

NATIONAL BOARD OF ACCREDITATION

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

M.Tech. (Structural Engineering)



**NATIONAL BOARD OF
ACCREDITATION**

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Self Assessment Report (SAR) UG

Part A

I. Institutional Information

I.1. Name and address of the institution and affiliating university:

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

I.2. Name, designation, telephone number, and e-mail address of the contact person for the NBA:

Dr. Narendra S. Chaudhari, Director VNIT.

Ph :

Email : director@vnit.ac.in

Dr. K D Kulat, Professor, Department of Electronics Engineering

Ph : 0712-2801345

Email : kdkulat@ece.vnit.ac.in / kishor_kulat@yahoo.com

I.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,^[5] Nagpur is the 13th most populous city and 13th largest urban agglomeration in India. It is the 154th largest agglomeration and 164th 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.^{[9][10][11]} 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 19th 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"^{[13][14]} 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 the city. It's 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° 7' 28" , E 79° 3' 8" The official website address for VNIT is: 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 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.

Sr.No.	Program Name	Year	Intake Capacity
<u>Under Graduate Program : B. Arch/B. Tech.</u>			
01.	Architecture	1960	62
02	Chemical Engineering	2006	92
03.	Civil Engineering	1956	92
04.	Computer Science Engg.	1987	92
05.	Electronics and Communication Engineering	1980	92
06.	Electrical And Electronics	1960	92
07.	Mechanical Engineering	1960	92
08.	Metal and Materials Engineering	1965	92
09.	Mining Engineering	1982	32
	TOTAL		738
<u>Post Graduate & Research Programs :</u>			
<u>M. Tech.</u>			
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.	Material 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
	TOTAL		320
<u>M Sc.</u>			
01.	M Sc Chemistry	2013	20
02.	M Sc Mathematics	2013	20
03.	M Sc Physics	2013	20
	TOTAL		60

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 2nd March 2009. The details are given below:

The Accreditation Status of the programme(s) are:

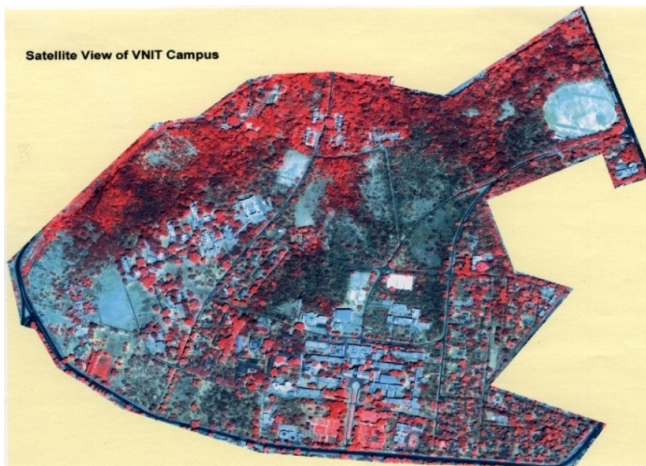
Sr.No	Name of UG & PG Programme(s)	Accreditation Status	Period of validity w.e.f. 10.02.2009
01.	B.Tech. Electronics & Comm. Engg.	Accredited	3 Years
02.	B.Tech. Mechanical Engg.	Accredited	3 Years
03.	B.Tech. Civil Engg.	Accredited	3 Years
04.	B.Tech. Computer Science & Engg.	Accredited	3 Years
05.	B.Tech. Mining Engg.	Accredited	5 Years
06.	B.Tech. Metallurgical & Materials Engg.	Accredited	5 Years

07.	B.Tech. Electrical & Electronics Engg.	Accredited	5 Years
08.	M.Tech. Integrated power System	Accredited	3 Years
09.	M.Tech. Structural Dynamics & Earth Quate Engg.	Accredited	3 Years
10.	M.Tech. Environmental Engg.	Accredited	3 Years
11.	M.Tech. Structural Engg.	Accredited	3 Years
12.	M.Tech. VLSI Design	Accredited	3 Years
13.	M.Tech. Industrial Engg.	Accredited	3 Years
14.	M.Tech. Ferrous Process Metallurgy	WITHDRAWN WITHDRAWN	
15.	M.Tech. Ferrous Process Metallurgy		

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	60

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 c omplex
- Academic Buildings, Administrative Building, and Library
- Residential Sector for family & staff

The academic buildings are located fairly in close proximate, 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:

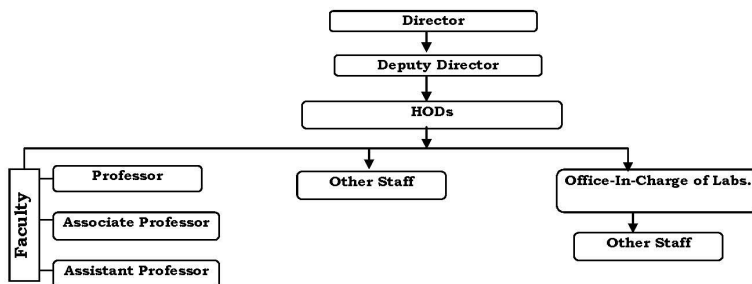
1.6.1 Administration

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

1.6.3 Flow Chart showing the hierarchy of Academic Departments

Figure - 2

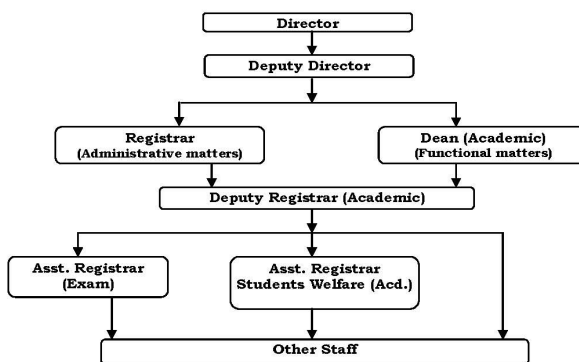
1. ACADEMIC DEPARTMENTS



	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)

I.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)

I.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.

I.10 Internally acquired funds:

(In Rupees)

Name of the Internal 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.)

I.11 Scholarships or any other financial assistance provided to students?

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

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

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

Details	CFY	CFYm1	CFYm2	CFYm3
Category				
Scholarship Assistance	Various sources given in I.11			
Amount	3,28,05,922	1,74,86,164	1,77,64,254	2,37,27,156

I.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.)

I.13 Total number of engineering students:

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

Total number of other students, if any

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

I.14 Total number of employees:

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

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

A. Regular Staff

Items	GEN DER	CAY		CAYm1		CAYm2		CAYm3	
		M in	M ax	M in	M ax	M in	M ax	M in	M ax
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

End of Part A I Institutional Information

II. Departmental Information

II.1 Name and address of the department :

**Department of Applied Mechanics,
Visvesvaraya National Institute of Technology, Nagpur
South Ambazari Road, Nagpur, Maharashtra – 440010**

II.2 Name, designation, telephone number, and e-mail address of the contact person for the NBA:

**Dr. S.V. Bakre
Associate Professor
Telephone No.: 0712-2801323, 0712-2801072, 0712-2801224,
Mobile: 9922659179
Fax: 0712-2223239, 0712-2801323
Email: svbakre@apm.vnit.ac.in**

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
History of Department	Established in 1966, the Department of Applied Mechanics offers two post graduate programs. The department offers structural engineering subjects to B.Tech. (Civil) and B.Arch, Student along with the subject of Engineering Mechanics to the first year B. Tech. students.
MTech in Structural Engineering (STR)	Started in 1991 with intake 18 (10+2+1+5) students. Further, the intake has been increased to 23 students. Programme was accredited in year 2008 for 3 years.
MTech in Structural Dynamics and Earthquake Engineering (SDEE)	Started in 2003 with intake of 18 (10+2+1+5) students. Further, the intake has been increased to 23 students. Programme was accredited in year 2008 for 3 years.

II.4 Mission and Vision of the Department

VISION:

The Department is committed to provide post graduate academic and research programs to produce high quality human resource with ability to meet the global

challenges associated with built environment and to emerge as centre of advanced studies in the field of structural engineering.

MISSION:

The mission of the department is to achieve excellence in structural & earthquake engineering education, research and professional service. It is endeavored to equip students to assume leadership positions in engineering practice, education & research and serve the mankind with structures designed for safety, serviceability and economy.

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

Sr. No.	Name of the Programme	Human resource Share in %	Facilities (Laboratory / Library/Internet) share in %
1.	First Year B Tech	10	33%
2.	B. Arch.	11	0
3.	B. Tech. (Civil)	33	50%

II.6 Total number of students

UG: **NIL**

PG:

Item	CAY	CAYm1	CAYm2	CAYm3
	2013-14	2012-13	2011-12	2010-11
M. Tech (Structural Engg)	26+19=45	20+19=39	19+18=37	18+17=35

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

Item	CAY		CAYm1		CAYm2		CAYm3	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Teaching Staff in the department	13	13	13	13	11	13	11	11
Non-teaching Staff	5	5	5	6	6	6	6	6
Total	18	18	18	19	17	19	17	17

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

Items	2013-2014		2012-2013		2011-2012		2010-2011	
	Budgeted in 2013-14	Actual Expenses till Oct 2013 *	Budgeted in 2012-13	Actual Expenses 2012-13 *	Budgeted in 2011-12	Actual Expenses 2011-12	Budgeted in 2010-11	Actual Expenses 2010-11
Laboratory equipment		4.99		2.61		6.04		0.72
software		-		-		3.00		13.14
Laboratory consumables	Plan 25.0 Lakhs	0.20	Plan 45.0 Lakhs	1.07	Plan 25.0 Lakhs	1.00	Plan 15.0 Lakhs	0.71
Maintenance and spares		0.21		0.02		0.09		0.48
Training and travel	Non-plan 2.50 Lakhs	-	Non-plan 2.0 Lakhs	0.57	Non-plan 2.0 Lakhs	0.43	Non-plan 1.65 Lakhs	0.46
Miscellaneous expenses for academic activities		0.29		-		0.06		0.29
total		5.69		4.27		10.62		15.80

* The amounts shown under expenditure does not include many items of routine expenses met from Centralized 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

M.Tech. (Structural Engineering)

III.2 Title of the Degree

Master of Technology in Structural Engineering

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

Dr. S.V. Bakre

Associate Professor

Telephone No.: 0712-2801323, 0712-2801072, 0712-2801224, Mobile: 9922659179

Fax: 0712-2223239, 0712-2801323

Email: svbakre@apm.vnit.ac.in

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

Programme	Description
MTech in Structural Engineering (STR)	Started in 1991 with intake 18 (10+2+1+5) students. Further, the intake has been increased to 23 students. Programme was accredited in year 2008 for 3 years.

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

- 1) Less number of experimental content**
- 2) Strengthening of Dept. library is required**
- 3) Low number of publications/R&D projects**

Measures taken to improve:

- 1) New laboratory experimental setups purchased**
- 2) Under CPDA more visits to conferences/workshops is made**
- 3) Under CPDA now a faculty can get funds for carrying out experimental research works, etc.**

III.6 Total number of students in the programme: **23+23=46**

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

Item	CAY		CAYm1		CAYm2		CAYm3	
	Min.	Max.	Min.	Max.	Min.	Max.	Min	Max.
Teaching Staff in the department	13	13	13	13	11	13	11	11
Non-teaching Staff	5	5	5	6	6	6	6	6

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):

Department does not have separate expenditures for different programmes in the department. Therefore, summary of budget for all the programmes in the department is given.

Items	2013-2014		2012-2013		2011-2012		2010-2011	
	Budgeted in 2013-14	Actual Expenses till Oct 2013	Budgeted in 2012-13	Actual Expenses 2012-13	Budgeted in 2011-12	Actual Expenses 2011-12	Budgeted in 2010-11	Actual Expenses 2010-11
Laboratory equipment		4.99		2.61		6.04		0.72
software		-		-		3.00		13.14
Laboratory consumables	Plan 25.0 Lakhs	0.20	Plan 45.0 Lakhs	1.07	Plan 25.0 Lakhs	1.00	Plan 15.0 Lakhs	0.71
Maintenance and spares		0.21		0.02		0.09		0.48
Training and travel	Non-plan 2.50 Lakhs	-	Non-plan 2.0 Lakhs	0.57	Non-plan 2.0 Lakhs	0.43	Non-plan 1.65 Lakhs	0.46
Miscellaneous expenses for academic activities		0.29		-		0.06		0.29
total		5.69		4.27		10.62		15.80

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 he institute and department (1)

VISION of the 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 of the Institute:

To achieve high standards of excellence in generating and propagating knowledge in engineering and allied disciplines. The Institute 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 of the Department:

The Department is committed to provide post graduate academic and research programs to produce high quality human resource with ability to meet the global challenges associated with built environment and to emerge as centre of advanced studies in the field of structural engineering.

MISSION of the Department:

The mission of the department is to achieve excellence in structural & earthquake engineering education, research and professional service. It is endeavored to equip students to assume leadership positions in engineering practice, education & research and serve the mankind with structures designed for safety, serviceability and economy.

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

- 1. Head of the Department Office**
- 2. Departmental Notice Board**
- 3. Departmental Brochure**
- 4. Institute website**
- 5. Departmental web site**

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

The vision statement of the “Department of Applied Mechanics” is in sync with the institute vision statement, scripted keeping in view the priorities of MHRD, Government of India for the technical human resource development. The accomplishment of this vision statement is by adopting the mission with relevant components required. The above are deliberated and finalized in the departmental meeting.

1.2 Programme Educational Objectives (10)

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

- 1. To impart concepts of structural engineering through the use of analytical techniques, experiments, computer simulation methods, and other modern engineering tools in the analysis and design of variety of civil engineering structures and their components effectively.**
- 2. Spreading the recent developments in structural engineering field through educating the students using updated codal provisions.**
- 3. To develop habit of individual critical thinking in analyzing a complex problem in structural engineering field.**
- 4. To develop skill of communicating structural engineering designs effectively in written, graphical, and oral form.**
- 5. Student’s capacity building in up-coming areas of research in structural engineering**

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

- 1. Head of the Department Office**
- 2. Departmental Notice Board**
- 3. Departmental Brochure**
- 4. Institute website**
- 5. Departmental web site**

1.2.3 List the stakeholders of the programme(1)

- 1. Society**
- 2. Academia**
- 3. Research Organisations such as: CSIR, BARC, SERC,**
- 4. Government organisations / Semi Governmnets, PSUs, private national and multinational**
- 5. Enterprenaur**

1.2.4 State the process for establishing the PEOs(3)

- 1. Departmental meetings**
- 2. Mentor meeting for quality improvement**
- 3. Participation of student committee and their feedback**

4. Peer review of the departmental academic activity

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

PEOs	Mission of the Institute		
	To achieve high standards of excellence in generating & propagating knowledge in engineering and allied disciplines	The Institute 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
1	x	x	
2	x	x	x
3		x	
4	x		x
5	x	x	

1.3 Achievement of Programme Educational Objectives (20)

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

The broad curriculum is based on making students understand structure, its analysis, and design. This is further more integrated with relevant practical sessions, experts/guests seminars, projects, and industrial visits.

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

The curriculum improvement, modifications and additions are governed by Board of Studies (BOS) and executed through senate on a continuous basis based on the feedback from the stakeholders and changing societal needs. This is feasible because our institute is autonomous. The meeting of BOS is held and all the faculty members are contributing in the curriculum development along with the experts from the IIT/Industry. The student class committee meets every semester and their views are incorporated in order to improve the curriculum.

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

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)

- (a) The department follows continuous evaluation system through assignments, projects, sessional (2 Nos.) and an end semester examination.**
- (b) The continuous academic quality assessments carried out through a peer (external) review process once in a year.**
- (c) The suitable feedback from Training and Placement cell is considered after the**

placement interviews of students are conducted.

- (d) Board of studies of the department includes two external experts (one from IITs and another from Industry) which advocate areas of skills and knowledge to be improved upon by the students in the context of changing situation.**

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

- a) The expected level of attainment for each of the programme education objectives
 - b) Summaries of the result of the evaluation processes and analysis illustrating the extent to which each of the PEO is being attained and.
 - c) How the results are documented and maintained
-
- a) **It is expected that the students shall be able to apply knowledge and various skills developed from the successful completion of programme to structural design industry, research and socio-economic development.**
 - b) **The students' progress is continuously monitored through regular assignments and practice sessions to ensure the achievement of course outcomes. To ensure the achievement of research & communication skills, students are required to undergo multiple research progress evaluation by a research progress committee, spanning the duration of 2 semesters.**
 - c) **Records (students work and evaluation) of the assignments, projects, sessional (2 Nos.) and an end semester examination are continuously maintained for each course. Multiple evaluations of research progress reports and presentations are made by each member of the research progress committee in terms of the quality of the work, quantity of the work and presentation skills and the record is maintained and used for the final evaluation of the work.**

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

- a) **Through the regular meetings of Board of Studies, by incorporating the suggestions of the two external experts.**
- b) **Through the comments/suggestions on weaknesses of the programme obtained from the past accreditation committee.**
- c) **Through peer review of courses carried out by experts from IITs/IISc and integrating the responses in improving the course objectives/outcomes which leads in the modification of the PEOs.**
- d) **Through feedback from the students taken at the end of each semester and incorporating the same.**
- e) **Through informal feedback from the alumni during their visit to the department and during alumni meet of the institute and incorporating the same.**
- f) **Through the feedback of the visiting faculty in the department from Industry and academia.**

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)

The course outcomes of M. Tech. program in (Structural Engineering) are given in Program Curriculum section (also in Appendix – A) with respective courses. The program outcomes are as follows:

Students are able to

- a. Acquire knowledge of structural engineering and be able to discriminate, evaluate, analyze and integrate existing and new knowledge**
- b. Be able to critically analyze and carry out independent research on complex problems of structural engineering**
- c. Be able to conceptualize and design civil engineering structures considering various socio-economic factors**
- d. Be able to carry out systematic research, design appropriate experiments and tools, and interpret experimental and analytical data for development of technological knowledge in structural engineering**
- e. Be able to create, decide and judiciously apply appropriate resources, tools & techniques in handling various problems in structural engineering**
- f. Be able to function productively with others as part of collaborative and multi-disciplinary team**
- g. Be able to understand critical issues for professional practice such as detailing work and the interaction with contractors during construction phase of a project**
- h. Be able to communicate effectively with written, oral and visual means, the design and research outcomes to the stakeholders**
- i. Be able to recognize state-of-the-art need and will be able to engage in life-long learning**
- j. Be able to understand professional and ethical responsibility while carry out research and design activities**
- k. Be able to critically analyze, scrutinize and rectify one's decisions and actions and apply self corrective measures**

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

- 1. Programme Course Book,**
- 2. Departmental information brochure,**
- 3. Website**

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

The POs has been defined by keeping in view the present and future needs of country and world. Following parameters are considered while defining the POs:

- 1. Present and future need of academia, research and Industry.**
- 2. Sustainable social development.**
- 3. Economic growth of the country.**

To achieve consistencies with the aforementioned parameters, following processes have been employed:

- a) by the regular meetings of Board of Studies,
- b) by incorporating the comments/suggestions on weaknesses of the programme obtained from the past accreditation committee,
- c) by peer review of courses carried out by experts from IITs/IISc,
- d) through feedback from the students,
- e) through feedback from the alumni,
- f) through the feedback by personnel from Industry and academia.

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

Graduate Attributes\POs	a	b	c	d	e	f	g	h	i	j	k
1. Scholarship of Knowledge	x										
2. Critical Thinking		x									
3. Problem Solving			x								
4. Research Skill				x							
5. Usage of modern tools					x						
6. Collaborative and Multidisciplinary work						x					
7. Project Management and Finance							x				
8. Communication								x			
9. Life-long Learning									x		
10. Ethical Practices and Social Responsibility										x	
11. Independent and Reflective Learning											x

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

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

2.2. Attainment of Programme Outcomes (75)

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

The correlation between the course outcomes of each course and the programme outcomes is as follows:

Course Name: AML 431- FINITE ELEMENT METHOD

Course Outcome/PO	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
i	X	X		X	X	X					
ii	X	X	X								
iii	X	X		X	X	X					X
iv	X	X		X	X						
v	X	X	X	X	X	X	X	X	X	X	
vi	X	X		X	X		X				X
vii				X			X			X	X

Course Name: AML –501- EARTHQUAKE RESISTANT DESIGN OF RC STRUCTURES

Course Outcome/PO	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
i	X	X	X			X			X		X
ii	X	X	X		X		X		X		
iii			X		X	X	X	X	X	X	X
iv	X	X	X	X	X			X	X		X

Course Name: AML –506- ANALYSIS AND DESIGN OF SPECIAL STRUCTURES

Course Outcome/PO	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
i	X	X		X	X						

ii	X	X		X					X		X
iii			X		X	X	X	X		X	X
iv		X		X						X	

Course Name: AML –422- THEORY OF PLATES AND SHELLS

Course Outcome/PO	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
i	X	X		X				X			X
ii	X	X		X				X			X
iii	X	X		X				X			X
iv	X	X		X				X			X

Course Name: AML – 424- STRUCTURAL DYNAMICS

Course Outcome/PO	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
i	X										
ii	X	X	X	X	X				X		
iii	X	X	X	X	X						
iv	X	X	X	X	X						
v	X	X	X	X	X						

Course Name: AML –425- ADVANCED DESIGN OF STEELSTRUCTURES

Course Outcome/PO	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
i	X	X			X						
ii			X								
iii				X					X		
iv							X			X	
v								X			X

Course Name: AML –426- ADVANCED DESIGN OF REINFORCED CONCRETE STRUCTURES

Course Outcome/PO	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
i	X				X		X	X	X	X	
ii	X				X		X	X	X	X	
iii	X				X		X	X	X	X	
iv	X				X						

Course Name: AML –428- STRUCTURAL INSTRUMENTATION AND REHABILITATION OF STRUCTURES

Course Outcome/PO	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
i	X			X	X		X	X	X	X	
ii	X				X		X	X	X	X	
iii	X				X		X	X	X	X	
iv	X				X		X	X	X	X	

Course Name: AML –430- ANALYSIS AND DESIGN OF INDUSTRIAL BUILDINGS

Course Outcome/PO	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
i	X	X									
ii			X								
iii					X						
iv							X			X	
v				X							X

Course Name: AML –432- ANALYSIS AND DESIGN OF MULTISTORIED BUILDINGS

Course Outcome/PO	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
i	X				X		X	X	X	X	
ii	X				X		X	X	X	X	
iii	X				X		X	X	X	X	
iv	X				X						

Course Name: AML –435- COMPUTER PROGRAMMING AND NUMERICAL METHODS

Course Outcome/PO	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
i		X		X	X						
ii		X		X	X						
iii		X	X	X	X						X
iv			X	X	X						X

Course Name: AML – 504- WIND EFFECTS ON STRUCTURES

Course Outcome/PO	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
i	X	X		X	X						
ii	X	X		X	X						
iii	X	X		X	X						
iv	X	X		X	X						X

Course Name: AML – 509- ADVANCED FINITE ELEMENT METHOD

Course Outcome/PO	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
i	X	X	X								
ii	X	X	X	X	X						
iii	X	X	X	X	X				X		
iv				X	X			X	X	X	X

Course Name: AML – 512- FOUNDATIONS SUBJECTED TO VIBRATIONS

Course Outcome/PO	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
i	X	X		X				X	X		
ii	X	X		X				X	X		
iii	X	X		X				X	X		
iv	X	X						X			
v				X					X	X	X

Course Name: AML – 505- EARTHQUAKE DYNAMICS

Course Outcome/PO	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
i	X										
ii				X							
iii							X				
iv									X		
v		X									

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

Course Name: AML 431- FINITE ELEMENT METHOD

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

Course Name: AML –501- EARTHQUAKE RESISTANT DESIGN OF RC STRUCTURES

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

Course Name: AML –506- ANALYSIS AND DESIGN OF SPECIAL STRUCTURES

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

Course Name: AML –422- THEORY OF PLATES AND SHELLS

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

Course Name: AML – 424- STRUCTURAL DYNAMICS

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

Course Name: AML –425- ADVANCED DESIGN OF STEELSTRUCTURES

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

Course Name: AML –426- ADVANCED DESIGN OF REINFORCED CONCRETE STRUCTURES

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

Course Name: AML –428- STRUCTURAL INSTRUMENTATION AND REHABILITATION OF STRUCTURES

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

Course Name: AML –430- ANALYSIS AND DESIGN OF INDUSTRIAL BUILDINGS

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

Course Name: AML –432- ANALYSIS AND DESIGN OF MULTISTORIED BUILDINGS

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

Course Name: AML –435- COMPUTER PROGRAMMING AND NUMERICAL METHODS

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

Course Name: AML – 504- WIND EFFECTS ON STRUCTURES

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

Course Name: AML – 509- ADVANCED FINITE ELEMENT METHOD

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

Course Name: AML – 512- FOUNDATIONS SUBJECTED TO VIBRATIONS

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

Course Name: AML – 505- EARTHQUAKE DYNAMICS

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

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

Course Name: AML 431- FINITE ELEMENT METHOD

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

Course Name: AML –501- EARTHQUAKE RESISTANT DESIGN OF RC STRUCTURES

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

Course Name: AML –506- ANALYSIS AND DESIGN OF SPECIAL STRUCTURES

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

Course Name: AML –422- THEORY OF PLATES AND SHELLS

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

Course Name: AML – 424- STRUCTURAL DYNAMICS

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

Course Name: AML –425- ADVANCED DESIGN OF STEELSTRUCTURES

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

Course Name: AML –426- ADVANCED DESIGN OF REINFORCED CONCRETE STRUCTURES

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

Course Name: AML –428- STRUCTURAL INSTRUMENTATION AND REHABILITATION OF STRUCTURES

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

Course Name: AML –430- ANALYSIS AND DESIGN OF INDUSTRIAL BUILDINGS

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

Course Name: AML –432- ANALYSIS AND DESIGN OF MULTISTORIED BUILDINGS

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

Course Name: AML –435- COMPUTER PROGRAMMING AND NUMERICAL METHODS

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

Course Name: AML – 504- WIND EFFECTS ON STRUCTURES

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

Course Name: AML – 509- ADVANCED FINITE ELEMENT METHOD

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

Course Name: AML – 512- FOUNDATIONS SUBJECTED TO VIBRATIONS

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

Course Name: AML – 505- EARTHQUAKE DYNAMICS

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

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

(Justify how the project works/thesis works carried out as part of the programme curriculum contribute towards the attainment of the POs.)

Project work Outcome/PO	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
i	x	x							x	x	x
ii		x		x	x				x	x	x
iii								x			x

2.3 Evaluation of the attainment of Programme Outcomes (125)

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

Describe the assessment process that periodically documents and demonstrates the degree to which the Programme Outcomes are attained. Also include information on:

- A listing and description of the assessment processes used to gather the data upon which the evaluation of each the programme educational objective is based. Examples of data collection processes may include, but are not limited to, specific exam questions, student portfolios, internally developed assessment exams, senior project presentations, nationally-normed exams, oral exams, focus groups, industrial advisory committee;
- The frequency with which these assessment processes are carried out.

Demonstration of attainment of Programme Outcomes through various modes of evaluation:

Programme Outcomes	Modes of evaluation			
	Written Examination	Assignments	Mini-project Presentations	Dissertation Reports and Seminars
a	x	x		
b	x	x		x
c	x	x	x	
d		x	x	x
e	x	x	x	x
f		x	x	
g	x			x
h	x	x	x	x
i			x	x
j		x	x	x
k	x		x	x

Frequency of various modes of evaluation for attainment of Programme Outcomes:

Modes of evaluation	Frequency
Written Examination	2 sessional examinations each of 15% weightage and one end-semester examination of 60% weightage
Assignments	Number of assignments with total weightage of 10%
Mini-project Presentations	One in each semester for a course, however, not compulsory
Dissertation Reports and Seminars	2 progress report submissions and one progress seminar presentation (along with report) in Phase I of evaluation. 2 progress seminar presentations (along with report) and one progress report submission in Phase II of evaluation. In addition to above requirement, the open defence for the dissertation in the presence of peers, research progress committee and other dissertation students.

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

- c) The expected level of attainment for each of the programme outcomes;
- d) Summaries of the results of the evaluation processes and an analysis illustrating the extent to which each of the programme outcomes are attained; and
- e) How the results are documented and maintained.

Results of evaluation of each Programme Outcomes though various qualitative parameters is as follows:

Programme Outcomes	Programme Outcomes Attainment Results				
	Review by Faculty	Feedback from Students	Feedback from Alumni	Feedback from Class Committee	Review by Board of Studies
a	Attained	Attained	Attained		Attained
b	Attained		Attained		
c	Attained	Attained	Attained	Attained	
d	Attained	Attained			Attained
e	Attained	Attained	Attained		
f	Attained		Attained	Attained	
g	Attained		Attained		
h	Attained		Attained		
i	Attained		Attained		Attained
j	Attained		Attained		
k	Attained	Attained	Attained	Attained	Attained

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)

(Articulate with rationale the curricular improvement brought in after the review of the attainment of the POs)

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

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

(Articulate with rationale the curricular delivery and assessment improvement brought in after the review of the attainment of the POs)

Student's feedback for faculty and course contents is taken twice in a semester, respectively during mid of semester and at the end of semester. Performance of each faculty is evaluated on

the scale of 10 by the students. The students feedback is shared with the concerned faculty teaching the course and effective measures are followed based on students suggestions.

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

(Articulate with rationale how the results of the evaluation of POs have been used to review/redefine the POs in line with the Graduate Attributes of the NBA.)

The revising and redefining of the POs is governed by assessing the need of research, industry and socio-economic development of the country. This is achieved by the feedback from the students, stakeholders and changing societal needs. In addition to this the experienced engineers from Industry and senior faculty members from IITs and similar national institutes and research organizations are invited to work on the Board of Studies and their suggestions are given due consideration in revising and redefining the POs.

3. Programme Curriculum (75)

3.1. Curriculum (15)

3.1.1. Describe the Structure of the Curriculum (5)

CREDIT REQUIREMENTS FOR POST GRADUTE STUDIES

Postgraduate Core (PC)		Postgraduate Elective (PE)	
Category	Credit	Category	Credit
Departmental Core (DC)	74	Departmental Electives (DE)	30
Basic Science (BS)	00	Other Courses (OC)	00
Total	74	Total	30
Grand Total PC + PE			104

Details of credits for courses of MTech in Structural Engineering:

I Semester				II Semester			
CORE				CORE			
Code	Course	L-T-P	Cr	Code	Course	L-T-P	Cr
AML421	Matrix method of structural analysis	3-1-0	8	AML425	Advanced Design of Steel Structures	3-1-0	8
AML422	Theory of Plates and Shells	3-0-0	6	AML426	Advanced Design of Reinforced Concrete Structures	3-1-0	8
AML423	Theory of Elasticity and Elastic Stability	3-0-0	6	AML429	Substructure and Foundation design	3-0-0	6
AML424	Structural Dynamics	3-0-0	6				
AMP424	Structural Dynamics Laboratory	0-0-2	2				
ELECTIVE (Any one)				ELECTIVE (Any two)			
AML428	Structural Instrumentation and Rehabilitation of Structures	3-0-2	8	AML507	Analysis and Design of Bridges and Retaining Walls	3-1-0	8
CEL 406	Advanced Concrete Technology	3-1-0	8	AML431	Finite Element Method	3-1-0	8
AML427	Introduction to Earthquake Engineering	3-0-0	6	AML432	Analysis and Design of Multistoried Buildings	3-1-0	8
AML435	Computer Programming and Numerical Methods	3-1-0	8	AML504	Wind Effects on Structures	3-1-0	8
CEL 413	Pre-stressed Concrete Structures	3-1-0	8	AML512	Foundations subjected to Vibrations	3-1-0	8
				AML501	Earthquake Resistant Design of RC str.	3-1-0	8

		36/34				38	
III Semester				IV Semester			
AMD501	Project Phase-I	-	6	AMD502	Project Phase-II	-	18
ELECTIVE (Any one)							
AML430	Analysis and Design of Industrial Buildings	3-1-0	8				
AML514	Analysis and Design of Environmental Engineering Structures	3-1-0	8				
AML506	Analysis and Design of Special structures	3-1-0	8				
AML509	Advanced Finite Element Method	3-1-0	8				
			14				18

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

The justification for attainment of the POs for various courses is as follows:

Courses\POs	a	b	c	d	e
AML422: Theory of Plates and Shells	x	x	x	x	
AML423: Theory of Elasticity and Elastic Stability	x	x		x	x
AML423: Structural Dynamics	x	x			x
AMP423: Structural Dynamics Laboratory	x	x			x
AML428: Structural Instrumentation and Rehabilitation	x	x	x	x	x
AML427: Introduction to Earthquake Engineering	x	x		x	x
AML435: Computer Programming and Numerical Methods	x	x			
AML425: Advanced Design of Steel Structures	x	x	x	x	x
AML426: Advanced design of reinforced concrete structures	x	x	x	x	x
AML429: Substructure and Foundation Design	x		x	x	x
AML507: Analysis and Design of Bridges and Retaining Walls					
AML431: Finite Element Method	x	x	x	x	
AML432: Analysis and Design of Multistoried Buildings	x	x	x	x	x
AML504: Wind Effects on Structures	x	x			x
AML512: Foundations subjected to vibrations	x		x	x	x
AML501: Earthquake Resistant	x	x	x	x	x

Design of RC Structures					
AML430: Analysis and Design of Industrial buildings	X	X	X	X	X
AML506: Analysis and Design of Special Structures	X	X	X	X	X
AML509: Advanced Finite Element Methods	X	X	X		

The justification for attainment of the PEOs for various courses is as follows:

Courses\PEOs	1	2	3	4	5
AML421: Matrix Method of Structural Analysis	X		X		X
AML422: Theory of Plates and Shells	X		X		X
AML423: Theory of Elasticity and Elastic Stability	X		X		X
AML423: Structural Dynamics	X		X	X	X
AMP423: Structural Dynamics Laboratory	X		X		X
AML428: Structural Instrumentation and Rehabilitation	X	X	X		
CEL406: Advanced Concrete Technology	X	X		X	X
AML427: Introduction to Earthquake Engineering	X	X	X	X	X
AML435: Computer Programming and Numerical Methods	X		X		X
CEL413: Pre-stressed Concrete Structures	X	X		X	X
AML425: Advanced Design of Steel Structures	X	X		X	X
AML426: Advanced design of reinforced concrete structures	X	X		X	X
AML429: Substructure and Foundation Design	X	X		X	X
AML507: Analysis and Design of Bridges and Retaining Walls	X	X		X	
AML431: Finite Element Method	X		X		X
AML432: Analysis and Design of Multistoried Buildings	X	X	X	X	X
AML504: Wind Effects on Structures	X	X	X		X
AML512: Foundations subjected to vibrations	X	X	X		X
AML501: Earthquake Resistant Design of RC Structures	X	X	X	X	X
AML430: Analysis and Design of Industrial buildings	X	X	X	X	X
AML514: Analysis and Design of Environmental Engineering Structures	X	X		X	X

AML506: Analysis and Design of Special Structures	X	X		X	X
AML509: Advanced Finite Element Methods	X		X		X
AMD501: Project Phase I	X		X	X	X
AMD502: Project Phase II	X		X	X	X

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

(Give the details of R&D organizations and industry involvement in the programme such as industry-attached laboratories and partial delivery of courses and internship opportunities for students)

There is no direct involvement of R & D organizations and industries for laboratories, internship and partial delivery of courses. However, the students interact with various research organizations through faculty research projects and are exposed to live problems/working through industrial visits.

3.3. Curriculum Development (15)

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

(Describe the process that periodically documents and demonstrates how the programme curriculum is evolved considering the PEOs and the POs)

Based on the PEOs and POs, the design of programme curriculum is governed by Board of Studies (BOS) and executed through senate. The meeting of BOS is held and all the faculty members are contributing in the curriculum development along with the experts from the IIT/Industry.

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

(Articulate the process involved in identifying the requirements for improvement in courses and curriculum and provide the evidence of continuous improvement of courses and curriculum)

The improvements, modifications and additions to the curriculum are governed by Board of Studies (BOS) and executed through senate on a continuous basis based on the feedback from the stakeholders and changing societal needs. The meeting of BOS is held and all the faculty members are contributing in the curriculum development along with the experts from the IIT/Industry. The student class committee meets every semester and their views are incorporated in order to improve the curriculum.

3.4. Course Syllabi (5)

(Include, in appendix, a syllabus for each course used. Syllabi format should be consistent and shouldn't exceed two pages.)

- Designation as required or elective course
- Pre-requisites
- Contact hours and type of course (lecture, tutorial, seminar, project, etc.)
- Course Assessment methods (both continuous and semester-end assessment)
- Course outcomes
- Topics covered
- Text books and/or reference material

The syllabus for each course is enclosed in Appendix - I.

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: 13-14	23	23	100	23	100
CAYm1: 12-13	23	20	86.9	18	78.2
CAYm2: 11-12	20	19	95	17	85
CAYm3: 10-11	20	18	90	16	80

Average percentage of seats filled through approved procedure =

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

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: 13-14	23	Not Applicable
CAYm1: 12-13	20	0.73
CAYm2: 11-12	19	0.77
CAYm3: 10-11	18	0.82

Average API = 0.77

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 = $1.5 \times$ Average API = **1.155**

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

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

Item	M. Tech (Structural Engineering)		
	No of students admitted	No of students with valid GATE score	Percentage of students with valid GATE score
CAY(2013-14)	23	23	100
CAYm1(2012-13)	20	18	78.2
CAYm2(2011-12)	19	17	85
CAYm3(2010-11)	18	16	80

Average Percentage of students with valid GATE score = **86**

Assessment = $10 \square$ (Average percentage of students admitted with valid GATE score/PG entrance of state) = **860**

4.2.Success Rate (20)

Provide data for the past three batches of students

GI = Graduation Index

= (Number of students graduated from the programme) /
(Number of students joined the programme)

Year	Number Of Students Graduated From The Programme	Number Of Students Joined The Programme	Gi
LYG 2012-13	14	19	0.73
LYGm1 2011-12	14	18	0.77
LYGm2 2010-11	14	17	0.82

Average GI=0.77

Assessment = 20*average GI =16

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 2012-13	15	7.84
LYGm1 2011-12	18	7.63
LYGm2 2010-11	15	7.90

$$\text{Assessment} = 2 * \text{average API} = 16$$

4.4.Placement and Higher Studies (20)

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

where, x = Number of students placed
 y = Number of students admitted for higher studies with valid qualifying scores/ranks, and
 N = Total number of students who were admitted in the batch to maximum assessment points = 20.

Item	LYG 2013	LYGm1 2012	LYGm2 2011
Number of admitted students corresponding to LYG(N)	20	19	18
Number of Students who obtained jobs as per the record in the industry/ academia	13	16	14
Number of Students who opted for higher studies with valid qualifying scores/ranks (y)	0	1	0
Assessment points	13	20	15.56

$$\text{Average assessment points} = 17$$

4.5. Professional Activities (25)

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

Membership in Professional Societies/Chapters

Name of Faculty	Professional Society	Membership no	Membership details
L.M. Gupta	<ol style="list-style-type: none"> 1. Institution of Engineers (India) (IE (I)) 2. Indian Concrete Institute (ICI) 3. Association of Civil Consulting Engineers (ACCE) 4. Indian Water Works Association (IWWA) 5. Indian Society for Wind Engineering (ISWE) 6. Indian Association for Structural Engineer (IASE) 		Life member for all
M.M. Mahajan	<ol style="list-style-type: none"> 1. Indian Concrete Institute (ICI) 2. Institute of Engineers (India) (IE (I)) 3. Indian Water Works Association (IWWA) 4. Indian Society for Wind Engineering (ISWE) 	<ol style="list-style-type: none"> 1. LM 4724 2. M - 059627 3. LM 1945 4. LM 505 	Life member for all
R.K. Ingle	<ol style="list-style-type: none"> 1. The Indian Society for Technical Education (ISTE) 2. Indian Society for Earthquake Technology (ISET) 3. Institute of Engineers (India) (IE(I)) 4. Indian Water Works Association (IWWA) 5. Indian Association of Computational Mechanics (IACM) 6. Association of Consulting Civil Engineers (ACCE) 	<ol style="list-style-type: none"> 1. LM 23315 2. LM - 792 3. M115460/5 4. LM 02401 	Life member for all
O.R. Jaiswal	<ol style="list-style-type: none"> 1. The Indian Society for Technical Education (ISTE) 2. Indian Society for Earthquake Technology (ISET) 3. Indian Society for Wind Engineering (ISWE) 4. Indian Concrete Institute (ICI) 		Life member for all
R.S. Sonparote	<ol style="list-style-type: none"> 1. The Indian Society for Technical Education (ISTE) 2. Indian Society for Wind Engineering (ISWE) 		Life member for all

S.S. Gadve	1. Indian Society for Technical Education 2. Association of Structural Rehabilitation	1. LM 21647 2. A 0087	Life member for all
S.V. Bakre	1. Association of Structural Engineers 2. Association of Computational Mechanics		Life member for all
S.B. Borghate	1. The Indian Society for Technical education (ISTE) 2. AMIE	1. LM 32497	Life member for all
A.Y. Vyavahare	1. Indian Association of Structural Engineering 2. Indian Association of Computational Mechanics 3. Indian Society for Wind Engineering 4. Integrated Publishing Association		Life member for all
D. Datta	1. The Indian Society for Technical Education (ISTE) 2. Indian Society of Earthquake Technology (ISET)	1. LM 67302 2. LM 1372	Life member for all
Ratnesh Kumar	1. Indian Society of Earthquake Technology (ISET) 2. The Institution of Engineers (India) (IE (I))	1. LM -1401 2. AM – 097273-0	1. Life member 2. Associate member

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

(Instruction: The institution may provide data for past three years).

Date/Year	Event	Organizing Agency & Place	Name of the Faculty Member	Outcome
2012	15th World Conference on Earthquake Engineering	International Association of Earthquake Engineering, Lisbon, Portugal	Dr. S. V. Bakre	Paper Presented
2012	15th World Conference on Earthquake Engineering	International Association of Earthquake Engineering, Lisbon, Portugal	Dr. O.R. Jaiswal	Paper Presented
2012	15th World Conference on Earthquake Engineering	International Association of Earthquake Engineering, Lisbon, Portugal	Dr. Ratnesh Kumar	Paper Presented
2012	ISEUAM - 2012	Bengal Engg And Sciences University, Shibpore, India	Dr. D. Datta	Paper Presented
2012	4 th International Conference on Structural Stability & Dynamics	MNIT, Jaipur	Dr. S. V. Bakre	Paper Presented
2012	4 th International Conference on Structural Stability & Dynamics	MNIT, Jaipur	Mr. A.P. Khatri	Interaction with other researchers
2012	SPICON2012, International conference	SPCE Mumbai	Dr. S.S. Gadve	Paper Presented
2011	International Conference on Wind Engineering	IWS Netherlands	Mr. A.Y. Vyavahare	Paper Presented
21 st July 2011	Induction Training Programme For Newly Recruited Engineers Of Civil Engineering Discipline	RITES Limited Nagpur	Dr. M.M.Mahajan	Lecture Delivered
8 th March 2011	Geological Aspects Of Earthquake Engineering	IIT Gandhinagar	Dr. M.M.Mahajan	Participated
29 th April	Third Curriculum	Yeshwantrao Chavan	Dr. M.M.Mahajan	Participated

2011	Development Workshop	College Of Engineering Nagpur		
7th October 2011	Career Planning In Engineering	Dharampeth Polytechnic Nagpur	Dr. M.M.Mahajan	Lecture Delivered
9 August 2010	Workshop on Fire Safety Engineering and Structures in Fire	IISc Bangalore, UKIERI	Dr. S.V.Bakre	Participated
6 August, 2010	Basics of Structural Engineering	Raisoni College of Engineering, Nagpur	R S Sonparote	Lecture Delivered

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

(Instruction: The institution may list the publications mentioned earlier along with the names of the editors, publishers, etc.).

List of Publications in International/National Events:

Sr. No.	Publication	Year
1.	A. N. Gajre, S. V. Dhage, O. R. Jaiswal, 2010, "A new approach to obtain optimum TMD parameter using equal modal mass criteria", 14th Symposium on Earthquake Engg., IIT Roorkee, Dec 2010.	2010
2.	O. P. Gomase and S.V. Bakre, "Non-linear Time History Analysis of Elastomeric Base-Isolated Building Structure", Conference on Infrastructure, Sustainable Transportation, and Urban Planning, Paper # I030, 18th – 20th October, 2010 at Bangalore, India.	2010
3.	Priyanka M. Nagdeve and S.V. Bakre, "Dynamics Analysis of Bridges to Multi-support Excitation", International Conference on Design & Construction of Urban Transport Structures, 23rd – 25th April, 2010 at Hyderabad, India.	2010
4.	S. Adhikary, Y. Singh, and R. Kumar (2010), "Effect of Soil Amplification and Foundation Flexibility on Seismic Performance of a Four Storey RC Frame Building," Proc. 14th Symposium on Earthquake Engineering, December 17-19, Indian Institute of Technology, Roorkee, pp. 1424-1433	2010
5.	A. Khandeshe, R.K. Ingle, 2010, "Comparison of various IS Code Methods of RCC Design for Water Retaining Members", Keynote Paper at International Conference on Innovative World of Structural Engineering, India	2010
6.	Reddy, K. R. C., Jaiswal, O. R., Godbole, P. N., "Wind and earthquake analysis of tall RC chimneys", International Conference on Advances in Civil Engineering (ACE-2011), KL University, Vaddeswaram, Guntur, October 2011, 508-511, 2011.	2011
7.	Nikil N. Pujari and S V Bakre, "Optimum Sizing of X-plate dampers for seismic response control of multistoried buildings", 4th International Conference on Structural Stability and Dynamics, 4-6 January, 2012, Jaipur, India.	2012
8.	Nilesh U. Mate, S V Bakre and O R Jaiswal, "Comparative Study of Impact Simulation Models for Linear Elastic Structures in Seismic Pounding", 15th World Conference on Earthquake Engineering, Lisbon, Portugal, 24-28 September 2012.	2012
9.	Pradnya Thakre and O. R Jaiswal, 2012, "Comparative study of fixed base and base isolated buildings using seismic analysis", Proc. of International Conference Structural Stability and Dynamics, 4-6 January, MNIT, Jaipur, India.	2012
10.	Reddy, K. R. C., Jaiswal, O. R., Godbole, P. N., 2011, "Wind and earthquake analysis of tall RC chimneys", International Conference on Advances in Civil Engineering (ACE-2011), KL University, Vaddeswaram, Guntur, pp 508-511.	2012
11.	S G Tidke and D Datta, "Study of short concrete filled tubular (CFT) columns of different shapes", SPICON 2012, International Conference at Sardar Patel College of Engineering Mumbai, June 2012	2012
12.	T. N. Manikanta and O. R. Jaiswal, 2012, "Effect of diagonal mods on response spectrum analysis", 15th World Conference on Earthquake Engineering, 15WCEE, Lisbon, Portugal, 24-28 September 2012. Paper No. 2688.	2012
13.	Naveen. R, A. Y. Vyavahare, 2013, Finite Element Analysis of Steel Beam Column Connection, Indian conference on Applied Mechanics (INCAM), 4-6 July, IIT Madras, India	2013
14.	V K Jain and S.V. Bakre, "Evaluation of Structural System in Cold-Formed Steel for Housing Applications", Indian conference on Applied Mechanics (INCAM), 4-6 July, IIT Madras, India.	2013

15.	A. Khandeshe, R.K. Ingle, 2013, “Parametric Studies of Haunched Braces for Staging of Elevated Water Tank”, National Conference on New Horizons in Civil Engineering, India	2013
16.	A. Khandeshe, R.K. Ingle, 2013, “Critical Directions of Horizontal Load for Maximum Force in Columns and Braces for Elevated Tanks”, Asian Conference on Civil, Material and Environmental Sciences, Tokyo Japan	2013

4.5.4. Entrepreneurship initiatives and innovations (5)

(Instruction: The institution may specify the efforts and achievements.)

The Entrepreneurship initiatives and innovations are taken care of by the Center for Innovation. The Center for Innovation (CIVN), hosted at VNIT Nagpur, under assistance of Rajiv Gandhi Science and Technology Commission Government of Maharashtra (RGSTC) is an umbrella for promotion of entrepreneurship at VNIT Nagpur. CIVN administers a business incubator which provides support for technology based entrepreneurship. Thus, CIVN extends the role of VNIT Nagpur by facilitating the conversion of research activity into entrepreneurial ventures.

At VNIT, Industry Institute Interaction (III) Cell has been active since inception in 1993. It has established linkages with local industry, industry associations, and Govt. Departments in the promotion of technology.

The technology developed in the laboratories can be used for development of new products and services. VNIT likes to support a thriving and knowledge based business community in the country.

5. Faculty Contributions (200)

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	IPRs	R & D and consultancy work with amount (for last four years including CAY) (In Lakhs)	Holding an incubation unit	Interaction with outside world
			1 st year	UG	PG					
Dr. L M Gupta	Ph.D. (1991), M. Tech (1983), B.E (1980), DBM (1984) All from Nagpur University	Professor 18/10/1989	11	47	42	IJ*-11 NJ-19 IC-20 NC-56	NIL	131.58	NIL	Indicated in a separate table given below
Dr. M M Mahajan	Ph.D. (2000), M. Tech (1986), B.E (1977) All from Nagpur University	Professor 17/8/1992	0	65	35	NJ-6 IC-2 NC-15	NIL	1.07	NIL	Indicated in a separate table given below
Dr. R K Ingle	Ph.D. (2000, Nagpur University), M. Tech (1987, IITB), B.E (1988 Nagpur University)	Professor 14/9/1992	10	30	60	IJ-11 NJ-19 IC-26 NC-20	NIL	Consultancy = 150.54 R & D = 11.805	NIL	Indicated in a separate table given below
Dr. G N Ronghe	Ph.D. (2000), M. Tech (1982), B.E (1979) All from Nagpur University	Professor 1/7/1989	0	32	68	IJ-2 NJ-10 IC-4 NC-5	NIL	131.58	NIL	Indicated in a separate table given below
Dr. O R Jaiswal	Post – doc (1996-1998, The University of Liverpool, UK), Ph.D. (1995, IISc), M. Sc. Engg. (1991, IISc), B.E (1987, VNIT)	Professor 30/10/1998	37	47	16	IJ-14 NJ-06 IC-18 NC-24	NIL	0.3	NIL	Indicated in a separate table given below

Dr. R S Sonparote	PhD (2013, VNIT), M. Tech (1989, IIT B), B.E (1988, Amravati Univ)	Associate Professor 11/8/1992	9	56	35		NIL	15.6	NIL	Indicated in a separate table given below
Dr. S V Bakre	Ph.D. (2006, IIT B), M. Tech (2002, Nagpur Univ.), B.E (1999, Pune Univ.)	Associate Professor 16/5/2006	23	35	42	IJ-6 IC-7 NC-5	NIL	3.9	NIL	Indicated in a separate table given below
Dr. Sangeeta Gadve	Ph.D. (2008, IIT B), MTech (SPCE), BE (1993, VNIT)	Associate Professor 8/6/2012	75	0	25	IJ-3 IC-4 NC-1	NIL	NIL	NIL	Indicated in a separate table given below
Dr. D. Datta	Ph.D. (2010, IIT B), MTech (Bengal Engineering College, Shibpore), BE	Assistant Professor 15/6/2010	54	15	31	IJ-1 IC-1	NIL	NIL	NIL	Indicated in a separate table given below
Dr. Ratnesh Kumar	Ph. D. (2011, IITR), M.Tech (2004, IITR), B.E. (2000, Bangalore Univ.)	Assistant Professor 17/4/2012	57	14	29	IC-1	NIL	2.01	NIL	Indicated in a separate table given below
Mr. S B Borghate	M. Tech. (1995), B. E. (1992), Nagpur University	Assistant Professor 30/8/1998	31	54	15	IC-1	NIL	31.9	NIL	Indicated in a separate table given below
Mr. A Y Vyavhare	M. Tech. (2002, VNIT), B.E. (1999), BAMU, Aurangabad	Assistant Professor 14/6/2006	26	59	15	IJ-2 IC-4 NC-7	NIL	2.75	NIL	Indicated in a separate table given below
Mr A P Khatri	BE (2000, Nagpur University), M.Tech. (2002, VNIT)	Assistant Professor 28/11/2008	100	0	0	IJ-1	NIL	0.29	NIL	Indicated in a separate table given below

* IJ: International Journals; NJ: National Journals; IC: International Conferences; NC: National Conferences

Details of Faculty Interaction with outside world

Name of Faculty	Interaction with outside world
Gupta L. M.	<ol style="list-style-type: none"> 1. Examiner for Ph.D's and M. Tech projects for Amravati University, Nagpur University, Pune University, Shivaji University, IIT Madras, IIT Bombay, MNIT Bhopal 2. Corresponding member of steel bridge committee (B-7) of Indian Road Congress from 1995 to 1998 3. West zone coordinator and expert member for the Best Innovative Structural Steel Design Project Award for students of Civil Engineering of Institute for Steel Development and Growth KOLKATA from 2004-2007 and 2009 onwards 4. Expert member in Board of Studies of Applied Mechanics of S. V. National Institute of Technology, Surat 5. Expert member of NBA Accreditation program in various Polytechnics/Engineering College 6. Expert member of selection committee for appointment of faculty in engineering colleges 7. Member for committee's of Assistant Director of Technical Education Board Nagpur for starting of New Courses of Engineering and Technology 8. Editor of Journal of Wind and Engineering published by Indian Society for Wind Engineering from 2006-2008 9. External expert member for selection of Scientist in Defence Research & Development Organisation, New Delhi 10. Chairman of Indian Society of Wind Engineering (Nagpur local Chapter)
Ingle R. K.	<p>PhD Examiner for various Universities, BoS Member of Civil Engg. Dept., COE, Amravati Committee member of CED 39 of BIS</p>
Ronghe G. N.	<ol style="list-style-type: none"> 1. External examiner for M. Tech. (Str Engg.) course at Govt. College of Engineering, Amravati.
Mahajan M. M.	<ol style="list-style-type: none"> 1. Delivered : Invited Lectures on Machine foundation In 2010 11, 2011-12 and 2012-2013 Training programme of Mahagenco KORADI Nagpur
Jaiswal O. R.	<ol style="list-style-type: none"> 1. Seismic Design of Tanks, Special Lectures on Workshop on IS 3370, Organised by IWWA, Nagpur Center, on 6th January 2010. 2. Seismic Design of Tanks, special Lecture at the Training Center of Irrigation Department, Nagpur on 11th November 2010. 3. Seismic Design of Railway Bridges, Delivered a set of lectures as resource person at the Short course arranged at IIT Kanpur during 2nd to 6th May 2011. 4. Seismic Safety concepts for Architecture Students, Special Lecture delivered at Workshop for UG Students of Architecture at IIT Kanpur from 7th to 12th July 2013 5. Seismic Design of Water Tanks, special lecture delivered at the Short Term Training Program under TEQIP at SGSJET, Indore on 21st September 2013 6. Development of guidelines of seismic design of railway bridges with IIT Kanpur, for Indian railways with RDSO.
Bakre S. V.	<ol style="list-style-type: none"> 1. Expert for Ph. D. Progres Seminar at G. H. Raisoni college of engineering on July 31, 2013 2. External examiner for M. Tech. (Str Engg.) course at Govt. College of Engineering, Aurangabad.
Gadve S.	<ol style="list-style-type: none"> 3. Visited Indira Gandhi Center for Atomic Research, Kalpakkam to discuss about the research projects and preview of lab facilities during 31.07.2013 to 01.08.2013.
Borghate S. B.	<ol style="list-style-type: none"> 1. Delivered expert lecture on Introduction to Bar and Beam element in STTP course on FEM & Applications in Civil Engineering, PUSAD, Sept 13, 2012
Datta D.	<ol style="list-style-type: none"> 1. Expert for M.Tech final defense in Govt. College of Engineering Amravati on July 27,

	2013
Kumar Ratnesh	<ol style="list-style-type: none"> Executive Committee Member, Indian Society of Earthquake Technology (2011-2012) Reviewer for ACI Structural Journal External Co-PI in a Indo-Norwegian collaborative research project on “Earthquake Hazard and Risk Reduction on Indian Subcontinent” funded by Norwegian embassy with Department of Earthquake Engineering, IIT Roorkee Delivered expert lectures on Introduction to earthquake, seismicity of Maharashtra earthquake parameters, Hazards/Disaster : Natural and Manmade at Regional Training Center, Nagpur in Course on Disaster mitigation and rehabilitation (12to 15 Mar., 13)

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

U0 = Number of Students in UG 1st Year

U1 = Number of Students in UG 2nd Year

U2 = Number of Students in UG 3rd Year

U3 = Number of Students in UG 4th Year

P1 = Number of Students in PG 1st Year

P2 = Number of Students in PG 2nd Year

N1 = Total Number of Faculty Members in the Parent Department

S=Number of Students in the Parent Department

$$= U0+U1 + U2 + U3 + P1 + P2$$

Student Teacher Ratio (STR) = S / N1

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

Year	U0	U1	U2	U3	P1	P2	S	F	STR	Assessment
CAY 2013-14	87	37	37	37	44	32	274	13	21.08	12.34
CAYm1 2012-2013	87	37	37	37	32	31	261	13	20.08	12.95
CAYm2 2011-2012	87	37	37	37	31	31	260	11	23.64	11.00
CAYm3 2010-2011	87	37	37	37	31	25	254	11	23.09	11.26

Average Assessment = 12

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: 2013-2014	10	13	15.38
CAYm1: 2012-2013	10	13	15.38
CAYm2: 2011-2012	7	11	12.73

Assessment = 20 x [X/Y]

Average Assessment = 15

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: 2011-2012	7	4	11	8.55	34.18
CAYm1: 2012-2013	10	3	13	9.08	36.31
CAY: 2013-2014	10	3	13	9.08	36.31
Average Assessment					35.6

5.4. Faculty Competencies correlation to Programme Curriculum (15)

(Indicate the faculty competencies (specialisation, research publication, course developments etc.) to correlate the programme curriculum)

Faculty Name	Specialisation field	Research Publications	Course development	Any other detail related to programme curriculum
Prof. L M Gupta	Structural Engineering	IJ*-11 NJ-19 IC-20 NC-56	Developed courses such as Design of steel structures, Analysis and design of industrial buildings.	NIL
Prof. M.M.Mahajan	1) RCC Analysis and Designs 2) Foundations and substructures subjected to vibration	NJ-6 IC-2 NC-15	Developed short term course on Practical Application of Building Construction	Co-opt Member for revision IS:2950
Prof. R. K. Ingle	Finite Element Method, Structural Dynamics & Earthquake Engineering, Seismic Design of Water Tanks, Bridges & Buildings,	IJ-11 NJ-19 IC-26 NC-20	The syllabus of various PG courses was developed	
Prof. G N Ronghe	Structural Instrumentation, NDT, Multistoried Buildings, proof load testing of Bridges,	IJ-2 NJ-10 IC-4 NC-5	The syllabus of this course was developed in discussion with the BOS faculties	Site photographs of non-destructive testing and instrumentation

	Prestressing of Steel Structure			
Prof. O. R. Jaiswal	Structural Dynamics, Seismic Design of Water Tanks, Bridges	IJ-14 NJ-06 IC-18 NC-24	The syllabus of this course was developed in discussion with the faculty from IIT.	Students are given the data of real life structures for learning seismic analysis techniques.
Prof. S.V. Bakre	Earthquake Engineering and Structural Dynamics	IJ-6 IC-7 NC-5	Taught Earthquake Resistant Design of Structures to MTech(STR), Introduction to Earthquake Engineering to MTech(SDEE) and Earthquake Resistant Design of Steel Structures to MTech(SDEE)	
Sangeeta Gadve	Concrete Technology, Reinforced Concrete, NDT, FEM	IJ-3 IC-4 NC-1		
Dr.DebaratiDatta	Structural Dynamics and Reliability concepts	IJ-1 IC-1		
Ratnesh Kumar	Earthquake Engineering and Structural Dynamics	IJ - 2 NJ - 4 IC - 4 NC - 5	None	
S. B. BORGHATE	Structural Engineering,	IC-1	The syllabus of this course was developed in discussion with the faculty from IIT and Emeritus Professor Dr. P.N. Godbole (IIT Roorki) .	Students are given the data of real life structures for learning finite element analysis techniques.
Prof. A. Y. Vyavahare	Structural Engineering	IJ-2 IC-4 NC-7		
Prof. A. P. Khatri	Structural Engineering	IJ-1		

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

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 2011-2012	CAYm1 2012-2013	CAY 2013-2014
Gupta L. M.	3	3	
Ingle R. K.	3	3	5
Ronghe G. N.	3	3	
Mahajan M. M.	5	5	
Jaiswal O. R.	3	3	5
Sonparote R. S.	3	3	
Bakre S. V.	3	3	
Gadve S.			
Borghate S. B.		3	
Vyavahare A. Y.	3	3	
Khatri A. P. (Participation+Delivered)	5	5	3
Datta D.	3	5	
Kumar Ratnesh	Not Applicable	5	
Sum	34	44	13
N(Number of faculty positions required for an STR)	21 (20.81)*	18 (17.69)	19 (18.61)
Assessment = 3 x Sum/N	4.85	7.33	2.05
Average Assessments			5

*Figure in bracket indicates actual STR

5.6. Faculty Retention (15)

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

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 2011-2012	CAYm1 2012-2013	CAY 2013-14
Number of faculty members with experience of less than 1 year(x_0)	0	2	0
Number of faculty members with 1 to 2 years experience	1	0	2
Number of faculty members with 2 to 3 years experience	1	1	1
Number of faculty members with 3 to 4 years experience	0	1	1
Number of faculty members with 4 to 5 years experience	0	0	0
Number of faculty members with more than years experience(x_5)	9	9	9
N	13	13	13
RPI = $x_1 + 2x_2 + 3x_3 + 4x_4 + 5x_5$	48	50	52
Assessment	11.1	11.54	12
Average Assessment			12

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) (Figure in the bracket indicates number of publications)		
	CAYm2 2011-2012	CAYm1 2012-2013	CAY 2013-14
Dr. L M Gupta	5 (2)	5 (4)	
Dr. M M Mahajan			
Dr. R K Ingle		5 (3)	
Dr. G N Ronghe		5 (1)	
Dr. O R Jaiswal	5 (1)	5 (5)	
Dr. R S Sonparote			
Dr. S V Bakre	5 (2)	5 (2)	5 (1)
Dr. Sangeeta Gadve			
Dr. D. Datta	5 (2)	5 (1)	
Dr. Ratnesh Kumar		5 (1)	
Mr. S B Borghate			
Mr. A Y Vyavhare	5 (1)	5 (2)	5 (1)
Mr A P Khatri		5 (1)	
Sum	25	45	10
N(Number of faculty positions required for an STR of 15)	15	15	16
Assessment of FRP = $6 \times \text{Sum}/N$	10	18	3.75
Average Assessment			11

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			

No faculty members are having Intellectual Property Rights

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 2011-2012	CAYm1 2012-2013	CAY 2013-2014
Dr. L M Gupta	5	5	5
Dr. M M Mahajan	3	2	0
Dr. R K Ingle	5	5	5
Dr. G N Ronghe	5	5	5
Dr. O R Jaiswal	0	1	0
Dr. R S Sonparote	3	3	5
Dr. S V Bakre	3	4	4
Dr. Sangeeta Gadve	0	0	0
Dr. D. Datta	0	0	0
Dr. Ratnesh Kumar	0	4	3
Mr. S B Borghate	5	5	5
Mr. A Y Vyavhare	4	2	1
Mr A P Khatri	0	1	0
Sum	33	37	33
N	13	13	13
Assessment of FRP = $4 \times \text{Sum}/N$	10.15	11.38	10.15
Average Assessment			11

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 2011-2012	CAYm1 2012-2013	CAY 2013-2014
Dr. L M Gupta	5	5	5
Dr. M M Mahajan	3	2	0
Dr. R K Ingle	5	5	5
Dr. G N Ronghe	5	5	5
Dr. O R Jaiswal	5	1	0
Dr. R S Sonparote	3	3	5
Dr. S V Bakre	3	4	4
Dr. Sangeeta Gadve	0	0	0
Dr. D. Datta	0	0	0
Dr. Ratnesh Kumar	0	4	3
Mr. S B Borghate	5	5	5
Mr. A Y Vyavhare	4	2	1
Mr A P Khatri	0	1	0
Sum	38	37	33
N	13	13	13
Assessment of FIP = $3 \times \text{Sum}/N$	8.76	8.54	7.62
Average Assessment			8

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
Classrooms-03 Nos				
AM 1/1	Theory Classes	Exclusive	40	YES
AM 1/4	Theory Classes	Exclusive	58	YES
Seminar Hall	Theory Classes, Seminar & Conferences	Shared	60	YES
Tutorial rooms-03Nos				
Structural Analysis Lab	Lab & Tutorial	Shared	30	YES
Structural Dynamics Lab	Lab, Tutorial & Seminar	Shared	30	YES
Strength of Materials Lab	Lab & Tutorial	Shared	35	YES
Seminar Rooms-03Nos				
Seminar room	Theory Classes, Seminar & Conference	Shared	60	YES
P.G. Computer Lab	C. Lab & seminar	Shared	40	YES
S.D. Lab	Lab, Tutorial & Seminar	Shared	30	YES
Meeting Room-01 No	Staff Meeting	Exclusive	30	YES
Faculty Rooms-13 Nos	Staff seating	Exclusive	01	YES

6.1. Classrooms in the Department (15)

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

There are adequate numbers of rooms available in the department for the conduct of lectures for core/electives, tutorials and seminars.

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

Each classroom, lab, seminar hall, meeting hall is equipped with multimedia projectors, white display boards and few classrooms are also equipped with Public Address Systems.

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

Each classroom, lab, seminar hall, meeting hall is having good acoustics, adequate size, conditions of chairs and benches is good, ambience, air circulation and lighting is good. There are more than one exits to seminar hall, one classroom, SA Lab, EM Lab, SoM Lab, EE Lab, SD Lab etc. There are two water coolers for drinking water equipped with water purifying system. There are dedicated toilets for Gents, Ladies and Persons with

Disabilities. PG Computer Lab, Reading Room, Research Scholars Lab, SA Lab, SD Lab and Seminar Hall is equipped with Air conditioners.

6.2. Faculty Rooms in the Department (15)

6.2.1. Availability of individual faculty rooms (5)

All the faculty members are provided with individual faculty rooms.

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

Room/Lab	White Board	Black (Green) Board	Computer	White Projection Board	Internet & Wi-fi	Air Conditioner/ Coolers
Classroom AM1/1		Yes		Yes		Yes (In Summer)
Classroom AM1/4		Yes		Yes		Yes (In Summer)
SA Lab		Yes	Yes	Yes	Yes	Yes
SD Lab	Yes		Yes		Yes	Yes
PG Computer Lab	Yes		Yes	Projection on Wall	Yes	Yes
SoM Lab		Yes	Yes	Projection on Wall	Yes	Yes
EM Lab		Yes		Projection on Wall		
Seminar Hall	Yes	Yes	Yes		Yes	Yes
Meeting Room			Yes	Yes	Yes	Yes
SI Lab		Yes	Yes	Projection on Wall	Yes	Yes
Faculty Rooms	Yes (Few)	Yes (One)	Yes		Yes	Yes

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

There is meeting room and seminar hall for discussion with the students.

A counsellor is available to the students for addressing their problems. The counsellor available to the department students on 2nd and 4th Thursdays of the month in the department. In addition to this, health centre of the Institute is having a visiting counsellor. Counsellor is also available to the students in the central library building on daily basis.

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)

Correlation of various lab to meet curriculum requirements with POs is as follows:

Room/Lab	POs				
	a	b	c	d	e
SA Lab		x	x		x
EM Lab		x			x
SD Lab	x	x	x		
PG Computer Lab	x	x	x	x	x
SoM Lab	x	x	x		
EE Lab	x	x	x		x
SI Lab	x	x	x	x	x

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

As shown in the table given in 6.2.2 all the labs and other facilities are equipped with computing facilities. Approximately, there are 20 computers exclusively for faculty members and 50 computers exclusively for students. Two labs viz., Advance Computing Lab and Data Processing lab are in process of procuring 4 high-end computer workstations for students/faculty for research.

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

It can be noted from table given in 6.3.1 that the POs related to research are achieved from various labs. In addition, the SoM Lab, SD Lab, SI Lab and EE Lab are equipped with various equipments/facilities for carrying out experimental work.

It is also to be noted that a majority of work requires computer simulations. As shown in the table given in 6.2.2 all the labs and other facilities are equipped with computing facilities. Approximately, there are 20 computers exclusively for faculty members and 50 computers exclusively for students. Two labs viz., Advance Computing Lab and Data Processing lab are in process of procuring 4 high-end computer workstations for students/faculty for research work related to computer simulations.

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

All the facilities are available to the students and faculty round the clock.

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

Laboratory description in the curriculum	Exclusive use/ shared	Space (m ²)	Number of experiments	Quality of instruments	Laboratory manuals
PG Computer Laboratory (PG Comp Lab)	Exclusive	120	Not Applicable	Not Applicable	Not Applicable
Research Scholars Laboratory (ORJ) (RS Lab)	Exclusive	50	Not Applicable	Not Applicable	Not Applicable
PG Laboratory (RKI) (PG Lab)	Exclusive	50	Not Applicable	Not Applicable	Not Applicable
Structural Dynamics (SD lab)	Exclusive	121	10	Good	Available
Structural Instrumentation (SI Lab)	Exclusive	163	11	Excellent	Available
Earthquake Engineering (EE Lab)	Exclusive	170	5	Excellent	Available
Structural Analysis (SA Lab)	Exclusive	160	11	Average	Available
Engineering Mechanics (EM Lab)	Exclusive	180	9	Good	Available
Strength of Materials (SoM Lab)	Exclusive	270	17	Good	Available

6.4. Technical Manpower Support in the Department (15)

Name of the technical	Designation (pay-scale)	Exclusive/ shared work	Date of joining	Qualification		Other technical skills gained	Responsibility
				At joining	Now		
Mr. S.R. Kulvi	Senior Lab Assistant (12740 + Grade Pay 2800)	Equipments and Machinery Handling, Conduct of Practicals, Testing	9/1/1986	HSC (12th)	HSC (12th)	Handling new machinery/ equipments, Computers, Computer Softwares	Testing of materials, Conduct of Lab Practicals and Maintenance of machinery/ equipments

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

Since the department is having laboratory load of UG, PG, PhD and testing of materials, there is an urgent need of technical supporting staff to cater the needs/load.

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

There is mechanism through which incentives in terms of increment in the payment of the technical staff member is enhanced if the knowledge of the technical staff is upgraded. A committee is constituted to verify if the enhanced technical skill is helping the staff in performing the duties in a better way. If it is established that the additional skill gained is helping the technical staff member in discharging his/her duties to the institute then incentives in terms of increments in payment is awarded.

Moreover, irrespective of incentives being awarded, any additional upgradation in skills of the technical staff helps them in further promotions.

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.

There is a continuous evaluation system followed in the department with 2 sessional examinations and one end-semester examination. The weightages for the sessional exams is 15 % each and end-semester examination is 60%. 10% weightage is given for internal assessment of the students which accounts for quizzes, assignments and mini-projects. Moreover, it is proposed to enhance the Industry-Institute interaction (through industrial visits and guest lectures) and include the same in the evaluation.

Assessment =

7.1.2. Seminar and Presentation Evaluation (10)

Assessment is based upon the methodology being followed and its effectiveness

The students are required to deliver seminar to the supervisor, other invited faculty members and fellow students. The student's performance is evaluated under three heads, namely, quality of the work, quantity of the work and quality of presentation, each for 10 marks. Students are then rated for the average marks obtained from the faculty members attending the seminar and presentation.

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

After every sessional examination the course coordinator is required to send the list of students having either class attendance less than 60% or marks obtained less than 30% in the exam or both, to the corresponding Faculty Advisor. Further, the faculty advisor identifies students having poor performance in terms of attendance and/or marks as defined earlier in three or more courses. Those students are counselled on personal basis by Faculty Advisor and medical counsellor.

Moreover, weaker students are handled very carefully and special remedial classes are organized for them either by the senior students or by the faculty or both.

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.

The students are allowed to see their evaluated answer sheets for all the exams conducted in the department. The student's grievances, if any, are addressed during the process of showing the answer sheets. This mechanism is very well accepted by the students and they are very satisfied with the same. Moreover, they are free to meet the Head of the Department and Dean (Academic) for further grievance.

Assessment =

7.2. Evaluation Process: Project Work / THESIS (25) Details of Thesis Allocation, Evaluation and Presentation:

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

The department follows a well organized procedure for allocation of supervisor to the students. In the department all the faculty members are eligible supervisor. At the end of second semester examination, all the faculty members are required to float few topics of his/her interest for the MTech Dissertation/Thesis. Each supervisor is assigned with a fixed number of students to be supervised by him. Every student has to fill a priority list of his/her choice of supervisor. In case of conflict with other student for a particular supervisor, the student having higher CGPA is given priority in allotment of supervisor.

Assessment =

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

Separate Research Progress Committee (RPC) is constituted for every student including supervisor and at least 2 other faculty members of the department. The RPC periodically evaluates the performance of the student and provides recommendation for progress.

At the completion of thesis/dissertation, the final evaluation is carried out thorough an open defense. The evaluation committee for the open defense consists of one Chairman from other department of the institute, supervisor(s), one faculty member from the department and one external examiner from reputed institutes like IITs, IISc, NITs, CSIR Labs, and engineering colleges.

Assessment =

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

Schedule of Evaluation/Presentation

Project Phase 1 (AMD501)		Project Phase 2 (AMD502)	
First report submission (No Seminar)	2nd Week after the start of Odd Semester	Fourth report submission & Seminar	Last working day of 1st Week after the start of Even Semester (Dates to be finalized) 2nd Week after the start of Even Semester
Second report submission (No Seminar)	23rd September 2013	Fifth report submission (No Seminar)	(Dates to be finalized)
Third report submission & seminar Seminar	25th October 2013 28th Oct to 1st Nov 2013 for presenting entire work for Phase 1	Sixth report submission & seminar Seminar	(Dates to be finalized) (Dates to be finalized)

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.

Department follows two patterns of collecting feedback from students, viz, written feedback for each course and oral feedback (documented) through *Class Committee, twice in a semester. The written feedback consists of two parts, viz., Part A: Teachers Feedback and Part B: Course Evaluation. Both the parts consists of 10 criteria, each criterion of Part A is to be rated on the scale of 1 to 10 and for Part B on the scale of 1 to 5. In addition to this, students have to write comments for both the parts. Oral feedback in class committee meetings is mostly to identify and resolve allied problems such as non-functional equipments in laboratory, ambience and issues related to other facilities. Moreover, the faculty members also reciprocate their general views about the performance and behavior of students in their respective course.

[*Class Committee: Committee consisting of a Chairman/Chairperson who is not teaching any course to the class, all the course coordinators and two student representatives from each class having CGPA 7.5 and above nominated by Head of the Department.]

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.

The written student's feedback is shared with the corresponding faculty members by the Head of the Department and remedial measures/modifications are undertaken. The oral feedback is acquired through class committee meetings constituted by the Head of the Department and relevant issues are undertaken with due priority.

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.

The course coordinator identifies students having poor performance in terms of attendance and/or marks as defined earlier in three or more courses. Those students are counselled on personal basis by course coordinator, Head of the department, Faculty Advisor and medical counsellor.

Moreover, weaker students are handled very carefully and special remedial classes are organized for them either by the senior students or by the faculty or both.

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.)

Students are promoted to go for various self learning topics, however, no credit is allocated for the same. They are also promoted to participate in various outreach/webinars conducted by ACI/ASCE/EERI and other International institute and centres. They are also promoted to refer courses available through various channels of outreach i.e. NPTEL and Khan's Academy.

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.)

The department has various self-learning facilities and materials for learning beyond syllabus. Department is having computer labs with high speed internet connections and reading room cum library facilities for self-learning in addition to the central library facility and CDEEP. Moreover, number of guest lectures of invited experts from academia and industry are also organized.

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 counseling for higher studies, industry interaction for training/internship/placement, Entrepreneurship cell and incubation facility and impact of such systems.)

VNIT has a Training and Placement department which aims to provide students with a platform for using their technical insight to gain valuable experience by working in the mainstream industry. It also acts as an interface for Companies seeking talented young graduates and post-graduates in various disciplines.

The Training and Placement Department also provides the necessary guidance to the students for career planning and personality development. It invites public and private sector organizations for campus recruitment of final year B.Tech.,B.Arch. andM.Tech. Students

The Entrepreneurship initiatives and innovations are taken care of by the Center for Innovation. The Center for Innovation (CIVN), hosted at VNIT Nagpur, under assistance of Rajiv Gandhi Science and Technology Commission Government of Maharashtra (RGSTC) is an umbrella for promotion of entrepreneurship at VNIT Nagpur. CIVN administers a business incubator which provides support for technology based entrepreneurship. Thus, CIVN extends the role of VNIT Nagpur by facilitating the conversion of research activity into entrepreneurial ventures.

At VNIT, Industry Institute Interaction (III) Cell has been active since inception in 1993. It has established linkages with local industry, industry associations, and Govt. Departments in the promotion of technology.

The technology developed in the laboratories can be used for development of new products and services. VNIT likes to support a thriving and knowledge based business community in the country.

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 express Feeder and is exempt from load shedding interruptions. The current maximum load demand is of the order of 1000 KVA while the total connected load is estimated at 1500 Kw at substantially unity power factor. The 200 acre Campus is served by three substation having 3 transformers of 400 KVA each and a smaller transformer of 250 KVA. The Internal distribution to various units of the campus such as Hostel, Academic Bldgs., Residential area is entirely by underground LT cabling. As a backup to the Electricity Board supply due to unforeseen reasons beyond institute's control, a set of 2 Diesel Generators each of 250 KVA capacity is available for serving essential load such as computer/Network center Library/Administration Bldg. etc.

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

8.1.3.B Water Supply Details:

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

8.1.4 C Campus Security Section:

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

8.2. Organisation, Governance, and Transparency (10)

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

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

(A) Board of Governors

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

(B) **Senate**

1.	Dr. N. S. Chaudhari, Director, VNIT, Nagpur	Chairman
2.	Prof. S. V. Bhat, Deptt. of Physics, IIS, Bangalore – 560 012	Member
3.	Dr. T. S. Sampath Kumar, Asso. Prof., Deptt. of M.M.S.	Member
4.	Prof. (Ms.) R. B. Nair, HD,. H & S.S., IIT, Delhi	Member
5.	Dr. 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, 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, 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, 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.	Ms. Alpana Dongre, 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. B. M. Ganveer, Registrar, VNIT, Nagpur	Secretary

(C) **Finance Committee**

1.	Dr. S. K. Joshi , 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.	Prof. A. G. Kothari , Professor, Electrical Engineering Department, VNIT, Nagpur	Member
6.	Dr. N. S. Chaudhari, Director, VNIT, Nagpur	Member
7.	Dr. B. M. Ganveer 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 | |
| 4. | Prof. S. C. Sahasrabudhe, Director D.A.I.T, Gandinagar | Member |
| 5. | Dr. Rajesh Gupta
Dean (P&D), V.N.I.T., Nagpur | Member |
| 6. | Mr. R. K. Naik , Superintending Engineer (Civil),
Central P.W.D., , Nagpur-440 006 | Member |
| 7. | Shri Arvind Garg , Suptd. Engineer (Electrical)
NAGPUR – 440006 | Member |
| 8. | Chief Engineer , Public Works Department,
NAGPUR – 440001 | Member |
| 9. | Supdt. Engineer (Electrical) , Public Works Department,
NAGPUR – 440001 | Member |
| 10. | Dr. B. M. Ganveer 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 Committe	4 in a year	Average 80%
Senate	4 in a year	Average 90%

Other than the above Committees, there in 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

Sr.No.	Particulars	Functionaries	Proposed Financial Limit
	All kinds of expenditure under plan and non-plan	Director	Up to 8 Crores
	All kinds of expenditure under plan and non-plan	Deputy Director	Upto 50 Lakhs
	All kinds of purchases & other expenditure Consultancy Funds	Dean (R&C)	Upto 10 Lakhs
	For Purchase of Consumables from Procurement	Principal Investigator	Upto 2 Lakhs (for Contract)
	1. Stores, spares, accessories under 2. Purchases under allotted Plan Grant	Heads of Deptts. Prof	Upto 2 Lakhs
	All Expenditure related to student's activities	Dean (St. Welfare)	Upto 2 Lakhs
	Purchases, Payments of scholarship & other expenses year. All related expenditure of PG students	Dean (Academics)	Upto 10 Lakhs

	Expenditure related to their operational	All Deans	Upto Rs. 2 Lakhs
	Expenditure for campus development, convocation and miscellaneous for which for the purpose.	Dean (P&D)	Upto Rs. 2 Lakhs
	Purchases of Journals, consumables, sp	Chairman, Library Co	Upto Rs. 2 Lakhs
	Expenditure for medicine/consumables/equipments directly related to Health Service expense.	Medical Officer	MO: upto Rs. 1 Lakhs lakhs per year
	[i] Payment of Telephone bill FAX, Bill Electricity/bill, Water bill etc., [ii] Purchases of equipment, uniform, consumables, stationeries, spares & acc for departments not covered above with	Registrar	Full power of [i] and
	For contingency expenditure	Dy. Registrar, Ass. Registrar (Independent	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. B. M. Ganveer, Registrar
 First Appellate Authority -- Dr. S. R. Sathe, Dean, (P&D)
 Second Appellate Authority -- Dr. N. S. Choudhary, Director

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

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

Item	Budgeted in CFY (2013-14)	Expenses in CFY (till 30-09- 2013) *	In Rupees	
			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):

Department does not have separate expenditures for different programmes in the department. Therefore, summary of budget for all the programmes in the department is given.

Items	2013-2014		2012-2013		2011-2012		2010-2011	
	Budgeted in 2013-14	Actual Expenses till Oct 2013	Budgeted in 2012-13	Actual Expenses 2012-13	Budgeted in 2011-12	Actual Expenses 2011-12	Budgeted in 2010-11	Actual Expenses 2010-11
Laboratory equipment		4.99		2.61		6.04		0.72
software		-		-		3.00		13.14
Laboratory consumables	Plan 25.0 Lakhs	0.20	Plan 45.0 Lakhs	1.07	Plan 25.0 Lakhs	1.00	Plan 15.0 Lakhs	0.71
Maintenance and spares		0.21		0.02		0.09		0.48
Training and travel	Non-plan 2.50 Lakhs	-	Non-plan 2.0 Lakhs	0.57	Non-plan 2.0 Lakhs	0.43	Non-plan 1.65 Lakhs	0.46
Miscellaneous expenses for academic activities		0.29		-		0.06		0.29
total		5.69		4.27		10.62		15.80

* 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.)

Before commencement of new financial year the budgetary requirement for each office/lab/faculty member is discussed in departmental faculty meeting. The total requirement is then communicated to institute administration. The same is then sanctioned which is found to be 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 allocated funds has been utilized for purchase of new laboratory equipments, softwares, laboratory consumables, maintenance of equipments/machinery and for required spares, training and travel and other miscellaneous expenses for academic activity.

8.5. Library (20)

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

(Instruction: Provide information on the following items.)

Carpet area of library (in m2) Reading space (in m2) = 6400 m²

Number of seats in reading space = 150 (Night Reading)+ 200 (Library) = 300

Number of users (issue book) per day = 512

Number of users (reading space) per day =468

Timings: During working day, weekend, and vacation = 360 days, timings 8:30 a.m. to 9:30 p.m.

Number of library staff = 23 (08 permanent)

Number of library staff with degree in Library Management = 21,

Computerisation for search = 21

indexing, issue/return records Bar coding used = yes

Library services on Internet/Intranet INDEST or other similar membership Archives

8.5.2. Titles and volumes per title (4)

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

SUBJECT WISE TITLES (TILL 31ST MARCH 2011)

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

SUBJECT WISE TITLE (TILL 31ST MARCH 2012)

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

SUBJECT WISE TITLES (TILL 31ST MARCH 2013)

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

8.5.3. Scholarly journal subscription (3)

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

(1) 05 Subject collection with 694 titles 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):-

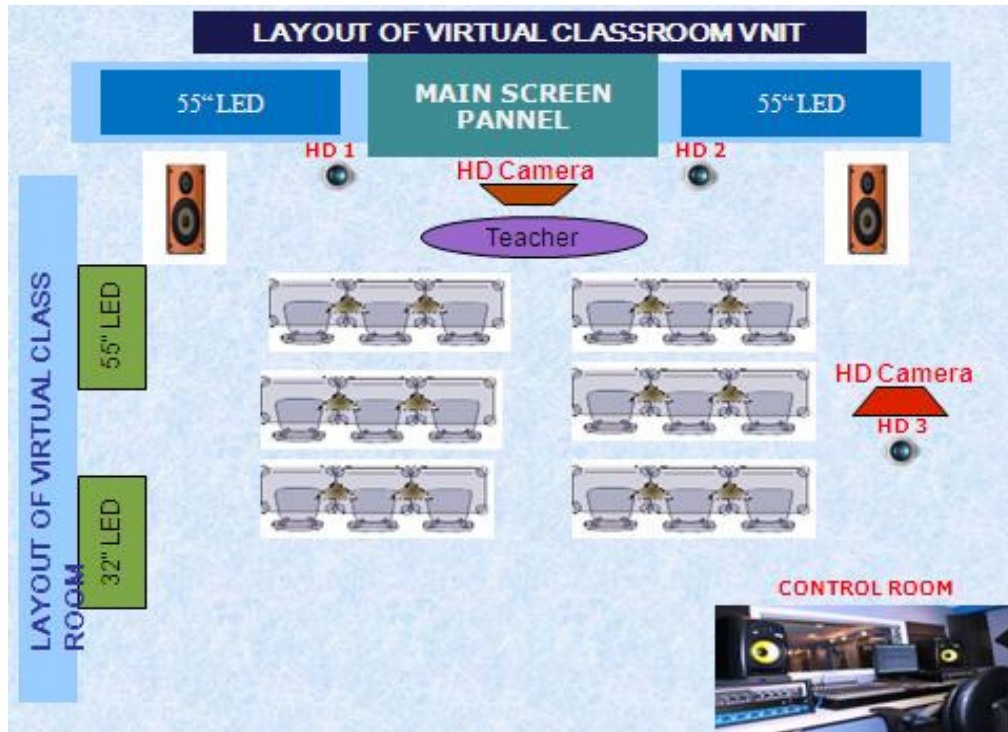
- Total Project Cost of Virtual Class-Room -- Rs. 32,26,524/-
- Civil Work for Virtual Class Room -- Rs. 10,00,000/-
- Technical Assistant for Virtual Class Room -- Rs. 1,80,000/-
- Bandwidth;-
 - Speed for Video only 50 mbps
 - Speed for net only 50 mbps
 - Total Bandwidth 100 mbps
- Portal of NKH 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

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 software's for all campus users. The documentation is also provided for special purpose software regarding installation on end user computer. Power lingo language software is available for the benefit of students.

The centralized installation of quick Heal Antivirus software is provided for all campus users.

Network center has hardware such as core switch, blade chasis, Blade server,

Rack mount server, SAN Storage, Lenovo All in one Desktops, HP Laserjet M 1536 DNF Printer, Lenovo MAKE Desktop, HP Dual CPU Server, Netscreen Firewall, Check Point UTM, HP-ML-370 G4 Server Dual Processor.

The approximate cost of hardware is around 1 crore 60 lakhs only (Rs. 1,60,00,000/-) The approximate cost of software is rupees Two Lakh eighty thousand only (Rs. 280000/-) Computer Hardware AMC is outsourced. The cost of annual maintenance charges on computer hardware is approximately two lakhs (Rs. 2,00,000)

The annual charges of Reliance LL is approximately twenty five lakhs (Rs. 25,00,000) and that of BSNL LL is around ten lakhs (Rs. 10,00,000/-)

Network Center has one permanent staff and three adhoc staff - 11 and recurring charges is as under –

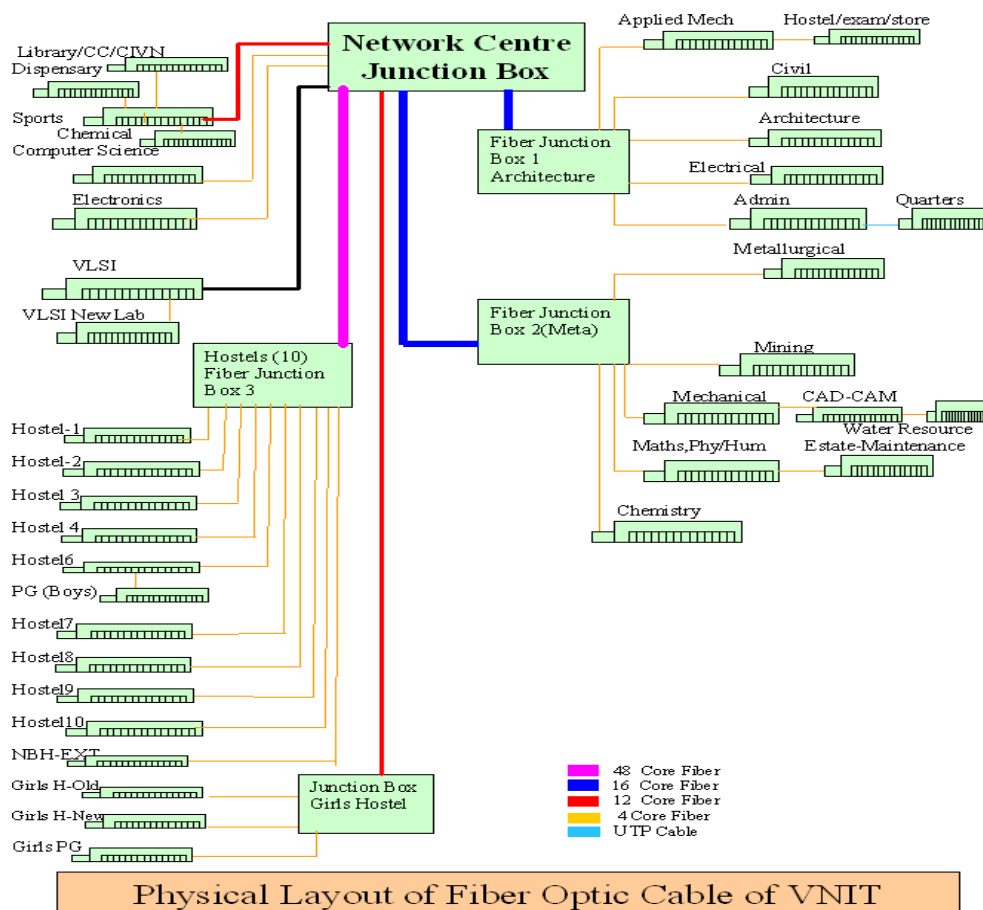
AMC -- 2.0 L

Reliance LL -- 25.0 L

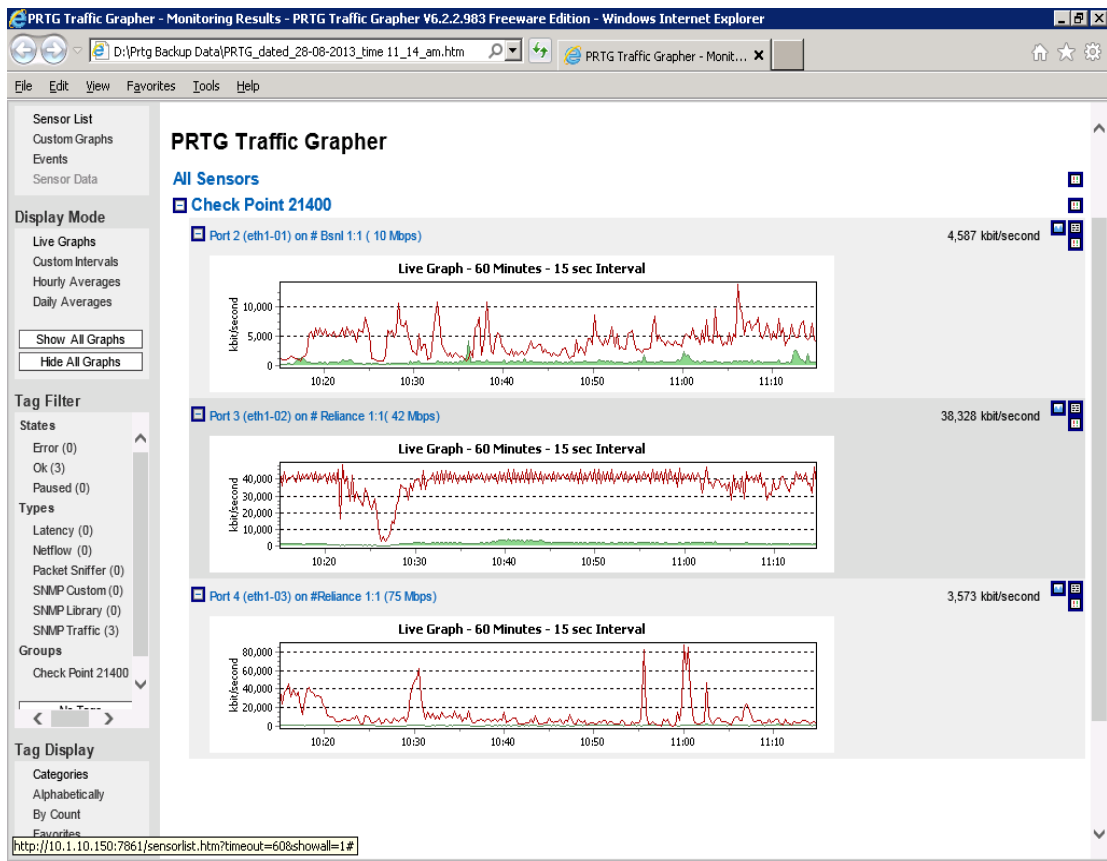
BSNL -- 10.0 L

8.7.2 Physical Layout of Fiber Optic Cable of VNIT

Figure I



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 measurements: Effective safety arrangements with emergency multiple exits and ventilation/exhausts in auditoriums and large classrooms/laboratories, fire-fighting equipment and training, availability of water, and such other facilities (1)

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

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 surveillence for dealing with any fire related emergency

8.8.3. Safety of civil structure (1)

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

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

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

Date : 10/07/2013

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

8.8.4. 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:

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

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

Holistic health services available at health centre include family physician, counsellors, lady doctor, Paediatrician & dental services. Alternative health services like 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 provided through 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.

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, Football, Hockey, and Cricket. NCC unit is also located on campus. There are very well used by students and campus residents of quarters

8.9.2 Physical Education facilities:

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

The Institute aims at all round development of the students. This can be seen from the importance given to the Physical Education. Classes for Physical Education have been included in regular Time Table so as to ensure development of Physical Fitness of the students. Physical Education programs also include general health and safety information in addition to providing opportunities for students to learn how to cooperate with one another in a team setting.

Participation of students in different games

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

Krik Mania:

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

Intramural and Krida Diwas:

This is a unique program of event inter-section tournaments for different games conducted for first year B.Tech./B.Arch. students which goes round the year. The department celebrates the birth anniversary of the great Hockey legend Major Dhyan Chand on 29th 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

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

9.1. Improvement in Success Index of Students (5)

From 4.2

Items	LYG 2012-13	LYGm1 2011-12	LYGm2 2010-11	Assessment
Success Index	0.73	0.77	0.82	4.0

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

From 4.3

Items	LYG 2012-13	LYGm1 2011-12	LYGm2 2010-11	Assessment
API	0.78	0.76	0.79	4.0

9.3. Improvement in Student-Teacher Ratio (5)

From 5.1

Items	LYG 2012-13	LYGm1 2011-12	LYGm2 2010-11	Assessment
STR	0.2	0.24	0.23	1.0

9.4. Enhancement of Faculty Qualification Index (5)

From 5.3

Items	LYG 2012-13	LYGm1 2011-12	LYGm2 2010-11	Assessment
FQI	0.86	0.9	0.9	5.0

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

From 5.7 and 5.9

Items	LYG 2012-13	LYGm1 2011-12	LYGm2 2010-11	Assessment
FRP	0.1	0.18	0.38	1.0
FRDC	0.1	0.11	0.1	1.0

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
Workshop on Seismic Analysis and Design of RC and Masonry Structure	None	Prof. A P Khatri & Dr Ratnesh Kumar	2 days (2-3 March 2013)	Dr. Y. Singh, IITR Dr. R.N. Dubey, IITR and Dr. M. Shrikhande, IITR	MTech students & research scholars of the dept.; Faculty from VNIT and other engineering colleges,	For enhancement of knowledge
Workshop on Earthquake Resistant Design of Sensitive Structures	None	Dr. Debarati Datta	2 days (22 – 23 March 2013)	Faculty from IIT and other reputed institutes	MTech students & research scholars of the dept.; Faculty from VNIT and other engineering colleges,	For enhancement of knowledge
Workshop on CPHEEO sponsored refresher course on Structural Design Of Water Treatment Plants and other related structures	None	Dr. S.V. Bakre	7 days (27 Nov to 3 Dec, 2012)	Faculty from VNIT and Industry	Engineers of various state and central Govt. organizations	For enhancement of knowledge
One-day Sensitization programme for Masons and Barbenders	None	Dr. S.V. Bakre & Ratnesh Kumar	1 day (8 June 2012)	Faculty from VNIT	Masons and Barbenders from construction Industry	For enhancement of knowledge

on Earthquake-Resistant RC Building						
Workshop for M Tech students on career Opportunities/Personality development		Dr. M M Mahajan	1 day (13 October 2012)	Faculty from VNIT	MTech students & research scholars of the dept.; Faculty from VNIT and other engineering colleges,	For enhancement of knowledge
Quiz on Earthquake Tips sponsored by Nicee, IIT Kanpur	IIT Kanpur	Dr. O R Jaiswal & Dr. Ratnesh Kumar	1 day (23 November 2012)	Faculty from VNIT	Students from various schools in Nagpur	For enhancement of knowledge
Workshop on Rehabilitation and Retro Fitting of RC Structures Using FRP	None	Dr. S S Gadve	2 days (15-16 March 2013)	Dr. A. Mukherjee, IITGn and experts from Industry	MTech students & research scholars of the dept.; Faculty from VNIT and other engineering colleges,	For enhancement of knowledge
Short Term Course on IS 800:2007		A. Y. Vyavahare L. M. Gupta	3 days (Apr 19-21, 2011)	Faculty from VNIT	MTech students & research scholars of the dept.; Faculty from VNIT and other engineering colleges,	For enhancement of knowledge
CPHEEO sponsored short term course on Water Treatment Plant		S. V. Bakre R. K. Ingle	7 days (Nov 21-27, 2011)	Faculty from VNIT and Industry	Engineers of various state and central Govt. organizations	For enhancement of knowledge

Assessment =

9.7. New Facility Created (15)

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

Lab	Developed by	Facility created
Data Processing Laboratory	Mr. A. Y. Vyavahare	Data Processing Laboratory has been established
Advance Computing Laboratory	Dr. Ratnesh Kumar and Mr. A. P. Khatri	Advance Computing Laboratory is under process of establishing
Structural Dynamics Laboratory	Dr. R.S. Sonparote	New experimental Setups added
Structural Instrumentation Laboratory	Dr. G.N. Ronghe	New experimental Setups added

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: 13-14	2 new labs created	Dr. Ratnesh Kumar and Mr. AY Vyavahare	a, b, e	None
CAYm1: 12-13				
CAYm2: 11-12				

To be filled in after the issues in 9.1 to 9.5 are solved by Dr. Kulat.

Declaration

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

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

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

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

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

I undertake that the institution shall co-operate 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.

(Dr. N. S. Chaudhari)
Director

Place: **Nagpur**
Date: **30/10/2013**

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

Appendix – I

Syllabus of each course in the Structural Engineering Programme

Course Name:AML421–Matrix Method of Structural Analysis

Pre-requisites: Nil

Offered in:I Semester (Odd Semester)

Scheme and Credit:[(3-1-0); Credits: 8]

Type of Course: Core

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Syllabus:

Introduction to stiffness and flexibility approach, Stiffness matrix for spring, Bar, torsion, Beam (including 3D), Frame and Grid elements, Displacement vectors, Local and Global co-ordinate system, Transformation matrices, Global stiffness matrix and load vectors, Assembly of structure stiffness matrix with structural load vector, Solution of equations, Gauss elimination method, Cholesky Decomposition method, Analysis of spring and bar assembly, Analysis of plane truss, plane frame, plane grid and space frames subjected to joint loads, Analysis of Structures for Axial Load.

Analysis for member loading (self, Temperature & Imposed) Inclined supports, Lack of Fit, Initial joint displacements. Finite (Rigid & flexible) size joint, Effect of shear deformation, internal member end releases.

Use of MATLAB/MATHCAD / other software.

Effect of axial load on stiffness of members, Analysis of building systems for horizontal loads, Buildings with and without rigid diaphragm, various mathematical models, Buildings with braces, shear walls, non-orthogonal column members.

Advanced topics such as static condensation, substructure technique, constraint equations, Symmetry and antisymmetric conditions, Modeling guidelines for framed structures.

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2. Kanchi, M.B. “Matrix Analysis of Structural Analysis”, John Willey & Sons, 2nd Edition 1999.
3. Bathe K.J. “Finite Element Procedures”, Springer; 2nd Edition, 2002.
4. Kasmali Aslam “Matrix Analysis of Structures”, Brooks/Cole Publishing Co., 1999.
5. Cook, R.D.et.al “Concept and Applications of Finite Element Analysis”, John Willey & Sons, NY, 1995.
6. Gere, W. and Weaver, J.M “Matrix Analysis of Structural Analysis 3rd Edition”, Van Nostrand Reinhold, NY, 1990.
7. Martin, H.C. “Introduction to Matrix Method of Structural Analysis”, McGraw Hill Book Co., 1996.

Course Name:AML422 -Theory of Plates and Shells

Pre-requisites: Nil

Offered in:I Semester (Odd Semester)

Scheme and Credit:[(3-0-0); Credits: 6]

Type of Course: Core

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives:

- A. To understand the behavior and basic concepts of analytical methods for 2 dimensional Structural Engineering problems
- B. To develop the ability for mathematical modeling of structural Systems
- C. To understand the Governing differential equations of thin rectangular Plates with various
- D. To communicate effectively the concepts for analysis and design
- E. To use and spread the knowledge about 2D structural engineering concepts in professional or academic field

Course Outcomes:

- i. Developed skill in understanding the behavior of plates and analytical techniques to solve the 2 Dimensional structural engineering problems
- ii. Ability to construct the mathematical models of structural systems
- iii. Can understand the application of differential equations for the response of 2 D problem
- iv. Can work as a structural designer or in the field of teaching

Syllabus:

Governing differential equations of thin rectangular Plates with various boundary conditions and loadings.

Bending of long thin rectangular plate to a cylindrical surface, Kirchhoff plate theory, Introduction to orthotropic plates.

Circular plates with various boundary conditions and loadings.

Numerical methods for solution of plates, Navier's, Levy's solutions.

General shell geometry, classifications, stress resultants, equilibrium equation, Membrane theory for family of Shells (Parabolic, Catenary, Cycloid, Circular, hyperbolic).

Classical bending theories of cylindrical shells with and without edge beams such as approximate analysis of cylindrical shells.

Reference Books/ Material:

2. Timoshenko, S.P. &Kriegar, W., "Theory of Plates & Shells", McGraw Hill, NY, 1970.
3. Szilard, R. "Theory and Analysis of Plates", Prentice Hall, 1974.
4. Novozhilov, V.V, "Thin Shells", Noordho of Groningen, 1964.
5. Ramaswamy, G. S "Design of Concrete Shells", Krieger Publ. Co, 1984.
6. Chandrashekhar, K. "Theory of Plates", University Press India Ltd., Hyderabad, 1st Edition, 2001.
7. Bairagi, N. K. a Text book of Plates Analysis.
8. Chatterjee, B.K., "Theory and Design of Concrete Shells.

Course Name: AML423- Theory of Elasticity and Elastic Stability

Pre-requisites: Nil

Offered in:I Semester (Odd Semester)

Scheme and Credit:[(3-0-0); Credits: 6]

Type of Course: Core

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives:

The main objective of studying the course of ‘Theory of Elasticity and Elastic Stability’ is to understand the theoretical concepts of material behavior with particular emphasis on their elastic properties.

- A. To understand the basics of stresses, strains, equilibrium and compatibility, and introduction to three-dimensional problems.
- B. To provide the student with the tools and an understanding of the use of vectors and tensors in describing the deformation and motion of elastic solids, the formulation of the governing equations using physical laws, and the solution of simple linear elasticity problems using various analytical techniques.
- C. To understand the fundamental principles of structural stability, to become familiar with common types of bifurcation and buckling phenomena.
- D. To address the specific problem of column and beam design, taking account of initial imperfections, coexistent end-moments, residual stresses and material inelasticity.

Course Outcomes:

At the completion of this course, the student should be able to

- i. Define 3D state of stress and strains, equilibrium and compatibility.
- ii. Derive the governing equations and their solutions for application to problems in plane stress state, plane strain state, torsion, bending.
- iii. Determine elastic critical loads for simple structures by eigenvalue analysis, and the limitations of such analysis.
- iv. Understand how elastic stability may be determined from the total potential energy
- v. Apply approximation methods based on energy to determine the stability of simple systems.
- vi. Understand second-order beam theory, using s and c functions.

Syllabus:

Stress at a point, relationship between stresses and strains, Elastic moduli, Basic equations of theory of Elasticity. Plane stress-strain, Airy's stress function, strain-displacement relationship, Principal Planes and Principal stresses in three dimensions, equilibrium and compatibility in rectangular coordinates and other coordinate systems.

Simple applications in tension, bending and torsion.

Concept of Stability, Axial buckling of columns by Energy Criteria of Stability & approximate methods, lateral torsional buckling of beams and beam columns, Coupled axial torsion and flexural buckling.

Buckling of rectangular thin plates.

References:

1. Timoshenko, S.P., “Theory of Elasticity”, McGraw Hill, 3rd Edition, NY, 1970.
2. Irving Shames “Advanced Solid Mechanics”
3. Popov and Balan “Mechanics of Solids”
4. Timoshenko, S.P., “Theory of Elastic Stability”, McGraw Hill, 2nd Edition, NY, 1961.
5. AswiniKumar “Stability, Theory of Structures” Tata McGraw Hill
6. Trahair, N.S., “Flexural Torsional Buckling of Structures”, E & FM SPON, London.

7. Chen, W.F., "Theory of Beam-Columns-Space Behaviour and Design", 2nd Vol., McGraw Hill
8. NPTEL Lecture Notes: IIT, Madras.

Course Name: AML424- Structural Dynamics

Pre-requisites: Nil

Offered in: I Semester (Odd Semester)

Scheme and Credit: [(3-0-0); Credits: 6]

Type of Course: Core

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives:

- A. Introduce fundamentals of vibrations of SDOF system
- B. Introduce damped and undamped system
- C. Introduce free and forced vibration
- D. Introduced free and forced vibration of MDOF system
- E. Introduced free and forced vibration of continuous system

Course Outcomes:

At the completion of this course, the student should able to

- i. Convert structure into SDOF system
- ii. Find response of free and force vibration (harmonic, periodic and transient) of SDOF system
- iii. Find natural frequency and mode shapes of MDOF system
- iv. Carry out modal analysis of MDOF system
- v. Performe experiments and computer simulation of vibrating system

Syllabus:

Sources of vibration, types of excitations, Principle and working of piezoelectric transducers, Spring action and damping; Degrees of freedom; Application of Newton's laws, D'Alembert's principle, Single degree of freedom systems; Mathematical model of physical systems; Free vibrations of undamped and viscously damped systems;

Coulomb damping material and radiation damping. Response of viscously damped SDOF systems to harmonic excitation; Vibration Isolation, Force transmissibility and base motion; Principle of vibration measuring instruments; Equivalent viscous damping; structural damping, Response of an undamped SDOF to short duration impulse; unit impulse response.

Response of undamped system of rectangular, triangular and ramp loading; response to general dynamic excitation;

Duhamel integral method. Response spectra, Numerical evolution of dynamic response of linear systems, Frequency domain analysis, Fast Fourier Transform

Multiple degree of Freedom system: Vibration of undamped 2 DOF systems; Response of 2 DOF to harmonic excitation, mode superposition, vibration absorber, Lagrange equation and their application to lumped parameter models of MDOF (up to 3 DOF). Free vibration of MDOF (up to 3 DOF) systems, methods of solving eigen value problems; iteration methods.

Dynamic response of MDOF (2 DOF) systems-modal superposition method.

Vibration of Continuous Systems: Free vibrations of Continuous systems-axial and transverse vibration of bars / beams. Response of continuous systems to dynamic loads.

Energy Principle, Rayleigh-Ritz method.

Reference Books/Material:

1. Chopra, A.K., "Dynamics of Structures", Prentice Hall, 3rd Edition, NY, 1970.
2. Clough, R.W. & Penzin, J., "Dynamics of Structures", McGraw Hill, 1993.
3. Humar, J.L., "Dynamics of Structures", Prentice Hall, 1990.
4. Mario, Paz, "Structural Dynamics", CBS Publ. N-Delhi, 1995.
5. Timoshenko, S., "Advanced Dynamics", McGraw Hill Book Co, NY, 1948.
6. Meirovitch, L., "Elements of Vibration Analysis", 2nd Edition, McGraw Hill International Edition, Singapore, 1986.
7. Biggs, J.M., "Introduction of Structural Dynamics", McGraw Hill, NY, 1964.

Course Name: AMP424- Structural Dynamics Laboratory

Pre-requisites: Nil

Offered in: I Semester (Odd Semester)

Scheme and Credit: [(0-0-2); Credits: 2]

Type of Course: Core

Course Assessment Method: Continuous Evaluation

Course Objectives:

Introduce fundamentals of vibrations of SDOF system

Introduce damped and undamped system

Introduce free and forced vibration

Introduced free and forced vibration of MDOF system

Introduced free and forced vibration of continuous system

Course Outcomes:

At the completion of this course, the student should able to

- i. Appreciate the theory of vibrations
- ii. Computer simulation of structure subjected to dynamic load

List of experiments:

1. To find the time period of compound pendulum
2. To study instrumentations in structural dynamics
3. To find natural frequency of SDOF system
4. To find natural frequency of two DOF system
5. To find natural frequency of three system
6. To observe liquifaction of soil
7. To observe phenomenon of vibration absorption
8. To carry out parametric study

Course Name: AML428- Structural Instrumentation and Rehabilitation of structures

Pre-requisites: Nil

Offered in:I Semester (Odd Semester)

Scheme and Credit:[(3-0-2); Credits: 8]

Type of Course: Elective

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives :

- A. To impart knowledge on laboratory / field testing of Civil Engineering Structures
- B. To expose students to state-of-the-art Instrumentation for Structural analysis results and techniques for Rehabilitation of RC, Steel and Masonry structures
- C. To familiarize students with the Indian codes/Standards for proof load / non-destructive testing
- D. To inculcate aptitude for quality control and strengthening of civil structures

Course Outcomes:

Student will be familiarized with:

- i. The present methods of laboratory / field testing of Civil Engineering Structures
- ii. To identify cracks in buildings: causes and remedial measures
- iii. Indian codes/Standards for non-destructive / design impose load testing
- iv. Techniques for rehabilitation / strengthening of RC, Steel and Masonry structures

Syllabus :

Study of various transducers, Principle of their working, displacement, velocity, acceleration etc, strain gauge & piezoelectric type of transducers.

Strain measurements, strain gauges (static and dynamic), calculation of stresses and loads from measurements of strains and deflections.

Special concrete constructions: fibre reinforced concrete; fibre wrapping, Special concrete like lightweight concrete, ferro cement, fly ash concrete, High performance concrete, concrete admixtures.

Corrosion of steel and concrete: Theory and prevention.

Cracks in buildings: causes and remedial measures.

Techniques for Rehabilitation of RC, Steel and Masonry structures.

Non-destructive testing of concrete, steel structures, Various NDT tests, codal provisions, Proof Load testing.

Reference Books / Material:

1. Singh, Sadhu; Experimental Stress Analysis, Khanna Publishers.
2. Soisson, H.E.; Instrumentation in Industry; John Willey & Sons; NY; 1975
3. Boomfield, J.P.; Corrosion of Steel in Concrete; E& FN SPON; 1997
4. Ganesan, T.P.; Model Analysis of Structures; University Press; 2000
5. IS: 13935; Repair and Seismic Strengthening of Bulidings- Guidelines; Bureau of Indian Standard; New Delhi; 1993
6. SP: 25; Causes and Prevention of Cracks in Buildings; Bureau of Indian Standard; New Delhi; 1984

Course Name: AML427- Introduction to Earthquake Engineering

Pre-requisites: Nil

Offered in:I Semester (Odd Semester)

Scheme and Credit:[(3-0-0); Credits: 6]

Type of Course: Elective

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives:

- A. To expose students to fundamentals of earthquake engineering and environmental conditions of the country and world.
- B. To learn method of deterministic seismic hazard analysis.
- C. To train the students to analyze earthquake characteristics and associated effects on structures.
- D. To communicate the concepts of dynamic analysis for civil engineering applications.
- E. To teach the various methods for strength, stress and load-resistant design.
- F. To impart the basic principles for seismic design and construction of structures in accordance with the provisions of Indian Standard Codes.

Course Outcomes:

- i. To understand the fundamentals of earthquake engineering and seismicity conditions of the country and world.
- ii. To perform site specific deterministic seismic hazard analysis.
- iii. To analyze earthquake characteristics and associated effects on structures, including linear responses.
- iv. To understand the concepts of dynamic equations of motion and perform analysis for dynamic systems in civil engineering applications.
- v. To evaluate the magnitude and distribution of seismic loads for strength, stress and load-resistant design.
- vi. To apply the basic principles for seismic design and construction of structures in accordance with the provisions of Indian Standard Codes.

Syllabus:

Origin of earthquakes, Engineering geology, Seismicity of the world, Faults, Propagation of earthquake waves. Quantification of earthquake (magnitude, energy, intensity of earthquake), Measurements of earthquake (accelerograph, accelogram recording), Determination of magnitude, Epicentral distance, focal depth, etc. Ground motion and their characteristics, Factors affecting ground motions.

Concept of response spectra, generation of site-specific spectrum, Estimation of PGA, Earthquake design spectrum and inelastic spectra.

Concept of earthquake Resistant design, design philosophy, Four virtues of EQRD: Stiffness, Strength, ductility and Configurations, Introduction to Capacity design concepts, Introduction to IS:1893, Codal Coefficient and Response Spectrum Method.

Reference Books/Material:

1. Dowrick, D. L. "Earthquake Resistance Design for Engineers and Architects", John Willey & Sons, 2nd Edition, 1987.
2. Housner, G. W. & Jenning, P.C. "Earthquake Design Criteria", Earthquake Engineering Research Institute, Oakland, California, USA, 1982.
3. Newmark, N. M. & Hall, W.J. "Earthquake Spectra & Design , Earthquake Design Criteria", Earthquake Engineering Research Institute, Oakland, California, USA, 1982.
4. Wakabayashi, M. "Design of Earthquake Resistance Buildings", McGraw Hill Books Company, 1986.
5. Okamoto, S. "Introduction to Earthquake Engineering", University of Tokyo press, 2nd Edition, 1984.
6. Kramer, S. L. "Geotechnical Earthquake Engineering", Prentice Hall, New Jersey, 1996.
7. Bolt, B. A. "Earthquakes", W. H. Freeman & Company, NY, 1988.

Course Name: AML435- Computer Programming and Numerical Methods

Pre-requisites: Nil

Offered in: I Semester (Odd Semester)

Scheme and Credit: [(3-1-0); Credits: 8]

Type of Course: Elective

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives:

- A. To introduce the concept of algorithm and computer programming for
- B. To develop the program writing skill among students
- C. To implement computer programs for solving real life problems
- D. To introduce various numerical methods for solving real life engineering problems
- E. To implement numerical methods to solve large scale problems
- F. To provide detail knowledge on application of numerical methods in Structural problems.

Course Outcomes:

- i. Ability to develop algorithm and computer program for engineering and data management problems.
- ii. Knowledge of various approximate numerical methods to deal with many real life mathematical problems
- iii. Ability to utilize numerical methods in structural dynamics , earthquake and wind engineering
- iv. Improvement in problem solving skill

Syllabus:

Computer programming fortran 95/C–Programming fundamentals, Introduction to algorithm development,

Computer Implementation of Matrices, Guidelines for development of a large sized problem.

NUMERICAL METHODS-Solution of Linear Simultaneous equations – Method of Gauss Elimination,Cholesky's, Jacobi iteration, Gauss – Seidel method of Iteration, Solution based on Band width and its Variants.

Numerical Integration – Trapezoidal, Simpson's and other Newton – Cotes formulae, Method of GaussQuadrature. Interpolation (Lagrange Interpolation, Taylor series expansion, Extrapolation), regression ;Solution of nonLinear Equations, Newton Raphson schemes. Eigen value and Eigen vectors. Problems associated with choiceand implementation of solution techniques in the eigen solution of large problems arising in dynamic systems.

Initial and boundary value problem, Euler's, Runge-kutta, Milne's etc, Computer oriented Algorithms.

Reference Books/Material:

1. Scarborough J. B., “Numerical Mathematical Analysis”, Oxford and IBH publishers, 1966.
2. Gerald C. F., “Applied Numerical Analysis”, Addison – Wesley Publishing Company, 1970.
3. Jain M. K., Iyengar S. R. K. and Jain R. K., “Numerical Methods for Scientific and Engineering Computations”, John Wiley – New Age International Limited, 1993.
4. Balgurusamy E., “Numerical Methods”, Tata McGraw Hill, New Delhi, Fifth Edition, 2001.
5. Rajaraman, V., “Fortran-95”, Prentice Hall of India, 1988.
6. McCormic J. M. and Salvadori M. G., “Numerical Methods in FORTRAN”, Prentice Hall of India, New Delhi, 1966.
7. Press, W.H; Tenkolsky, S.A.; Vetterling, W.T.; & Flannery, B.P., “Numerical Recipes-the art of scientific Computing; 2nd Edition”, Cambridge University Press, 1993.
8. Kanetkar Y. P., “Let us C”, BPB Publication, New Delhi.
9. Bathe, K. J., “Finite Element Procedures”, Springer, 2nd Edition, 2002

Course Name: AML425- Advanced Design of Steel Structures

Pre-requisites: Nil

Offered in: II Semester (Even Semester)

Scheme and Credit: [(3-1-0); Credits: 8]

Type of Course: Core

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives:

- A. To introduce the various method for design of steel structures with loading standards as per codal provision.
- B. To qualify the students for elementary design of beam, beam-column, plate girders.
- C. To disseminate the knowledge for design of workshop buildings along with concept of use of cranes.
- D. To qualify the students for design of various connections.

E. Introduction of steel-concrete composites for bridges and buildings

Course Outcomes:

- i. Capable of using all National as well as International loading and design methods for steel structures.
- ii. Capable of design of elements for steel construction.
- iii. Able to provides the design of industrial sheds with or without cranes, connections
- iv. Capable of providing the design of bridges using composite construction.
- v. Competent enough to scrutinize the analysis and design of steel structures

Syllabus:

Introduction to Allowable Stress Design, Plastic design, Load and Resistance Factor Design (LFRD). Loadings as per IRC, IRS, IS (IS:800, IS:875 part 1-V, IS:1893) applicable to various steel structures. Design of Beams, Beam-column, Plate Girders, Open web structures and Space structures. Bridges, Industrial Buildings including crane girders. Welded and riveted connections. Composite structures.

Reference Books/Material:

1. N. Subramanian, "Steel structure design practice", Oxford university press-2010.
2. R. Englekirk, "Steel Structures controlling behavior through design", John wiley& sons, 1994
3. Johnson, R.P. "Composite Structures of Steel and Concrete", Vol-I, Granada Publishing Ltd., London, 1994.
4. "Steel Design Manual", ELBS and Granada Publishers, London, 1990.

Course Name: AML426- Advanced Design of Reinforced Concrete Structures

Pre-requisites: Nil

Offered in: II Semester (Even Semester)

Scheme and Credit: [(3-1-0); Credits: 8]

Type of Course: Core

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives :

- A. To impart knowledge on Prestressed Civil Engineering Structures
- B. To expose students to state-of-the-art Prestressed concrete design
- C. To familiarize students with the Indian codes/Standards for Limit State Design of RC members and Prestressed concrete
- D. To inculcate aptitude for mathematical modeling of RC structures and Confinement of concrete, ductile detailing

Course Outcomes:

Student will be familiarized with:

- i. The present methods of Prestressed Civil Engineering Structures
- ii. To identify preliminary sizing for mathematical modeling of RC structures
- iii. Indian codes/Standards for RCC and PSC structures
- iv. Techniques for unbonded and bonded prestressed concrete

Syllabus :

Review of Limit State Design of RC members. Confinement of concrete, ductile detailing. Beams (Flexural, Shear and torsion)

Uni-axial and biaxial Beam-column (Axial, shear and moments)

Slabs (one way & two way) and slabs on grades. Preliminary sizing and modeling of RC structures.

Basics of Prestressed concrete Design, Material, Prestressing systems, Losses, Stress checks, Strength check, Deflection of prestressed concrete beams, Prestressed slabs and Beams, Behavior of unbonded and bonded prestressed concrete beams, Shear and Torsional resistance of the prestressed concrete members , Analysis and design of End blocks,

Reference Books / Material:

1. Paulay, T. and Prestiley, M.J.N.; Seismic design of R C & Masonry Buildings; John Willey & Sons; 2nd Edition; 1999
2. Booth, E.; Concrete Structures in Earthquake Regions; Longman Higher Education; 1994
3. Raynolds, C.E.; Reinforced Concrete Design Handbook; 9th Edition; Rupa& Company; Calcutta; 1981
4. Raynolds, C.E.; Basic Reinforced Concrete Design; Vol.-II; Conc. Publications Ltd.; 1962
5. Fintel, M.; Handbook of Concrete Engineering; 2nd Edition; CBS Publishers, Delhi; 1986
6. Park and Paulay; Reinforced Concrete Structures, John Wiley and Sons
7. Krishna Raju, N.; Prestressed Concrete Structures; TMH; Delhi; 1981
8. Lin, T.Y. and Burns, N.H.; Design of Prestressed Concrete Structures; 3rd Edition; John Wiley & Sons; NY; 1981
9. Chen, W.F. and Duan, L. Bridge engineering Handbook; CRC Press; 1999

Course Name: AML429- Substructure and Foundation Design

Pre-requisites: Nil

Offered in:II Semester (Even Semester)

Scheme and Credit:[(3-0-0); Credits: 6]

Type of Course: Core

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives:

- A. To prepare a student for a carrier in foundation engineering.
- B. To analyze and design various substructural components of bridges.
- C. To analyze and design all types of foundations and/or their components

Course Outcomes:

On completion of the course students shall be able to:

- i. To select appropriate foundation type based on various criteria.
- ii. To check the stability of various components of foundation.
- iii. To analyze and design all types of foundations.

Syllabus:

Analysis and design of Piers, Abutments and Retaining walls. Shallow foundations: Individual and combined footings for axial and bending loads (Uniaxial and biaxial), Loss of contacts. Rafts, Annular Footings, Rigid and flexible foundations, Beams and slabs on elastic foundations. Deep Foundations: Piles and Wells foundations. Design of Machine Foundations.

Reference Books / Material:

1. Hetenyi, M. "Beam on Elastic Foundation", University of Michigan Press, 1946.
2. Bowles, J. E. "Foundation Analysis & Design", McGraw Hill, 5th Edition, 1996.
3. Swami Saran, "Soil Dynamics and machine Foundations", Galgotia Publications (P) Ltd, New Delhi, 1999.
4. Srinivasulu, P., Vaidyanathan C.V. "Handbook of Machine Foundation".
5. Kurian, N. P. "Modern Foundations-Introduction to Advanced Techniques".

Course Name: AML507- Analysis and Design of Bridges and Retaining Walls

Pre-requisites: Nil

Offered in:II Semester (Even Semester)

Scheme and Credit:[(3-1-0); Credits: 8]

Type of Course: Elective

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Name: AML431- Finite Element Method

Pre-requisites: Nil

Offered in:II Semester (Even Semester)

Scheme and Credit:[(3-1-0); Credits: 8]

Type of Course: Elective

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives :

The objectives of this course are to:

- A. Understand the purposes and uses of the finite element analysis process in industry and the possible roles of the structural engineering technologist in that process.
- B. Learn basic aspects of finite element technology, including domain discretization,
- C. polynomial interpolation, application of boundary conditions, assembly of global arrays, and solution of the resulting algebraic systems.
- D. Enable the students to formulate the design problems into FEA.
- E. Enable the students to perform engineering simulations using commercially available
- F. Finite element analysis programs and software's.
- G. Interpret one's analytical and graphical results, check one's work and report one's findings.
- H. Enable the students to understand the ethical issues related to the utilization of FEA in the industry.

Course Outcome:

Upon completing this course, the students will be able to:

- i. Identify mathematical model for solution of common engineering problems.
- ii. Develop comprehensive knowledge in the fundamental mathematical and physical basis of FEM.

- iii. Know how to do build FEM models of physical problems and apply appropriate constraints and boundary conditions along with external static and dynamic loads followed by an analysis.
- iv. Derive element matrix equation by different methods by applying basic laws in mechanics and integration by parts.
- v. Use professional-level finite element software to solve engineering problems in Solid mechanics, fluid mechanics and heat transfer and communicate effectively to the society, stakeholders and industries.
- vi. Develop and exercise critical thinking in interpreting results from FEM analysis. This
- vii. Will include the ability to identify bad results by looking at deflected shapes, stress contours.
- viii. Appreciate the importance of professional responsibility and ethical issues pertaining to the effective utilization of FEA for analysis, design and research.

Syllabus:

Introduction to Finite element method, History, Applications, Introduction to Rayleigh Ritz Method, Stress strain relationship, strain displacement relationship, Equilibrium equations (Total potential approach, Virtual work approach)

Shape function, Stiffness matrix, load vector for 2-D elements (Plane stress, Plane strain & Axi-symmetric) using Displacement formulation. Cartesian and Iso-parametric element formulation. Numerical Integration, convergence study.

Formulation of 1-D elements (BAR, TORSION, BEAM) and 3-D solid elements.

Computer Implementation of FEM procedure for plane truss, Plane stress, plane strain and Axi-symmetric problems.

Constraint Equations (Penalty method, Lagrangian method), Patch test, mathematical modeling of structures.

Reference Books / Material:

1. Zienkiewicz, O. C. & Taylor, R. L., "Finite Element Method", Vol-I, II & III; Elsevier, 2000.
2. Hughes, T .R. J., "Finite Element Method", Dover Publication, 2000.
3. Bathe, K.J., "Finite Element Procedures", Pringor; 2nd Edition, 2002.
4. Reddy, J. N., "Finite Element Method", John Willey & Sons, 1982.
5. Buchanan, G.R, "Finite Element Analysis", McGraw Hill Publ.; NY, 1995.
6. Belegundu, A.D. & Chandrupatla, T.R., "Finite Element Method in Engineering", Prentice Hall India, 1991.
7. Pilkey, W.D. & Wunderlich, W., "Mechanics of Structures, Variation and Computational Methods", CRC Press, 2nd Edition.
8. Cook, R. D., "Concepts and Applications of Finite Element Analysis", John Willey & Sons; NY, 1995.
9. Prathap, G., "Finite Element Method", Kluwer Academic Publ, Dordrecht; 1993.
10. Irons, B. & Ahmad, S., "Techniques of Finite Elements", Elliswood London, 1980.

Course Name: AML432- Analysis and Design of Multistoried Buildings

Pre-requisites: Nil

Offered in:II Semester (Even Semester)

Scheme and Credit:[(3-1-0); Credits: 8]

Type of Course: Elective

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives :

- A. To impart knowledge on static and dynamic wind analysis, design of multistoried buildings
- B. To expose students to state-of-the-art multistoried / high-rise buildings
- C. To familiarize students with the Indian codes/Standards for static and dynamic wind analysis, design and design for Fire Resistant
- D. To inculcate aptitude for mathematical modeling with and without diaphragms, infill wall etc.

Course Outcomes:

Student will be familiarized with:

- i. The present methods of static and dynamic wind analysis of multistoried buildings
- ii. To identify preliminary sizing for mathematical modeling of RC/steel structures
- iii. Indian codes/Standards for RCC and PSC structures
- iv. Various shear wall analysis

Syllabus:

Building frames, frame-shear wall buildings, Braced Buildings, Mathematical modeling of buildings with different structural systems with and without diaphragms,

Earthquake, wind and other (i.e. blast, snow) load calculations along with dead load and live loads and their combinations.

Special aspects in Multi-storeyed buildings: Effect of torsion, flexible first story, P-delta effect, soil-structure interaction on building response, drift limitation.

Analysis and Design of multi-storeyed buildings with masonry infills, Sequential analysis for multistoried buildings.

Design for Fire Resistant, Creep, Shrinkage and Thermal stresses.

Reference Books / Material:

1. FarzadNaeim, "Handbook on Seismic Analysis and Design of Structures", Kluwer Academic Publisher; 2001
2. Paulay, T. &Prestiley, M.J.N., "Seismic design of R C & Masonry Buildings", John Willey & Sons, 2nd Edition; 1999
3. Booth, E., "Concrete Structures in Earthquake Regions", Longman Higher Education, 1994
4. Park, R. &Paulay, T., "Reinforced Concrete Structures", John Willey & Sons, 2nd Edition, 1975
5. Fintel, M., "Handbook of Concrete Engineering", 2nd Edition, CBS Publ.Delhi, 1986

Course Name: AML504- Wind Effects on Structures

Pre-requisites: Nil

Offered in: II Semester (Even Semester)

Scheme and Credit: [(3-1-0); Credits: 8]

Type of Course: Elective

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives:

- A. To introduce concept of wind flow
- B. To give knowledge on static and dynamic wind load analysis
- C. To give exposure to Indian Standard code for wind
- D. To enable students to do static wind load based design
- E. To introduce students to wind tunnels
- F. To perform experiments on wind effects on structures

Course Outcomes:

- i. In depth knowledge of IS - 875(Part 3), Indian Standard Code for wind load on structures
- ii. Knowledge about wind tunnels and various aspects of wind flow
- iii. Ability to do static and dynamic analysis for wind loading
- iv. Ability to design a structure for different types of wind induced loadings.

Syllabus:

Wind Characteristics: Variation of wind velocity, atmospheric circulations – pressure gradient force, coriolis force, frictionless wind balance, geostrophic flow, boundary layer. Extra ordinary winds – Foehn, Bora, Cyclones, Tornadoes etc.

Static wind effects and building codes with particular reference to IS 875 (Part-III), wind speed map of India, introduction to the proposed revisions of IS 875 (Part III).

Dynamic wind effects: Wind induced vibrations, flow around bluff bodies, along wind and across wind response, flutter, galloping, vortex shedding, locking, ovaling; analysis of dynamic wind loads, codal provisions – gust factor, dynamic response factor; vibration control and structural monitoring; exposure to perturbation method, averaging techniques

Wind tunnel testing : Open circuit and closed circuit wind tunnels, rigid and aeroelastic models, wind tunnel measurements and instruments along with site visit.

Case studies: low rise buildings, parking sheds, workshop building, multistory building, water tanks, towers, chimneys, bridges.

Reference Books/Material:

1. Emil Simiu and R. H. Scanlan, “Wind Effects on Structures – An Introduction to Wind Engineering”, John Wiley and Sons, New York, 1986.
2. C. Scruton, “An Introduction to Wind Effects on Structures”, Oxford University Press, Oxford, UK, 1981.
3. Peter Sachs, “Wind Forces in Engineering”, Pergamon Press. Oxford UK, 1972.
4. Lawson T. V., “Wind Effects on Buildings”, Applied Science Publishers, London, UK, 1980.

5. Cook, N. J., "The designer's guide to wind loading of building structures. Part 1 Background,damage survey, wind data and structural classification. Building Research Establishment", Butterworths, U. K., 1985.
6. Cook, N. J., "Designer's guide to wind loading of building structures. Part 2: Static structures. Building Research Establishment", Butterworths, U. K., 1990.
7. Simiu, E., Scanlan, R. H., "Wind Effects on Structures: fundamentals and applications to design",3rd Edition, John Wiley & Sons, New York, 1996.
8. Dyrbye, C., Hansen, S. O., "Wind loads on structures", John Wiley, New York, 1997.
9. Holmes, J. D., "Wind loading on Structures", Spon Press, London, U. K., 2001.
10. Nayfeh, E.H., "Introduction to perturbation techniques", Wiley-Interscience
11. Blevins, R.D., "Flow induced vibration", Van Nostrand Reinhold

Course Name: AML512- Foundations Subjected to Vibrations

Pre-requisites: Nil

Offered in:II Semester (Even Semester)

Scheme and Credit:[(3-1-0); Credits: 8]

Type of Course: Elective

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives:

- A. To understand the behavior and basic concepts for the Design of foundation subjected to vibrations
- B. To develop ability for mathematical modeling of Foundation systems
- C. To understand the theory of Dynamic and dynamic properties of soil with special reference to Foundation subjected to vibrations
- D. To communicate effectively the concepts for analysis and design
- E. To use and spread the knowledge about 2D structural engineering concepts in professional or academic field

Course Outcomes:

On completion of the course students

- i. Developed skill in understanding the basics of vibration
- ii. Developed the understanding for type and principles for machine foundations
- iii. get exposure to Dynamic soil properties and soil testing methods in laboratory and on field
- iv. Can understand the importance of huge machine foundations in power plants
- v. Can work as a structural designer or in the field of teaching

Syllabus:

Introduction to Foundation Vibration, Dynamic Soil Properties, Field Test and Laboratory Techniques, Elastic Modulus and Elastic Constants.

Wave Propagation in Elastic Homogeneous and Isotropic Materials, Vibration of Elastic Media, Elastic Waves

General Principle of Machine Foundation, Analysis and Design, Type of Machine Foundation, Block Type Foundation, Foundation for Impact Type Machine, Reciprocating Machine Framed Foundation

Introduction to IS Codes, Design of Different Machine Foundations based on IS Code Method

Elastic Half Space Method, Analysis based on Elastic Half Method, Different Methods based on Elastic Half Space.

Bearing Capacity of Shallow Foundation, Pile Foundation under Dynamic Load, Vibration Isolation

Reference Books/Material:

1. Krammer., "Earthquake Geotechnical Engineering".
2. Bowles, J. E., "Foundation Analysis & Design", McGraw Hill, 5th Edition, 1996.
3. Richart; F.E.; Hall, Jr. J.R. & Wood, R.D., "Vibrations of Soil & Foundations", Prentice Hall; New Jersey, 1970.
4. Prakash; S., "Soil Dynamics", McGraw-Hill Book Co.; New York, 1981.
5. Wolf, J.P., "Dynamic soil structure interaction", Prentice-Hall, Inc. Eaglewood Cliffs, N. J., 1985.
6. Swami Saran, "Soil Dynamics and Machine Foundations", Galgotia Publications (P) Ltd, New Delhi, 1999.
7. Bhatia K. A., "Foundation for Industrial Machine", D-CAD Publishers, New Delhi, 2008.

Course Name: AML501- Earthquake Resistant Design of RC Structures

Pre-requisites: Nil

Offered in: II Semester (Even Semester)

Scheme and Credit: [(3-1-0); Credits: 8]

Type of Course: Elective

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives:

- A. To integrate information from various engineering and scientific disciplines such as engineering seismology, architecture, structural dynamics and analysis and design of structures in order to provide a rational basis for the design of earthquake-resistant RC structures
- B. To introduce effect geometric and modeling irregularities in planning and design of RC structures based on observations of behavior from past earthquakes
- C. To review various national and international design codes for RC structures
- D. To introduce philosophy of seismic design with emphasis on strength, stiffness and ductility effects
- E. To qualify students in modeling, analysis and design of RC structures for seismic forces
- F. To introduce concepts and performance based design and pushover analysis

Course Outcomes:

- i. Capable to correlate information from various engineering and scientific discipline to understand complex behavior of RC structure subjected to seismic forces
- ii. Apply capacity design principle
- iii. Capable to design RC structures in accordance with the provisions of Indian and International Building Codes considering seismic forces
- iv. Capable to use performance based design framework and nonlinear analysis techniques

Syllabus:

Review of Limit State Method (LSM), Confinement of Concrete, Ductility, Capacity Design of RC Members,

Design of Beams, Beam-Column, Shear wall with ductile detailing.

Performance of RC buildings, behaviors of RC buildings in past earthquakes, influence of unsymmetry, infill walls, foundations, soft story, Strong Column –Weak Beams etc.

Preliminary sizing and Modelling of RC Buildings, Ductility and factors affecting ductility of RC members.

Design for Strong column & weak beam, Design of Beam-Column Joints.

Pushover analysis of Buildings. Concepts of Performance based design.

Reference Books/Material:

1. FarzadNaeim, “Handbook on Seismic Analysis and Design of Structures”, Kluwer Academic Publisher, 2001.
2. Paulay, T. &Prestiley, M.J.N., “Seismic design of R C & Masonry Buildings”, John Willey & Sons, 2nd Edition; 1999.
3. Dowrick, D. J., “Earthquake Resistant Design for Engineers & Architects”, John Willey & Sons, 2nd Edition; 1987.
4. Booth, E., “Concrete Structures in Earthquake Regions”, Longman Higher Education, 1994.
5. Park, R. &Paulay, T., “Reinforced Concrete Structures”, John Willey & Sons, 2nd Edition; 1975.
6. NEHRP Guidelines for the Seismic Rehabilitation of Buildings (FEMA 356), FEMA/ASCE, Washington DC, 1997.

Course Name: AML430- Analysis and Design of Industrial Buildings

Pre-requisites: Nil

Offered in:III Semester (Odd Semester)

Scheme and Credit:[(3-1-0); Credits: 8]

Type of Course: Elective

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives:

- A. To qualify the students to analyze and design of various types of industrial buildings
- B. To introduce the fast track construction using metal deck floors and steel-concrete composite building.
- C. To disseminate the complete knowledge to design of storage bins for industry.
- D. To introduce the analysis and design of storage tanks for liquids other than water.

Course Outcomes:

- i. Capable of design of industrial buildings with and without crane girders.

- ii. Able to provide the method to early completion of multistory building.
- iii. Competent to analysis and design the pressure vessels and storage bins as per industrial requirement.
- iv. Competent enough to scrutinize the analysis and design of various industrial structures.
- v. Capable to provide the quick solutions for retrofitting and rehabilitation of industrial structures.

Syllabus:

Design of Industrial building, Crane, Gantry Girder, North Light and Lattice girder structure, Multistory steel building (Maximum 2 bay and four storey), including composite construction. Design of Bunker and Silo (Rectangular or Square or Circular). Design of Pressure vessels and storage tanks (Circular and Square) IS 1893 Part IV.

Reference Books/Material:

1. N. Subramanian, "Steel structure design practice", Oxford university press-2010.
2. Reimburt M.L., Reimburt A.M., "Silos theory and practice", vol.1, No.3, Trans Tech Publications, 1976.
3. Johnson, R.P. "Composite Structures of Steel and Concrete", Vol-I, Granado Publishing Ltd., London, 1994.
4. Owen G.W., Knowles P.R., "Steel Design manual", Blackwell, 1994.
5. K. Rajugopalan, "Storage Structures", Oxford & IBH Publishing co. pvt. Ltd., 1989.

Course Name: AML514- Analysis and Design of Environmental Engineering Structures

Pre-requisites: Nil

Offered in: III Semester (Odd Semester)

Scheme and Credit: [(3-1-0); Credits: 8]

Type of Course: Elective

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Name: AML506- Analysis and Design of Special Structures

Pre-requisites: Nil

Offered in: III Semester (Odd Semester)

Scheme and Credit: [(3-1-0); Credits: 8]

Type of Course: Elective

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives:

To introduce mathematical modelling and analysis techniques special structures viz. Water Tanks, Masonry Structures, Industrial Structures, Chimneys & Dams.

A. To review various national and international code provision for design of special structures.

B. To qualify students to design of Masonry buildings, Industrial structures, Chimneys, Dams.

Course Outcomes:

- i. Capable to develop mathematical models for various special structures
- ii. Apply various analysis techniques for special structures
- iii. Apply the principles and provisions for seismic design and detailing for special structures
- iv. Initiate research on water tanks and masonry structures

Syllabus:

Earthquake analysis of overhead, underground, ground supported water tanks, Single mass and two mass systems, various mathematical modeling, IS code recommendations.

ERD and detailing of Masonry buildings, Industrial structures, Chimneys, Dams.

Reference Books/Material:

1. FarzadNaeim, "Handbook on Seismic Analysis and Design of Structures", Kluwer Academic Publisher, 2001.
2. IS 4326, "Earthquake Resistant Design and Construction of Buildings - Code of Practice", Bureau of Indian Standard; New Delhi, 1993.
3. Jain, S.K. &Jaiswal, O.R., "Guidelines for Seismic Design of Liquid Storage Tanks", NICEE, IITK, 2004.
4. Fintel, M., "Handbook of Concrete Engineering", CBS Publishers Delhi, 1986.
5. Witendry, A., "Structural Masonry", Macmillan Press Ltd..
6. Drusdale, R.; Hamid, R.; & Baker, L., "Masonry Structures - Behavior & Design", Prentice Hall, 2nd Edition; 1994.

Course Name: AML509- Advanced Finite Element Method

Pre-requisites: Nil

Offered in:III Semester (Odd Semester)

Scheme and Credit:[(3-1-0); Credits: 8]

Type of Course: Elective

Course Assessment Method: Sessional I (15%), Sessional II (15%), Internal assessment through assignments/seminar/quizzes (10%), End Semester exam (60%).

Course Objectives:

- A. To introduce advanced element used in FE analysis.
- B. To introduce nonlinear analysis of structure.
- C. To introduce formulation of dynamic problems in FEM
- D. To built the ability to model and to solve complex problems in engineering.

Course Outcomes:

After successfully completion of this course, the student shall be able to demonstrate knowledge and understanding of-

- i. Plate bending element, shell element, axisymmetric element etc.
- ii. Non-linear problems using FEA
- iii. Problems involving dynamics using FEA
- iv. Application of FEA for complex problem

Syllabus:

Plate elements (Kirchoff theory, Mindlin plate element, triangular and rectangular, conforming & nonconforming elements), Shell elements (flat faced triangular and rectangular elements, Degenerated shell elements), Axisymmetric plate & shell elements, Ring elements. Advanced elements- Mixed formulation, Infinite elements.

Formulation for Geometrical Nonlinear problems. Formulation for Material Nonlinear problems. Formulation of Dynamic problems, Consistent and lumped mass matrices.

Implicit and Explicit numerical integration.

Reference Books/Material:

1. Zienkiewicz O.C., Taylor R.L., Zhu J.Z., 'The Finite Element Method: Its Basis and Fundamentals', sixth edition, McGraw Hill, 2005
2. R.D. Cook, D.S. Makus and M.F. Plesha, 'Concept and Applications of Finite Element Analysis', John Wiley and Sons, 1981.
3. T. R. Chandrupatla, A. D. Belegundu, 'Introduction to Finite Elements in Engineering', third edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2002
4. Daryl L. Logan, 'A First Course in the Finite Element Method', Cengage Learning India Pvt. Ltd., New Delhi, 2008.
5. S. S. Rao, 'The Finite Element Methods in Engineering', fourth edition, Elsevier Science & Technology Books, 2004
6. S. Krishnamoorthy, 'Finite Element Analysis, Theory and Programming', Tata McGraw-Hill, Publishing Company Ltd., New Delhi, 1987.
7. Y. Nakasone, S. Yoshimoto, T. A. Stolarski, 'Engineering Analysis With ANSYS Software', Elsevier, Burlington, 2006
8. Thomas J. R. Hughes, 'The Finite Element Method- Linear Static and Dynamic Finite Element Analysis', Dover Publication, Inc., New York, 2000.

Course Name: AMD 501: Project Phase I and AMD 502: Project Phase II

Offered in: Semester III & Semester IV

Scheme and Credit: [Credits: 6 & Credits: 18]

Type of Course: Core

Course Objectives:

- A. A critical review of the state-of-the-art literature and current practice on the chosen research topic.
- B. To develop research plan and its consistency with the proposed research work.
- C. To assess and present the methods to be employed.
- D. To prepare a schedule for the research and the key components of funding and budget considerations.
- E. To present the significance of the study and contributions made to the chosen field of research.

Syllabus: Not Applicable

Reference Books/Material: Not Applicable

Course Outcomes:

Students shall be able to:

- a) Demonstrate advanced theoretical & experimental knowledge in the core & allied area of structural engineering in which they have chosen to undertake their dissertation.
- b) formulate hypotheses and design a research method to suitably test the hypotheses
- c) Competently present and defend the research to the supervisor, research progress committee, peers and other dissertation students.