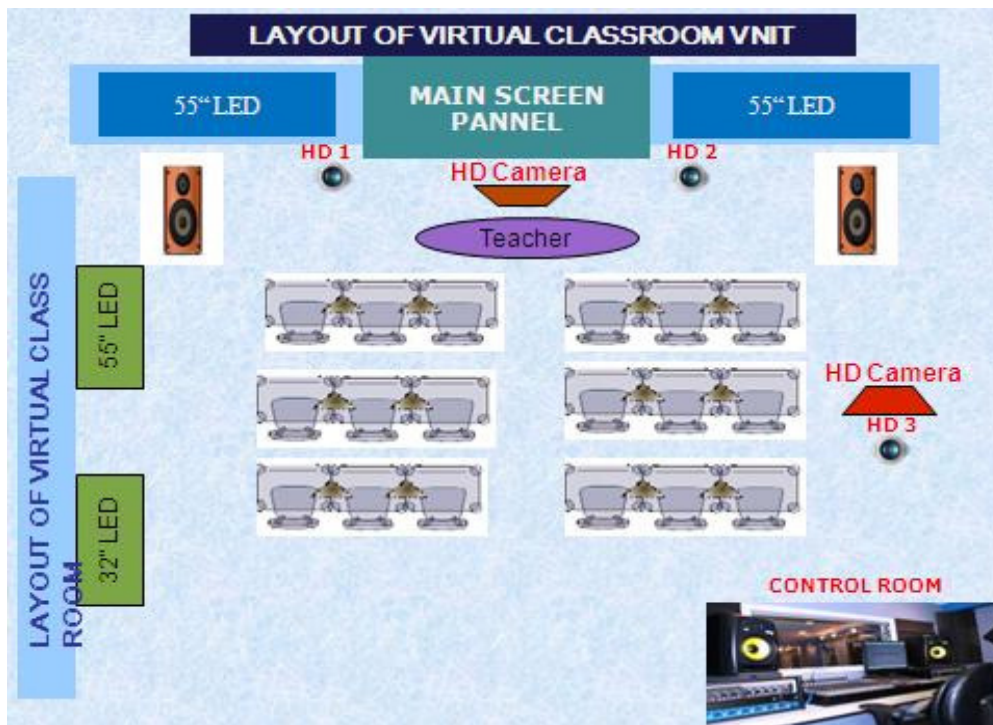
Total Bandwidth 100 mbps

- 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



### 8.6. Incubation facility (5)

(Instruction: Specify the details of incubation facility in terms of capacity, utilisation terms and conditions, usage by students)

The concept has already been accepted for implementation by the Governing Body of the Institute. A beginning has already been made in Electronics Engineering Deptt. and other departments shall follow soon. The basic details as currently approved are as follows:

Good infrastructure with common office facilities, computers, internet access, Shared facilities such as printing, photocopying, faxing, and scanning, well laid out entry and exit policies for tenant companies.

- Involvement, commitment and full cooperation from host institute and other stake holders.
- Experts for core technical guidance and assistance.
- Labs and technical facilities for prototype development.
- Assessment of Techno-commercial Viability of Proposals Received and proper mentoring.
- IPR and Legal Advice through a panel of specialist legal advisers identified for the purpose to help the prospective entrepreneurs.
- The centre proposes to tie-up incubating companies with reputed bankers and venture capitalists for mobilizing finances through Banks/Venture Capitalists/Angel Investors.
- Skill Development Programs for Managing Business activity shall be carried out by VNIT, other training institutes and individual experts as deemed fit.

## 8.7 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.)

### 8.7.1 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)

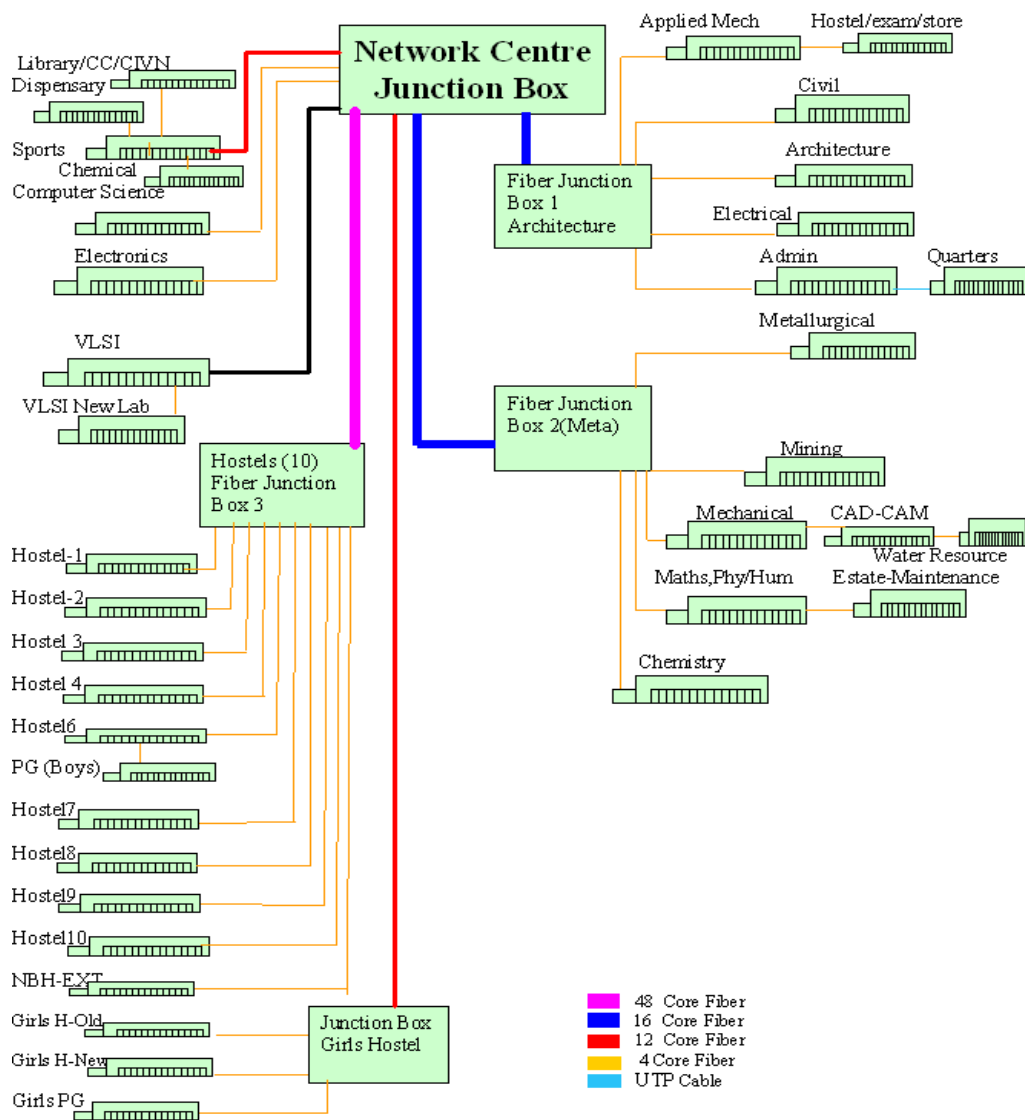
Network Center has in-house web server, mail server, proxies and application server along with Oracle server. We provide Web-based Email open source that enables all the users to access their mailbox from anywhere (inside or outside VNIT Nagpur) via the Internet, an institute wide. We mostly encourage 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.

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.

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

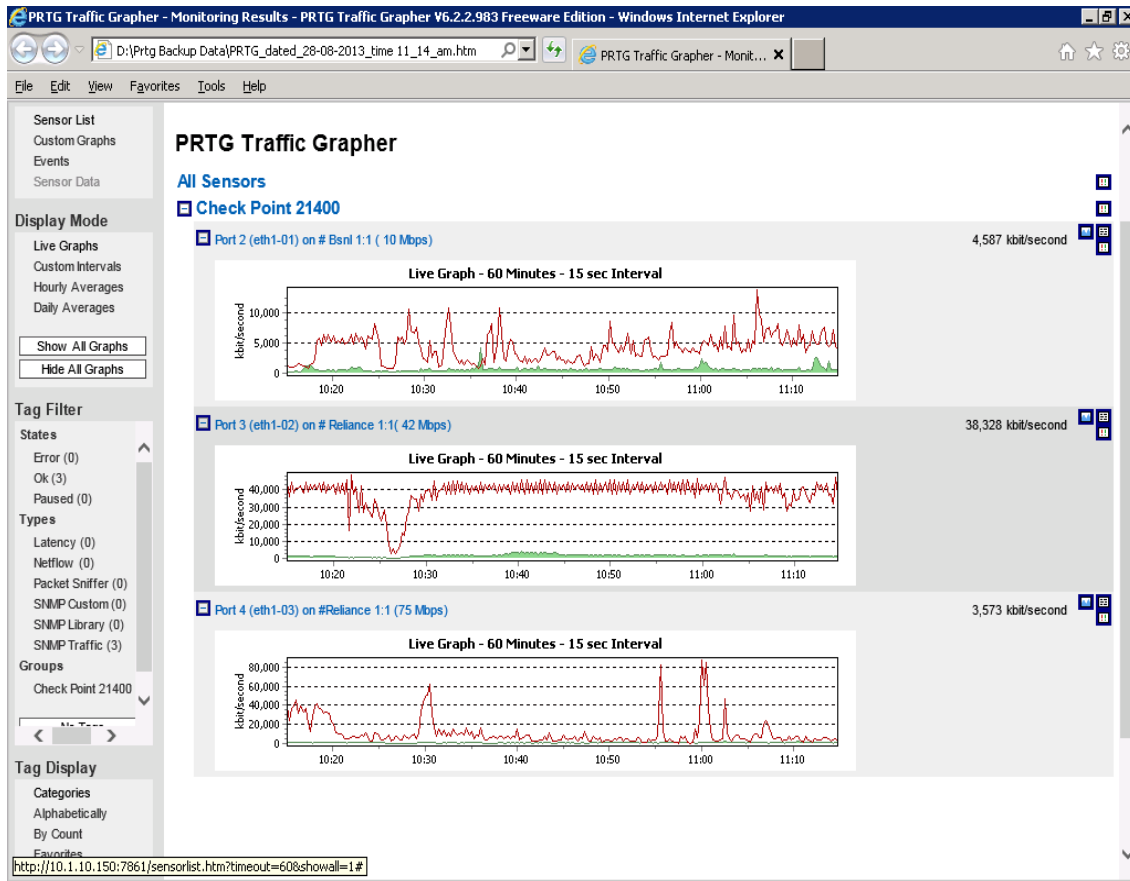
Figure I



Physical Layout of Fiber Optic Cable of VNIT

## 8.7.3 PRTG Traffic Grapher

Figure II



## 8.8 Safety Norms and Checks (5)

### 8.8.1. 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

**8.8.2. Fire - fighting measures:** 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.**

**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.

### **8.8.3. Safety of civil structure (1)**

Being a publicly 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 In-charge Engineer from Estate Maintenance section after physical verification. The latest certificate is reproduced below:

### **8.8.4. 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.)

## **8.9 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.)

### **8.9.1 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 to 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 Homeopathy & yoga are available. Referral for Ayurvedic services is available. Physiotherapy 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.

### **8.9.2 Physical Education facilities:**

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 (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

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

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

From 4.2

Items	LYG (c)	LYGm1 (b)	LYGm2 (a)	Assessment
Success Index	0.94	1	1	4.84

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

From 4.3

Items	LYG (c)	LYGm1 (b)	LYGm2 (a)	Assessment
API	0.92	1.04	1.00	4.80

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

From 5.1

Items	LYG (c)	LYGm1 (b)	LYGm2 (a)	Assessment
STR	0.84	0.89	1.00	4.48

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

From 5.3

Items	LYG (c)	LYGm1 (b)	LYGm2 (a)	Assessment
FQI	0.74	0.98	1.00	4.29



**9.5. Improvement in Faculty Research Publications, R&D Work and Consultancy Work (10)**  
**From 5.7 and 5.9**

Items	LYG (c)	LYGm1 (b)	LYGm2 (a)	Assessment
FRP	1.00	1.01	1.00	5.01
FRDC	0.90	0.93	1.00	4.69

**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/organised by	Duration	Resource persons	Target audience	Usage and citation
Expert Lecture Series		AR Ballal	5 days	Prof. BS Murty	PG and UG students	
Workshop on Failure Analysis of Engineering Materials	IIM Nagpur chapter and ISNT	DR Peshwe, JG Bhatt, YY Mahajan, MM Thaware	3 days	Experts from IITs / IISc/ Industry	PG students and people from industry	
Short Term Course on Characterization of Materials		RK Khatirkar, SG Sapate	3 days	Experts from industry and IITs	PG students and people from industry	
Basic Course on Heat Treatment and Metallography		RK Khatirkar, SG Sapate	2 days	Experts from academia and Industry	PG and UG students	
Synchrotron based X-ray characterization and data analysis		JG Bhatt	1 day	Dr. Imteyaz, Stanford University	PG students	
Short Term Course on Metallurgy for Non-metallurgists		SU Pathak, AA Likhite, JG Bhatt, DR Peshwe	3 days	Experts from academia and industry	PG students and people from industry	

Assessment =

9.7. New Facility Created (15)

- Creep testing lab
- Furnaces
- Mechanical characterization equipments/accessories

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

Specify the overall improvement:

Specify the strengths/weakness	Improvement brought in	Contributed by	List the PO(s) which are strengthened	Comments, if any
CAY	Continuous evaluation of M.Tech. projects	Head	PO2, PO3, PO9, PO10, PO12	
CAYm1	Project collaboration with ARCI	Dr. AR Ballal	PO1, PO2, PO3, PO9, PO10, PO12	
CAYm2	Industrial visit	Head	PO1, PO2, PO3, PO4, PO6, PO7, PO9, PO10, PO12	

## Declaration

This Self-Assessment Report (SAR) is prepared for the current academic year (2013-14) and the current financial year (2013-14) 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 with 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 of 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 by them.

Place:

Date:

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

**Course Syllabi****1. MMC501: Introduction to Metals and Alloys (3-0-2) (8 Credits)**

- I. Brief Description:  
It's a Departmental Core (DC) course. It is designed to impart knowledge to students about structure of metals and alloys, their phase diagrams, microstructures, various heat treatments, properties, and applications of ferrous alloys, non-ferrous alloys and special alloys.
- II. Course Coordinator: Prof. A. P. Patil, Room No. F7, First Floor, Old Building of Department
- III. Pre-requisites and Co-requisites: None
- IV. Textbook and /or Other Required Material
- Sidney H Avner, Introduction to Physical Metallurgy, 2<sup>nd</sup> Edition, McGraw-Hill, 1974
  - Prabhudeva K H, Handbook of Heat Treatment of Steels, Tata McGraw-Hill, 2000
  - ASM International, ASM Handbook, Vol. 4: Heat Treating, 1991.
- V. Course Outcomes:  
Upon successful completion of this course, each student should be able to understand:
- Basic crystalline structure of the metals.
  - Phases in metals and alloys and phase diagram of binary alloys.
  - Phase diagram of Iron-Iron carbide system, its various phases, microstructure of iron alloys, their heat treatment, properties and applications.
  - Alloys steels and effect of alloying elements.
  - Non-ferrous alloys, their phase diagrams, their properties and applications
  - Special alloys.
- VI. Expanded Course Description
- Crystalline nature of metals, crystal lattice, unit cell, Miller indices, crystal structures – BCC, FCC, HCP, packing density, defects in crystal.
  - Alloys – Binary phase diagrams, solid solutions, Hume-Rothery rules, phase rule, intermetallic compounds, lever rule, binary diagrams involving eutectic, eutectoid, peritectic reactions.
  - Iron-Iron Carbide diagram, classification of steels and Cast irons, critical temperatures, TTT diagrams, critical cooling rate, hardenability, measurement techniques, heat treatments such as annealing, normalizing, hardening, tempering, austempering, martempering.
  - Alloy steels: Effect of alloying elements in general and in particular, introduction to tool steels (low alloy tool steels, HCHC, HSS, OHNS steels). Stainless steels – alloying elements and their purpose, properties and applications.
  - Non-ferrous alloys: structure, properties and applications of Cu-Zn alloys - brasses, Cu-Sn alloys – bronzes, Al-Si alloys, age hardenable copper alloys etc.
  - Introduction to special alloys – super alloys, titanium alloys, magnetic alloys.
- Typical laboratory experiments
- Study of equipments used in the lab.
  - Sample preparation for optical microscopy.
  - Observe microstructure of a few steels.
  - Observe microstructure of a few cast irons.
  - Observe microstructure of a few non-ferrous alloys
  - Demonstration of Jominy Hardenability Test
  - Observe microstructure of a few hardened and tempered low alloy steels.
  - Observe microstructure of a few hardened and tempered tool steels.
- VII. Class /Laboratory Schedule
- Lecture: Three 60 minutes sessions per week
  - Laboratory: One 100 minutes session per week for a batch of 20 students.
- VIII. Evaluation of Students:
- Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams, two class test/quizzes/home assignments and end semester exam. Precise distribution is announced in 1<sup>st</sup> lecture.
  - Grades: Relative grading

## **2. MM503: THERMODYNAMICS AND PHASE TRANSFORMATIONS (3-0-0) (6 CREDITS)**

I Brief description- MML503/DC

II Course coordinator- Dr. S.N.Paul

III. Pre/co requisities- UG level

IV. Text book

1. Thermodynamics of materials- D.R.Gaskell

2. Phase transformation in metals and alloys- Porter and Easterling

3. Physical metallurgy principles- R.Reed-Hill

V. Course Objective:

To understand:

A) Fundamentals of materials thermodynamics

B) applications of thermodynamics

C) Kinetics of phase transformation

D) Mechanisms of phase transformation

VI. Course description

Thermo dynamical behavior, diffusion process, principle of phase transformation, transformation behavior in steel- isothermal and diffusion less transformation, order-disorder transformation, spinodal decomposition etc.

VII. Class schedule-Three 60 min/ week

VIII. Evaluation of Students:

(a) Evaluation- continuous- 2 sessional exam/ 1 end-semester/ quiz, seminar

(b) Grading- relative

### 3. MM547: Materials Characterization Techniques (3-0-4) (10 Credits)

- I. Brief Description:  
Core course providing: Crystallography, optical microscopy, scanning electron microscopy, chemical analysis using scanning electron microscope, physics of X-rays, diffraction by crystalline materials, applications of X-ray diffraction, spectrometric and thermal analysis of materials.
- II. Course Coordinator: Dr. Rajesh K. Khatirkar
- III. Pre-requisites and Co-requisites: None
- IV. Textbook and /or Other Required Material
  - a. Y. Leng, Materials Characterization, John Wiley & Sons, Hoboken, NJ, 2008.
  - b. D. Brandon and W.D. Kaplan, Microstructural Characterization of Materials, 2nd Edition, John Wiley & Sons, Hoboken, NJ, 2008.
  - c. D.B. Cullity and S.R. Stock, Elements of X-ray Diffraction, 3rd Edition, Prentice Hall, Upper Saddle River, NJ, 2001.
  - d. P.J. Goodhew, J. Humphreys, and R. Beanland, Electron Microscopy and Analysis, 3rd Edition, Taylor and Francis, London, UK, 2001.
  - e. Hatakayama and Quinn, Thermal Analysis Techniques, Wiley.
- V. Course Outcomes:  
Upon successful completion of this course, each student should be able to understand:
  - a. Basic crystallography
  - b. Microstructural characterization techniques.
  - c. IR spectroscopic techniques.
  - d. Thermal characterization methods.
  - e. Applications of each technique and its limitations.
  - f. Selection of a characterization method for a particular application.
- VI. Expanded Course Description
  - c. Expanded description of the course  
Introduction to materials characterization, its importance, structure sensitive/insensitive properties, structure-property correlation, crystallography basics, resolution, depth of field/focus, aberrations (spherical, chromatic and astigmatism), remedial measures for aberrations, levels of characterization (macro, meso and micro).  
Optical microscopy (OM) , introduction to scanning electron microscope (SEM), advantages/disadvantages as compared to OM, mechanics of SEM, types of electron gun and comparison between them (resolution, brightness, efficiency, cost and stability), ray diagram of SEM, working and construction, magnification. Electron-specimen interaction, Chemical analysis using SEM, EDS/WDS working principle, construction, spot analysis, line scan and area scan, resolution of EDS/WDS detector, advantages/disadvantages, calibration of EDS/WDS, qualitative and quantitative analysis. X-ray diffraction, applications of X-ray diffraction in materials characterization – determination of crystal structure, lattice parameter, introduction of GIXRD. Thermal analysis techniques. Gas chromatography, UV-Vis and Infra-red spectroscopy, Auger electron spectroscopy and X-ray fluorescence spectroscopy – principle, working and application.
  - d. Typical laboratory experiments
    1. Optical microscopy
    2. Scanning Electron Microscopy (imaging)
    3. Chemical analysis using scanning electron microscopy (EDS)
    4. Phase identification using X-ray Diffraction
    5. Determination of Crystallize/Grain Size and Lattice Strain using XRD
    6. Determination of onset of glass transition, crystallization and melting temperature using DTA.
    7. Identification and purity determination using DSC
    8. Quantification of crystalline percentage of a polymer using DSC
    9. Identification of polymer using FTIR.
- VII. Class /Laboratory Schedule

- e. Lecture: Three 60 minutes sessions per week
  - f. Laboratory: Two 100 minutes session per week for a batch of 20 students
- VIII. Evaluation of Students:
- g. Evaluation: (Theory) It comprises of two sessional exams, two class test/quizzes/home assignments and end semester exam. Precise distribution is announced in 1<sup>st</sup> lecture. (Lab) A process of continuous evaluation is followed. It comprises of two viva exams, one quiz and home assignments. Precise distribution is announced in 1<sup>st</sup> practical.
  - h. Grades: Relative grading

#### 4. MM507 POLYMER ENGINEERING (3-0-0) (6 Credits)

- I. Brief Description:  
Departmental core course for 1<sup>st</sup> Semester M.Tech. students. The course aims to provide in-depth structure-property-processing co-relation for polymeric materials.
- II. Course Coordinator: Dr. R. C. Rathod, Ground Floor, Old Building of Department
- III. Pre-requisites and Co-requisites: None
- IV. Textbook and /or Other Required Material
  - a. Clegg D.W., Collyer A. A., Structure and Properties of Polymeric Materials, Mats. Publ.,
  - b. Fried J.R., Polymer Science and Technology, Prentice Hall of India, New Delhi 2000.
  - c. Willam D., Callistor J.R., Material Science and Engineering, John Wiley and Sons, 1997.
  - d. Dyswan R.W., Speciality Polymers, Chapman and Hall, 1987.
- V. Course Outcomes:  
Upon successful completion of this course, each student should be able to understand:
  - a. Theoretical basis of polymeric materials.
  - b. Different polymerization process and its thermodynamic and kinetic aspect.
  - c. Characterization of polymer (physical, thermal, mechanical )
  - d. Engineering and specialty polymers – preparation, properties and application.
- VI. Expanded Course Description  
Introduction and classification of engineering polymers, solid state properties of polymers, deformation of polymers, polymer flow behavior, polymer structure, Properties- physical and mechanical, polymerization process and its thermodynamic and kinetic aspects, Polymer synthesis-batch or continuous –mass polymerization – solution- suspension-emulsion polymerization. Characterization of polymers, Chain end degradation and random degradation, additives, polymer processing – extrusion, blow molding, injection molding, thermoforming, calendaring, spinning, casting. Engineering and specialty polymers-preparation-properties and applications- polyolefins, styrene polymers, vinyl halide polymers, polyamide, polyester, polycarbonate, polyurethane, polyketon, inorganic polymers, conducting polymers.
- VII. Class /Laboratory Schedule  
Lecture: Three 60 minutes sessions per week
- VIII. Evaluation of Students:
  - a. Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams, seminars and end semester exam.
  - b. Grades: Relative grading



## 5. MM509 CERAMIC ENGINEERING (3-0-0) (6 CREDITS)

### I. Brief Description:

Departmental Core course for 1<sup>st</sup> Semester M.Tech. students.

II. Course Coordinator: Dr.V.K.Didolkar, Ground Floor, Old Building of Department.

III. Pre-requisites and Co-requisites: None

IV. Textbook and /or Other Required Material

- a. Kingery W.D & Bowman.-Introduction to ceramic materials
- b. Norton-Introduction to ceramics
- c. Chester-Refractories :Production and properties

V.Course Outcomes:

Upon successful completion of this course, each student should be able to understand:

- a. Overview of ceramic applications & markets.
- b. Ceramic fabrication techniques
- c. Characterisation of ceramics
- d. Structures & Imperfections in ceramics

VI. Expanded Course Description

Materials classification with special reference to ceramics. Structures of ceramics, History of ceramics. Classification of ceramics-AX/AmXp/AmBnXp types. Abrasives, Advanced ceramics. Ceramic structures–Silicates, gibbsite, kaolinite, muscovite, alumina. Raw materials for ceramics & their processing, functions of additives in processing. Ceramic fabrication techniques-pressing, slip casting, tape casting. Glass forming. Processes, Drain casting, Injection moulding, Isostatic pressing. Plasticisers, binders, lubricants. Rolling/forging/extrusion techniques as a forming technique. characterization of ceramics. Firing of ceramics, Drying & firing systems, Densification mechanisms in ceramics. Applications: Oxide/nonoxide ceramics, carbide/nitride/boride ceramics, traditional ceramics, pottery, Refractories-limestone, dolomite, magnesite, fireclays

VII. Class /Laboratory Schedule

Lecture: Three 60 minutes sessions per week

VIII. Evaluation of Students:

- a. Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams, two class test/quizzes/home assignments and end semester exam. Precise distribution is announced in 1<sup>st</sup> lecture.
- b. Grades: Relative grading

## **6. MMC502: Design and Selection of Materials (3-0-0) (Credit -6)**

### **I. Brief Description:**

Introduction to selection of materials, Properties of engineering materials, Properties trade off, Factors influencing materials election, material selection vs. materials processing, techno-economic aspects of materials selection, Selection of materials for static strength, stiffness, fracture toughness, Design for yielding and fracture toughness fatigue , creep and wear resistance.

II. Course Coordinator: Prof. S. G Sapate, Staff room, Old Building of Department

III. Pre-requisites and Co-requisites: Testing of materials

IV. Textbook and /or Other Required Material

- a. Charles J.A.; Crane FAA, Furness JAG; Selection & Use of Engineering Materials; Butterworth & Heinemann,
- b. Dieter G.E.; Mechanical Metallurgy; McGraw Hill, 1988.
- c. Ashby M.F., Jones D.R.; Engineering Materials; Pergamon Press, 1992.
- d. Askeland DR : Engineering Materials
- e. ASM Handbook : Vol.20: Material Selection : ASM

### **V. Course Outcomes:**

Upon successful completion of this course, each student should be able to understand:

- a. Fundamental concepts of material selection, analysis of service conditions, property trade off, factors influencing material selection. Techno economic aspects of material selection.
- b. Apply the fundamental concepts and factors involved in development of static strength and stiffness to material selection.
- c. Apply the fundamental understanding of fracture toughness and fatigue to relevant material selection situations.
- d. Apply the fundamental understanding of creep to relevant material selection situations
- e. Analyze and solve numerical related to design for fracture toughness, fatigue and creep life estimation.
- f. Understand different modes of wear, variables affecting wear by hard particles and apply the concepts to material selection for different wear situations.

### **VI. Expanded Course Description**

Introduction to Material Selection and design, engineering properties of Materials. Factors and property parameters in material selection. Material selection vis – a – vis design, Material selection for strength and stiffness, Material selection and design for toughness and fatigue, Material selection for creep and wear, Material selection criteria and case studies.

### **VII. Class /Laboratory Schedule**

- a. Lecture: Three 60 minutes sessions per week

### **VIII. Evaluation of Students:**

- a. Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams, two class test/quizzes/home assignments and end semester exam.
- b. Grades: Relative grading

## 7. MM504 ADVANCED COMPOSITE MATERIALS (3-0-0) (6 CREDITS)

### I. Brief Description:

Departmental Core Course for 2<sup>nd</sup> Semester M.Tech.

### II. Course Coordinator: Dr. D.R. Peshwe

### III. Pre-requisites and Co-requisites: None

### IV. Textbook and /or Other Required Material

- a) Matthews F.L ; Composite Materials Engg. & Science; Chapman & Hall, 1996.
- b) Composites-ASM Vol.I (10<sup>th</sup> Edition), ASM Internationals, 1995.
- c) Holliday L.; Composite Materials; Elseveis Publishing Co.; 1966.
- d) Chawala C.K., Composite Materials; Springer Publishing Co., 1987
- e) Prasad R.C. & P. Ramakrishnan, Composite Science & Technology; New Age International, 2000.

### V. Course Outcomes:

Upon successful completion of this course, each student should be able to understand:

- a. Fundamental concepts of composite materials
- b. Effect of parameters like composite matrix, reinforcing materials with respect to their structure, properties and manufacturing methods
- c. Manufacturing techniques of composites
- d. Structural, thermal, mechanical, physical, chemical and environmental characterization of composites and also their respective properties
- e. Advanced application and degradation of composites

### VI. Expanded Course Description

Introduction, concept and definition of composite materials, classification, advantages and limitations, scope and applications of composite materials.

Study of parameters like composite matrix, reinforcing materials with respect to their structure, properties and manufacturing methods.

Manufacturing techniques of composites such as vacuum bagging, filament winding, resin transfer, pultrusion, CVD, PVD etc. study of structural, thermal, mechanical, physical, chemical and environmental characterization of composites and also their respective properties.

Application and degradation of composites. Study of natural composites and laminates.

### VII. Class /Laboratory Schedule

- c. Lecture: Three 60 minutes sessions per week

### VIII. Evaluation of Students:

- d. Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams, two class test/quizzes/home assignments and end semester exam. Precise distribution is announced in 1<sup>st</sup> lecture.
- e. Grades: Relative grading

## 8. MM508 POWDER METALLURGY (3-0-0) (6 CREDITS)

### I. Brief Description:

Departmental Elective Course for 2<sup>nd</sup> Semester M.Tech.

II. Course Coordinator: Dr. V.K. Deshpande

III. Pre-requisites and Co-requisites: None

IV. Textbook and /or Other Required Material

Khanna A.K. ; Powder Metallurgy.

### V. Course Outcomes:

Upon successful completion of this course, each student should be able to understand:

- a. Powder production techniques
- b. Powder Characterization & Treatments
- c. Characterization of powders
- d. Consolidation techniques
- e. Concepts of Sintering
- f. Applications

### VI. Expanded Course Description

Status of PM industries in India, advantages / disadvantages of PM techniques. Powder production involved by comminuting of solid metals like machining, crushing, milling etc. Powder production by pulverizing molten metals, Physical methods of powder production, Chemical process of producing powder, **Powder Characterization & Treatments** :Thermal and mechanical treatments given to powders. Testing and evaluation of following characteristics of powder - particle size, shape & size distributions, surface topography, surface area, shape factors, apparent and tap density; mass and volume flow rates, compressibility and compression ratio etc. Compaction techniques -Pressures and pressure - less compaction methods, die compaction (single / double / multiple action); reflex action, rotary compaction; isocratic compaction; rolling / forging / extrusion as techniques of compaction; vibratory compaction, continues compaction; high energy rate following techniques; slip casting, green compact density, laminations and their control, hot pressing, explosive compaction. **Sintering , Powder Metallurgy Applications**

### VII. Class /Laboratory Schedule

- f. Lecture: Three 60 minutes sessions per week

### VIII. Evaluation of Students:

- g. Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams, two class test/quizzes/home assignments and end semester exam. Precise distribution is announced in 1<sup>st</sup> lecture.
- h. Grades: Relative grading

## 9. MML510 : WELDING TECHNOLOGY (3-0-0) (6 CREDITS)

- I. Brief Description:  
Departmental elective course.
- II. Course Coordinator: Dr. R. V. Taiwade, First Floor, last room, Old Building of Department.
- III. Pre-requisites and Co-requisites: None
- IV. Textbook and /or Other Required Material
  - a. J. C. Lippold and D. J. Kotecki: Welding Metallurgy and Weldability of Stainless Steels, John Wiley & Sons Inc. UK, (2005).
  - b. S. Kou: Welding Metallurgy, 2nd ed. John Wiley & Sons Inc., NewYork, (2003).
  - c. J. R. Davis: Corrosion of Weldments, ASM International, Materials Park, OH, (2006).
  - d. R. S. Parmar: Welding Engineering and Technology, 1st ed., KhannaPublication, New Delhi, India, (2004).
- V. Course Outcomes:  
Upon successful completion of this course, each student should be able to understand:
  - a. Basic knowledge of materials joining processes.
  - b. Weldability
  - c. Welding metallurgy
  - d. Welding defects and remedies
  - e. Heat transfer during welding
  - f. Dissimilar metal welding
- VI. Expanded Course Description  
Survey of welding processes, present status, classification, joint design, importance of backing and welding symbols. Study of welding processes such as, gas, electrode, resistance, spot, seam, electron beam, laser beam etc.: Scope, instruments, advantages, limitations, applications and standards, welding specifications etc. Study of VA characteristics and different parameters affecting quality Electrode classification. Study of special welding processes such as TIG, MIG, submerged arc welding, termite welding, underwater, ultrasonic welding and friction welding: Scope, instruments, advantages, limitations, applications and standards, welding specifications. Welding problems and remedies in steels, cast irons stainless steels and non-ferrous metals and alloys, requirements of quality control, inspection and testing in welding. Importance of welding metallurgy, weldability, test assessment techniques, heat flow in welding, HAZ and distortion, numerical based on heat transfer and welding metallurgy. Analysis of welding defects, dissimilar metal welding problems and remedies, welder accessibility test.
- VII. Class /Laboratory Schedule  
Lecture: Three 60 minutes sessions per week
- VIII. Evaluation of Students:  
Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams, two class test/quizzes/home assignments and end semester exam. Precise distribution is announced in 1<sup>st</sup> lecture.  
Grades: Relative grading

## 10. MM512 DEFORMATION BEHAVIOUR OF MATERIALS (3-0-0) (6 CREDITS)

- I. Brief Description: Departmental elective course.
- II. Course Coordinator: Dr. A. R. Ballal
- III. Pre-requisites and Co-requisites: None
- IV. Textbook and /or Other Required Material
  - a) Mechanical Metallurgy, G. E. Dieter
  - b) Mechanical Behavior of Materials, T.H.Courtney
  - c) ASM Handbook Vol. 14.; Forming & Forging, ASTM
- V. Course Outcomes:

Upon successful completion of this course, each student should be able to understand:

  - a. appreciate and understand the phenomenon of elastic deformation
  - b. understand the basics of anisotropy in elasticity
  - c. analyze stress and strain at any point
  - d. understand the significance of empirical tools like yield criteria and their application
  - e. understand the phenomena occurring during plastic deformation of metals/alloys
  - f. co-relate the structure-property-co relationship during deformation
- VI. Expanded Course Description

Elastic and Plastic behavior of Materials, Engineering Stress – strain curve. flow curve, Important relations of flow curve. Concept of stress and strain in two dimensions. Principal stresses, Mohr's circle, Yield Criteria. Mechanistic models for elastic, plastic and time-dependant deformation, phenomenological description of plastic deformation in metals – slip, twinning, stacking faults etc. , strengthening mechanisms, deformation modes and mechanisms for polymeric and ceramic materials. Fatigue of engineering materials, S-N Curve, Characteristics of fatigue fracture, Evaluation of fatigue behavior, mechanical and metallurgical aspects of fatigue life. High temperature deformation of materials, creep, analysis of creep curve, structural changes during creep ,deformation mechanism maps, Fracture of materials, types, effect of notch, structure and temperature, concept of toughness and fracture toughness, preliminary concept of LEFM and PYFM, strain energy release rate, stress intensity factors, Fracture toughness, design. Toughening mechanisms in various materials.
- VII. Class /Laboratory Schedule

Lecture: Three 60 minutes sessions per week
- VIII. Evaluation of Students:

Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams,two class tests and end semester exam. Grades: Relative grading

**11. MM526 SEMINAR (0-0-1) (2 CREDITS)**

**12. MM514 ALLOY AND SPECIAL STEELS (3-0-0) (6 CREDITS)**

- I. Brief Description: Departmental elective course.
- II. Course Coordinator: A. D. Chopde
- III. Pre-requisites and Co-requisites: None
- IV. Textbook and /or Other Required Material
  - a) Physical Metallurgy, S. Avner
  - b) Physical Metallurgy Principles- R. Reed-Hill
  - c) Physical Metallurgy of Stainless Steel- F.B Pickering
- V. Course Outcomes:

Upon successful completion of this course, each student should be able to understand:

  - a. Phase diagrams of alloy steels
  - b. Physical metallurgy of various alloy steels
  - c. Heat treatment of different alloy steels
- VI. Expanded Course Description  
Classification and Specification of Alloy Steels. Effect of Alloying Elements on the Constitution, Structure and Properties of Steels. Study of Phase Diagrams of Fe with Commonly used Alloying Elements. Low Alloy Structural and Engineering Steels, High Strength Low Alloy Steels, Dual Phase Steels. Alloy Tool Steels, Classification, Fundamental Properties, Role of Alloying Elements, Various Carbides. Detailed Study of High Speed Steels, High Carbon High Chromium Steels, Selection of Tool Steels. Stainless and Heat Resistant Steels – Classification and Specifications. Constituents Phase Diagrams, Precipitation Hardenable Steels. Maraging Steels – Special Properties, Alloying Elements, Heat Treatment and Applications. Magnetic Steel, Classification, Heat Treatment Properties and Applications. Spring Steels Processing and Heat Treatment.
- VII. Class /Laboratory Schedule  
Lecture: Three 60 minutes sessions per week
- VIII. Evaluation of Students:

Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams,two class tests and end semester exam.

Grades: Relative grading

### 13. MM516 BIO-MATERIALS (3-0-0) (6 CREDITS)

- I. Brief Description: Departmental elective course.
- II. Course Coordinator: Dr. S. N. Paul
- III. Pre-requisites and Co-requisites: None
- IV. Textbook and /or Other Required Material
  - a) Biomaterials- Sujata Bhat
  - b) Handbook of Materials Behaviour Models, Vol.3- Multiphase Behaviour
  - c) Biomaterials- Artificial organs & Tissue Engineering (Handbook)
  - d) Science & Engineering of Materials- D.R. Askeland
  - e) Light Alloys- Polmear
- V. Course Outcomes:  
Upon successful completion of this course, each student should be able to understand:
  - a. Various implant materials
  - b. Characterization methods for biomaterials
  - c. Aspects of tissue engineering
- VI. Expanded Course Description  
  
Introduction- Classification-General Characteristics-Structure & Properties of Materials-Relevance – Crystal/Molecular Structure-Imperfections-Phase Diagrams.  
Implant Materials-Metallic, Ceramic, Polymer, Composite  
Characterization of Biomaterials-Mechanical, Chemical, Thermal, etc.Structural evolution of biocompatibility with reference to corrosion. Structural property correlation  
Application of Biomaterials-Orthopaedic, Dentistry, Cardiac Devices, etc.  
Tissue Engineering- Soft Biomaterials  
Case Studies, Proliferation of Biomaterials for development of Medical Technology & mankind.
- VII. Class /Laboratory Schedule  
Lecture: Three 60 minutes sessions per week
- VIII. Evaluation of Students:  
Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams,two class tests and end semester exam.  
Grades: Relative grading



#### 14. MM518 CORROSION PROCESSES AND CONTROL (3-0-0) (6 CREDITS)

- I. Brief Description:  
Departmental elective course giving Introduction to corrosion, importance of corrosion studies, corrosion principles and kinetics, Different forms of corrosion, kinetics of electrochemical corrosion, Evans diagram, exchange current density, polarization, passivity, corrosion protection methods and equipments.
- II. Course Coordinator: Dr. R. C. Rathod, Ground Floor, Old Building of Department
- III. Pre-requisites and Co-requisites: None
- IV. Textbook and /or Other Required Material
  - a. Rajnarayan, An introduction to metallic corrosion and its prevention, New Delhi, Oxford & India Bank House-1983.
  - b. Banerjee S. N., An introduction to Science of Corrosion & its inhibition, 1983.
  - c. Fontana M.G. Green N.D., Corrosion Engineering , New York, McGraw Hill Publication
  - d. Uhlig H.H, Corrosion Handbook (ASM) Vol.3.01
- V. Course Outcomes:  
Upon successful completion of this course, each student should be able to understand:
  - a. Theoretical basis of corrosion process and method of control
  - b. Different form of corrosion
  - c. Kinetics of electrochemical corrosion
  - d. Corrosion testing and its control
- VI. Expanded Course Description  
Introduction to corrosion with historic and industrial cases, cost of corrosion, importance of corrosion studies, Thermodynamic aspect of corrosion reaction, Nerst equation, basic wet corrosion, electrode potential, potential Ph diagram, kinetics of corrosion reactions, Butler-Volmer equation, mixed potential theory, immunity, problems based on the theory.  
Types of corrosion-recognition and mechanisms- uniform corrosion-galvanic-pitting, dealloying-crevice corrosion-intergranular corrosion-filiform corrosion- impingement attack-cavitation-fretting-corrosion cracking process.  
Corrosion measurements-methods of measurement of corrosion based on study of various ASTM standards for corrosion-weight loss-electrochemical-electrical-thickness.  
Corrosion protection-principles of different methods of corrosion protection, anodic protection, cathodic protection-protective coatings.
- VII. Class /Laboratory Schedule  
Lecture: Three 60 minutes sessions per week
- VIII. Evaluation of Students:
  - a. Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams, seminars and end semester exam.
  - b. Grades: Relative grading

## 15. MM524 PROCESS MODELLING AND SIMULATION (3-0-0) (6 CREDITS)

- I. Brief Description:  
Departmental elective course giving Introduction to corrosion, importance of corrosion studies, corrosion principles and kinetics, Different forms of corrosion, kinetics of electrochemical corrosion, Evans diagram, exchange current density, polarization, passivity, corrosion protection methods and equipments.
- II. Course Coordinator: Dr. A.P. Patil
- III. Pre-requisites and Co-requisites: None
- IV. Textbook and /or Other Required Material
  - a) Hangos KM and Cameroon IT; Process modeling and model analysis, Academic Press, London, 2001.
  - b) Rao SS; Optimization – Theory and Applications, Wiley Eastern, 1978.
  - c) Aris R; Mathematical Modeling Techniques, Dover, New York, 1994.
- V. Course Outcomes:  
Upon successful completion of this course, each student should be able to understand:
  - a. Theoretical basis of metallurgical processes
  - b. System analysis
  - c. Presentation of simulation results
- VI. Expanded Course Description  
Essence of Modeling of Metallurgical Processes.  
Introduction to Simulation and its Importance in Engineering.  
Analysis of Transport Processes and their Application in Modeling.  
System Analysis, Development of Mathematical Model and Algorithm for Simulation, Presentation of Simulation Results.  
Physical Modeling and its Importance in Engineering Studies.  
Case Studies on Modeling and Simulation of some Metallurgical Processes e.g. Melting of Scrap, Refining of Melt, Solidification, Re-heating, Heat Treatment, Fluid Flow in Ladle, Tundish etc.
- VII. Class /Laboratory Schedule  
Lecture: Three 60 minutes sessions per week
- VIII. Evaluation of Students:
  - a. Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams, seminars and end semester exam.
  - b. Grades: Relative grading

## **16. MM528 ADVANCED CERAMICS (3-0-0) (6 CREDITS)**

- I. Brief Description:  
Departmental elective course for third semester M.Tech. students
- II. Course Coordinator: Dr. A.R. Ballal
- III. Pre-requisites and Co-requisites: Ceramic Engineering
- IV. Textbook and /or Other Required Material
  - a) Modern ceramic engineering, Taylor and Francis, D.W. Richerson
  - b) Ceramic materials, B. Carter and G. Norton
  - c) Sintering theory and practice, R.M. German
  - d) Powder metallurgy and particulate materials processing, R.M. German.
- V. Course Outcomes:  
Upon successful completion of this course, each student should be able to understand:
  - a. Advanced techniques of powder synthesis, consolidation, sintering
  - b. Advanced oxide and non-oxide ceramics
  - c. Functional ceramics
- VI. Expanded Course Description  
Background, Classification – Traditional v/s advanced ceramics, Spectrum of applications  
Novel processing techniques – Powder synthesis routes, consolidation/shaping techniques, advanced sintering techniques (Spark plasma sintering, microwave sintering), thin films  
Processing and properties of advanced ceramics –  
Oxide Ceramics - alumina, zirconia, titania, ceria  
Non-Oxide Ceramics - silicon carbide, silicon nitride  
Materials, structure, processing of functional ceramics: Electro ceramics, Bioceramics, Ultra-high temperature ceramics, Magnetic ceramics  
Glass ceramics – Synthesis, Processing, applications
- VII. Class /Laboratory Schedule  
Lecture: Three 60 minutes sessions per week
- VIII. Evaluation of Students:
  - c. Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams, seminars and end semester exam.
  - d. Grades: Relative grading

## **17. MM531 CASTING AND SOLIDIFICATION (3-0-0) (6 CREDITS)**

- I. Brief Description:  
Departmental elective course for third semester M.Tech. students
- II. Course Coordinator: Dr. D.R. Peshwe
- III. Pre-requisites and Co-requisites: None
- IV. Textbook and /or Other Required Material
  - a) R.W. Heine & Rosenthal ; Principles of Metal Castings (2<sup>nd</sup> Edition); Tata McGraw Hill
  - b) Wolf, Taylor and Flemmings; Foundry Technology, Wiley Eastern Pvt. Ltd., 1973.
  - c) Bailey P.R.; Foundry Technology (2<sup>nd</sup> Edition); Butterworth Heinemann, 2001.
- V. Course Outcomes:  
Upon successful completion of this course, each student should be able to understand:
  - a. Solidification mechanisms in metals and alloys
  - b. Design aspects in foundry
  - c. Foundry practices and defects
- VI. Expanded Course Description  
Introduction to various terms in foundry, design considerations, raw materials requirements & special casting techniques. Solidification of metals and alloys, study of segregation & shrinkage in casting. Calculations of solidification with reference to heat transfer principles, study of solidification Characters.  
Design considerations used in gating system, fluid flow applications. Gating designs for cast irons and steels castings & stack molding.  
Rising technique and design, feeding distance calculations, efficiency of the riser, principles of chill design, exothermic and insulating sleeves and directional solidification.  
Foundry practices for cast iron, steel and non-ferrous materials, study of plant and foundry layout.  
Casting defects and their remedies - case studies and recent trends in casting and solidification.
- VII. Class /Laboratory Schedule  
Lecture: Three 60 minutes sessions per week
- VIII. Evaluation of Students:
  - a. Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams, seminars and end semester exam.
  - b. Grades: Relative grading

## 18. MM535 FAILURE ANALYSIS OF ENGINEERING MATERIALS (3-0-0) (6 CREDITS)

- I. Brief Description:  
Departmental elective course for third semester M.Tech. students
- II. Course Coordinator: Dr. D.R. Peshwe
- III. Pre-requisites and Co-requisites: None
- IV. Textbook and /or Other Required Material
  - a) Bob Ross; Investigating Mechanical Failures; Chapman & Hall (1<sup>st</sup> Edition), 1995.
  - b) Wulpi D.J; Understanding How Components Fail; (2<sup>nd</sup> Edition), 1999.
  - c) Collins J.S.; Failure of Materials in Mechanical Design; A Wiley Interscience Publications, (2<sup>nd</sup> Edition), 1993.
  - d) ASM; Failure Analysis; The British Engine Technical Reports, 1981.
- V. Course Outcomes:  
Upon successful completion of this course, each student should be able to understand:
  - a. Techniques of failure analysis
  - b. Procedure for failure analysis and report writing
  - c. Detailed analysis of failures associated with metallurgical parameters
- VI. Expanded Course Description  
Techniques of failure analysis  
Stage of analysis, procedural sequence, collection of background data, classification of various failure needs, preparation of questionnaire, review of mechanical testing methods used in failure analysis, review of NDT method and their application in failure analysis  
Classification of fatigue and fracture modes, fractography and preparation of samples for fractography.  
Distortion failure, residual stress in engineering components, ductile and brittle fractures, fatigue fractures, Fundamentals of fracture mechanics; Casting / Welding related failures, Metallurgical failure in cast products and weldments ,Corrosion related failures. Practical examples and case studies, Elevated temperature failures. Creep Mechanism ,Elevated temperature fatigue ,Thermal fatigue , Metallurgical Instabilities, Environmentally induced failures. Wear Related failure: Wear types, Contact stress fatigue prevention methods. Subsurface origin and surface origin fatigue; Sub-case origin, cavitation fatigue, Case Studies on : (Metallurgical aspects) Failure of Shaft, bearings etc ,Failure of Mechanical fasteners ,Failure in Pressure vessels, Failure in Welded structure, Failure of gears, Advanced experimental techniques in failure analysis.
- VII. Class /Laboratory Schedule  
Lecture: Three 60 minutes sessions per week
- VIII. Evaluation of Students:
  - a. Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams, seminars and end semester exam.
  - b. Grades: Relative grading

## 19. MM537 NANO MATERIALS AND CHARACTERIZATION (3-0-0) (6 CREDITS)

### I. Brief Description:

It is a Departmental Elective (DE) subject at Master level. This subject is designed to give students to understand fundamental mechanism controlling formation of nanostructures and its effect on functional properties. Thrust is also given on use of modern characterization tools which are used for to study structure and properties of nanomaterials.

### II. Course Coordinator: Dr. Jatin Bhatt, Room No. F8, First Floor, Materials Engineering Centre

### III. Pre-requisites and Co-requisites: None

### IV. Textbook and /or Other Required Material

- a. G. Cao, Nanostructures & Nanomaterials: Synthesis, Properties and Applications, , Imperial College Press, 2<sup>nd</sup> Edition, 2004
- b. T. Pradeep , Nano- The Essentials, Tata McGraw-Hill, 1<sup>st</sup> Edition, 2008
- c. H. S. Nalwa, Handbook of Nano structured Materials and Nano Technology, H. S. Nalwa, Vols 1-5, Academic Press(2000)
- d. M.S, Ashby, P.J. Ferreira, D. L. Schodek, Nanomaterials, Nanotechnologies and Design, Elsevier Press, 2009

### V. Course Outcomes:

Upon successful completion of this course, each student should be able to understand:

- a. Origin of novel properties in nanomaterials
- b. Understanding of novel properties using modern testing tools
- c. In-situ and Ex-situ structural characterization of nanostructured materials
- d. Mechanism involved in synthesis of nanostructured materials
- e. Application of nanostructure materials in biomedical and device industry
- f. Social implication and long term environmental effects of nanomaterials

### VI. Expanded Course Description

- i. Introduction: Emergence of Nanotechnology, Bottom up and top down approaches, Challenges in nanotechnology.
- ii. Fundamentals of solid surfaces in nanoscale: Surface energy, nucleation theory, Chemical potential and stabilization
- iii. Synthesis and Fabrication of Nanostructures: nanoparticle (0D), nanowire and nanorod (1D), Thin films (2D) and bulk nanostructured materials.
- iv. Investigating and Manipulating materials in Nanoscale: Electron Microscopy, Scanning Probe Microscopy, Optical Microscopy and Chemical Spectroscopy.
- v. Properties of Nanomaterials: Electronic, Optical, Chemical, Mechanical, Thermal and Magnetic properties.
- vi. Applications of Nanomaterial's: Existing and emerging in Electrical, optical, catalytic, magnetic, biology, medicine and energy.
- vii. Society and Nano/ Safety: Societal Implications of Nan science and Nanotechnology, Environment and Health Issues of nanomaterials.

### VII. Class Schedule

Lecture: Three 50 minutes sessions per week

### VIII. Evaluation of Students:

- a. Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams, two class test/quizzes/home assignments and end semester exam.
- b. Grades: Relative grading

## 20. MM545 NON-DESTRUCTIVE EVALUATION (3-0-0) (6 CREDITS)

### I. Brief Description:

It is a Departmental Elective (DE) course for 3<sup>rd</sup> Semester M.Tech. Students.

### II. Course Coordinator: Y.Y. Mahajan

### III. Pre-requisites and Co-requisites: None

### IV. Textbook and /or Other Required Material

- a) Baldev Raj & T. Jayakumar ; Practical Non-destructive Testing; Nanda Publishers, 1997.
- b) Gordon & Breach ; Non-Destructive Testing, 1971
- c) Ultrasonic Testing, - Krautkammer Norsa Publ., 1993
- d) Feigenbanm A.V.; Total Quality Control,
- e) Metal Handbook ASM 8<sup>th</sup> Edition, Vol. II
- f) Davis Toxell; Non destructive evaluation of properties of materials

### V. Course Outcomes:

Upon successful completion of this course, each student should be able to understand:

- a. Principles of various NDT techniques
- b. Imaging techniques in NDT
- c. Advanced methods of NDE

### VI. Expanded Course Description

Introduction and scope of non-destructive testing and evaluation (NDT/NDE) methods. Visual examination , principles and equipments ,optical aids.

Liquid penetrant testing:, principle, procedure, penetrant materials and methods, applications.

Principles of magnetic particle testing, procedures and equipment's for MP ,magnetic field testing; limitations of MP methods ,electromagnetic testing for residual stress measurement. Eddy current testing, principle and instrumentation, techniques like high sensitivity, multifrequency, high area, pulsed ECT, inspection of ferro-magnetic material, application and limitation ECT.

Radiographic inspection, principle, radiation sources, radiation attenuation's; film effect.

Radiographic imaging, Imaging techniques: single wall, double wall, penetration ,single image etc., applications and case studies; limitations. Ultrasonic Testing, case studies, limitations. Special / advanced techniques of NDE /AET, thermography, replica microscopy (in situ). Leak testing, remote field ECT, microwave inspection, topography, holography. Criteria for selection of NDT methods and instruments related to metallurgical processes / defect in cast ,forged and rolled, heat treated and fabricated items (one case study for each category), reliability in NDT. Statistical method & quality control in NDT codes and standard specifications.

### VII. Class Schedule

Lecture: Three 60 minutes sessions per week

### VIII. Evaluation of Students:

- a. Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams, two class test/quizzes/home assignments and end semester exam.
- b. Grades: Relative grading

## **21. MM541 ENVIRONMENTAL MANAGEMENT (3-0-0) (6 CREDITS)**

- I. Brief Description:  
It is a Departmental Elective (DE) course for 3<sup>rd</sup> Semester M.Tech. students.
- II. Course Coordinator: Head, Department of Civil Engineering
- III. Pre-requisites and Co-requisites: None
- IV. Textbook and /or Other Required Material
  - a) Rau GJ and Wooten CD; EIA Handbook, Tata Mc-Graw Hill, 1986.
  - b) Dameja SK; Environmental Engineering and Management, SK Kataria and Sons, 2002.
  - c) Mo EF; Govt. Of India current documents and guidelines for EIA.
- V. Course Outcomes:  
Upon successful completion of this course, each student should be able to understand:
  - a. Pollution prevention strategies
  - b. Environmental legislation
  - c. Environmental audit
- VI. Expanded Course Description  
Eco System : Concept, Structure and functions; Biodiversity and it's conservation.  
Sustainable development; definition, significant issues in the context of India, Environmental carrying capacity.  
Environmental Pollution; Air, Water, Land, Noise etc., Pollution Prevention Strategies: Cleaner technologies of Production, Principles of waste minimization.  
Environmental legislation in India: Water Act 1974 , Air Act 1981, EPA 1986 and other important Acts.  
Environmental Impact Assessment (EIA): Identification, Prediction and Evaluation of Impacts on various environmental Components including Socio-economic, Methodologies, Environmental Management Plan, Environmental Impact Statement, and EIA process in India for Industries and Infrastructure Development Projects.  
ISO 1400, EMS, LCA, Environmental labeling, Environmental Audit, Design for Environment, environmental TQM.
- VII. Class Schedule  
Lecture: Three 60 minutes sessions per week
- VIII. Evaluation of Students:
  - a. Evaluation: A process of continuous evaluation is followed. It comprises of two sessional exams, two class test/quizzes/home assignments and end semester exam.
  - b. Grades: Relative grading

## **22. MMD501 PROJECT PHASE - I (6 CREDITS)**

## **23. MMD502 PROJECT PHASE - II (18 CREDITS)**