NATIONAL BOARD OF ACCREDITATION

SELF ASSESSMENT REPORT (SAR)

FOR ACCREDITATION OF

UG ENGINEERING PROGRAMMES
(TIER-I)

MINING ENGINEERING Department

NATIONAL BOARD OF ACCREDITATION

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Contents

Self Assessment Report (SAR)

Part A

1. Institutional Information

1.1. **Name and address of the institution and affiliating university:**
VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY (VNIT),
SOUTH AMBAZARI ROAD, NAGPUR 440010

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

Dr. Narendra S. Chaudhari, Director VNIT.
Ph : 0712-2801363
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

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

1.3.1 Historical Background

The VNIT, Nagpur is one of the thirty National Institutes of Technology in the country. The Central Government by Act of Parliament (National Institutes of Technology Act, 2007 (29 of 2007)) declared VNIT Nagpur as an Institute of National Importance. The Act was brought into force from 15th August 2007. VNIT Nagpur was conferred the Deemed to be University status (under University Grants Commission Act, 1956 (3 of 1956)) with effect from 26th June 2002 by the Central Government.

Earlier, the Institute was known as Visvesvaraya Regional College of Engineering (VRCE). It was established in the year 1960 under the scheme sponsored by Government of India and Government of Maharashtra. The college was started in June 1960 by amalgamating the State Government Engineering College functioning at Nagpur since July 1956. In the meeting held in October 1962, the Governing Board of the college resolved to name it after the eminent engineer, planner, and statesman of the country Sir M. Visvesvaraya.

1.3.2 Location

Nagpur known as Orange City is centrally located and well-connected to all the parts of the country by air, rail and road. It is also the second capital of Maharashtra. Nagpur is the largest city in central India and the winter capital of the state of Maharashtra. It is a fast growing metropolis and is the third most populous city in Maharashtra after Mumbai and Pune, and also one of the country's most industrialized cities. With a population of 2,405,421, Nagpur is the 13th most populous city and 13th largest urban agglomeration in India. It is the 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. 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" as it connects many tiger reserves in India to the world. It is among the important cities for the Information Technology Sector in Maharashtra. Nagpur lies at the dead center of the country with the Zero Mile marker indicating the geographical center of India. City of Nagpur is considered as geographic centre of India with its famous Zero Mile stone. Major National highways and rail networks connecting Delhi with Hyderabad/ Bangalore/Kanyakumari and Mumbai with Kolkata pass through the city. It is now recognized as Tiger Capital of India with major Tiger National parks around in the city. It 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 21^0, 7' 28",E 79^0, 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 18 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., 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, Excavation Engineering, Chemical Engineering and Urban Planning. The Institute also offers M.Tech. by research program in all engineering departments, Ph D (Full/Part Time). Institute has stared 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
Under Graduate Program : B. Arch/B. Tech.			
01.	Architecture	1960	62
02	Chemical Engineering	2006	92
03.	Civil Engineering	1960	92
04.	Computer Science Engg.	1987	92
05.	Electronics and Communication Engineering	1980	92
06.	Electrical And Electronics	1960	92
07.	Mechanical Engineering	1960	92
08.	Metallurgical and Materials Engineering	1965	92
09.	Mining Engineering	1982	40
	TOTAL		**738**
Post Graduate & Research Programs : M. Tech.			
01.	Environmental Engineering	1966	26
02.	Water Resources Engineering	2011	22
03.	Construction Technology and Management	2010	22
04.	Transportation Engineering	2012	22

05.	VLSI Design	2007	26
06.	Communication System Engineering	2012	26
07.	Computer Science Engineering	2007	24
08.	Industrial Engineering	1989	23
09.	Heat Power Engineering	2002	23
10.	CAD-CAM	2007	23
11.	Integrated Power System	1968	25
12.	Power Electronics & Drives	2010	25
13.	Materials Engineering	2005	22
14.	Structural Dynamics and Earthquake Engineering	2003	22
15.	Structural Engineering	1991	25
16.	Excavation Engineering	2012	20
17.	Urban Planning	1988	22
18.	Chemical Engineering	2015	24
	TOTAL		**422**
	M Sc.		
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
01.	B.Tech. Electronics & Comm. Engg.	Accredited	5 years
02.	B.Tech. Mechanical Engg.	Accredited	2 years
03.	B.Tech. Civil Engg.	Accredited	5 years
04.	B.Tech. Computer Science & Engg.	Accredited	2 years
	B.Tech. Chemical Engg.	Accredited	2 years
05.	B.Tech. Mining Engg.	Accredited	5 years
06.	B.Tech. Metallurgical & Materials	Accredited	5 years

	Engg.		
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. Computer Science & Engg.	Accredited	5 years
15.	M.Tech. Structural Engineering	Accredited	5 years
16.	M.Tech. Integrated Power System	Accredited	2 years
17.	M.Tech. Materials Engineering	Accredited	5 years
18.	M.Tech. Environmental Engineering	Accredited	2 years
19.	M.Tech. Ferrous Process Metallurgy	WITHDRAWN	
20.	M.Tech. Ferrous Process Metallurgy	WITHDRAWN	

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

New M.Tech. Programs started (year)

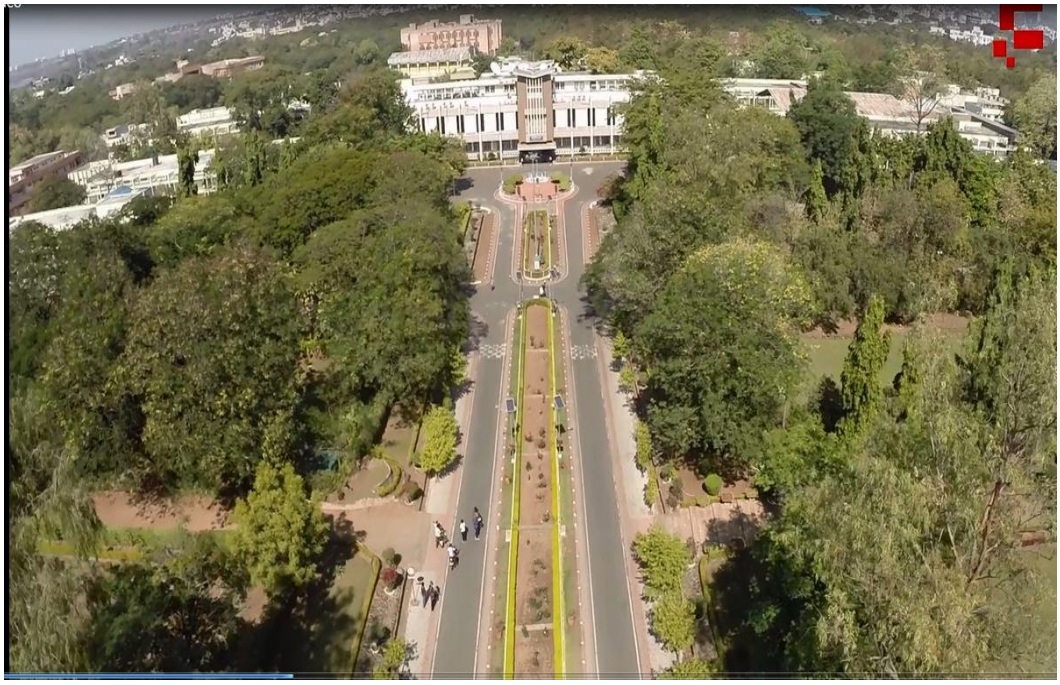
Sr.No.	**Title of Program**	**Intake**
01.	Transportation Engineering (2011)	20
02.	Communication System Engineering (2012)	20
03.	Water Resources Engineering (2011)	20
04	Construction Technology and Management	20
05	Excavation Engineering (2012)	20
06	Chemical Engineering (2015)	20
	Total Increased Intake	**120**

Institute has following ranked in various ranking surveys 2015:

- 11th Best Engineering Institute in India and the first among NITs in i3RC Times Engineering survey.
- 14th Top Engineering College in India and 2nd in Western India as per EDU-RAND rank.
- 25th Top Engineering College in India and 3rd in Western India as per digital LEARNING India.
- 27th Top Engineering College in India as per Outlook magazine.

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;
,l ,

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

The academic buildings are located fairly in close 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 in 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:

CENTERAL GOVT. MHRD,

Declared as Institute of National Importance by NIT Act of 2007 (29 of 2007)

1.5. Mission and Vision of the Institution:

Mission

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

Vision

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

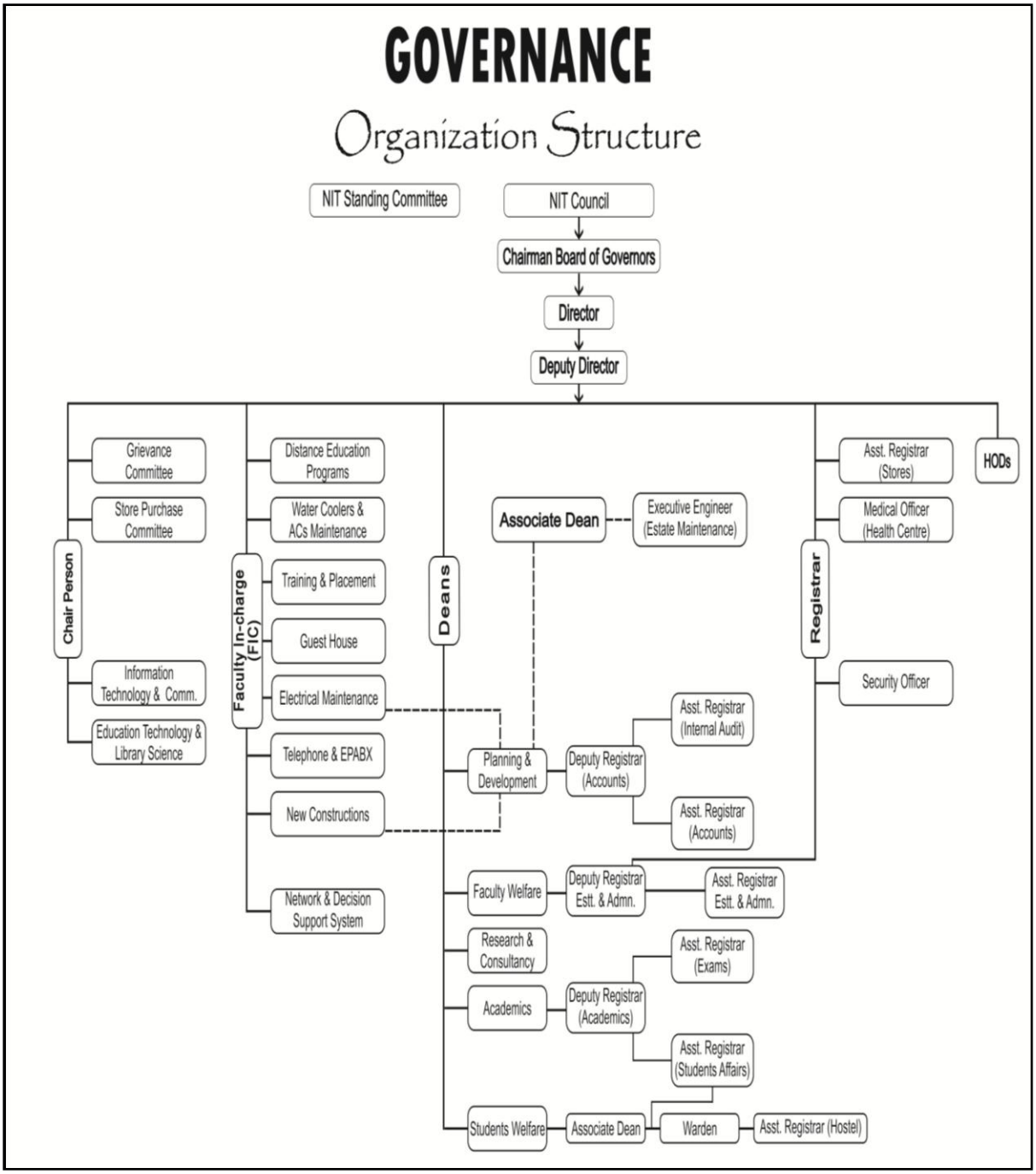
1.6. Organisational Structure:

1.6.1 Administration

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

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

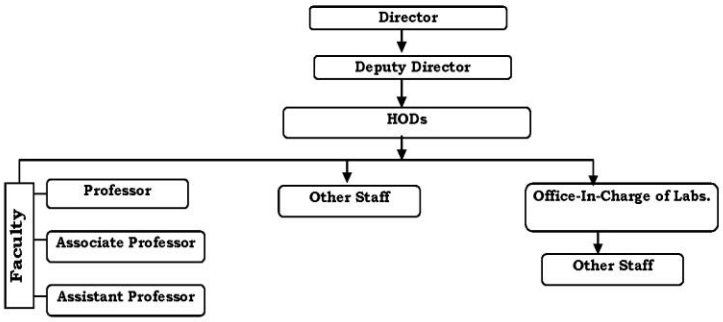
1.6.2 Flow Chart showing Institutional Administration



1.6.3 Flow Chart showing the hierarchy of Academic Departments

Figure - 2

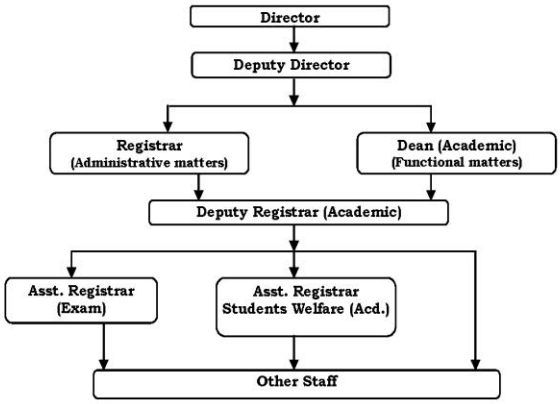
1. ACADEMIC DEPARTMENTS



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

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

2. ACADEMIC SECTION



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

* In consultation with Dean (Academic)

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

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

CFI (Centrally funded institution)

1.8. Nature of the trust/society:

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

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

Name of the Institution	**Year of establishment**	**Location**
NA	-	-

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

Name of the External Source	**CFY 2015-16**	**CFY 2014-15**	**2zCFY 2013-14**
Plan	**4487.84**	**7207.29**	**8730.90**
Non Plan	**5720.71**	**6460.53**	**4441.53**

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

1.10 Internally acquired funds: (In Rupees)

Name of the Internall Source	**CFY 2015-16 (as on 31 Dec. 2015)**	**CFY 2014-15**	**CFY 2013-14**
Students' fee	**3056.44**	**2536.51**	**1614.58**
Interest & Other Income	**1189.56**	**752.54**	**486.44**

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

1.11 Scholarships or any other financial assistance provided to students?

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

[1] Indian Oil Corporation Scholarship, Indian Oil Corporation has announced 2600 Scholarships for students of 10+/ITI, MBBS, Engineering & MBA on merit basis.

[2] NTPC Scholarship, NTPC is offering 35 scholarships to students belonging to SC/ST/PC categories persons who are pursuing 4 years full time degree course in engineering on a competitive basis for applicant from NIT.

[3] ONGC Engineering Scholarships ONGC offers 75 Scholarships for SC/ST students who are pursuing higher education in Engineering, Geology, Geophysics and MBA.

[4] GATE stipend for qualified post graduate students.

[5] AICTE PG Scholarship 2013 for M.E./M.Tech/M.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 2015-16**	**CFY 2014-15**	**CFY 2013-14**	**CFY 2012-13**	**CFY 2011-12**	**CFY 2010-11**
Scholarship Assistance	Various sources given in **1.11**					
Amount	**407.32**	**234.49**	**328.06**	**174.86**	**177.64**	**237.27**

1.12 Basis/criterion for admission to the institution:

All India entrance/state- level entrance/ university entrance/12th standard mark sheet / others:

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

1.13 Total number of engineering students:

	CFY 2015-16	**CFY 2014-15**	**CFY 2013-14**	**CFY 2012-13**	**CFYm1 2011-12**	**CFYm2 2010-11**	**CFYm3 2009-10**
Total no. of boys	3099	3235	3199	2868	2636	2398	2142
Total no. of girls	1154	1052	918	708	583	500	457
Total no. of students	4253	4287	4117	3576	3219	2898	2599

Total number of other students, if any

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

1.14 Total number of employees:

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

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

A. Regular Staff

Items	GENDER	CAY 2015-16		CAY 2014-15		CAY 2013-14		CAY 2012-13		CAY 2011-12		CAY 2010-11	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Teaching staff in engineering	M		133		118		131		122		123		119
	F		25		34		23		20		20		19
Teaching staff in sciences & humanities	M		23		24		24		15		17		16
	F		9		10		7		7		7		7
Sports Activity Center	M		2		2		2		-		-		-
Non teaching staff	M		163		160		9		10		10		
	F		39		39		3		3		3		3

B. Contract Staff

Items	GENDER	CAY 2015-16		CAY 2014-15		CAYm1 2013-14		CAYM2 2012-13		CAYM3 2011-12		CAYM4 2010-11	
		Min	Max	Min	Max	Min	Min	Max	Max	Min	Max	Min	Max
Teaching staff in engineering	M		13		19		01		01		02		00
	F		5		13		00		00		00		00
Teaching staff in sciences & humanities	M		5		5		01		00		00		00
	F		3		3		00		00		00		00
Non teaching staff	M		59		45		73		75		77		76
	F		36		32		19		19		19		19

End of Part A

II. Departmental Information

II.1. Name and address of the department:

Department of Mining Engineering, VNIT, Nagpur

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

Dr. Ishwardas L. Muthreja,
Head of the Department, Mining Engineering,
Telephone: 0712 2801350, 2801286
email : head@mng.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:

Program	Description
UG in Mining Engineering	Started with 20 seats in 1982 Intake increased to 32 in 2009 Intake increased to 40 in 2013
PG in Excavation Engineering	Started in 2013 with 20 intake

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

(The department is required to specify its Mission and Vision).

MISSION:

To create an environment conducive for attaining professional competence in the field of Mining Engineering and to provide specialised training for developing need-based human resource, while fostering within students and staff committed to academic, social and professional development.

VISION:

To maintain the standard of mining education and commitment for basic research and applied research in the diverse fields of mining, excavation engineering and other interdisciplinary areas and continuously starving to be recognized internationally for education, research and service to the mining and allied industry.

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

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

Department of Mining Engg receives support from the following departments

Department of Civil Engg	6 %
Department of Mechanical Engg	3 %
Department of Electrical Engg	3 %
Department of Metallurgical & Mat. Sc	3 %

II.6 **Total number of students:**

UG: 40

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 2015-16		CAYm1 2014-15		CAYm2 2013-14		CAYm3 2012-13	
	Min.	Max.	Min.	Max.	Min.	Max.	Min	Max.
Teaching Staff in the department	7*(R) +1** +6***	7*(R) +1** +6***	5(R) +4***	6(R) +4***	6(R) +3***	6(R) +4***	7(R) +3***	7(R) +4***
Non-teaching Staff	9	9	9	9	7	7	7	7
Total	23	23	18	19	16	17	17	18

* include new two recruitment , ** Adjunct Professor, ***Visiting faculty

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

Figures in '000'

Items	**Budget in CAY – 2015 - 16**	**Actual expenses in CAY – 2015 -16**	**Budgeted in CAY m1 2014-15**	**Actual Expenses in CAY m1 2014-15**	**Budgeted in CAY m2 2013-14**	**Actual Expenses in CAY m2 2013- 14**
Laboratory Equipment and Software	3191.5	780.58	4031.00	583.07	2000.00	485.63
		60.0		956.60		1294.63

purchase						
Laboratory consumables	28.40	39.38	60.00	38.96	50.00	29.12
Maintenance and spares	256.79	274.07	120.00	181.08	35.50	247.38
Travel	13.09	100.38	25.00	100.03	20.00	70.28
Miscellaneous expenses for academic activities	10.09	23.91	5.00	16.47	5.00	1.85
Total	3499.87	1278.32	4241	1876.21	2110.5	2128.89

III. Programme Specific information

III.1. **Name of the Programme**

UG in Mining Engineering

(List name of the programme, as it appears on the graduate's certificate and transcript, and abbreviation used for the programme.)

III.2. Title of the Degree

(List name of the degree title, as it appears on the graduate's certificate and transcript, and abbreviation used for the degree.)

Bachelor of Technology in Mining Engineering

III.3. **Name, designation, telephone number, and email address of the**

Dr. Ishwardas L. Muthreja,
Head of the Department, Mining Engineering,
Telephone: 0712 2801350, 2801286 email : head@mng.vnit.ac.in

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

Program	Description
Bachelor of Technology in Mining Engineering	Started with 20 seats in Mining Intake increased to 32 in 2009 Intake increased to 40 in 2013 Accredited in 1996, 2001 "A" for five years and 2009 was granted for five years.

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

Deficiencies or weaknesses:

1) Requirement of PG course
2) Less number of UG students
3) Not fully skilled non teaching staff
4) Modernisation of Laboratories

Action Taken:

1) PG course is started
2) Intake UG strength is increased
3) Skilled non teaching staff recruited for the department
4) Labs are modernized

III.6. Total number of students:

	Level	Programme	2015-16	2014-15	2013-14	2012-13
No. of boys	IV yr	B. Tech U/G	28	28	18	15
No. of girls	IV yr	B. Tech U/G	0	0	0	0
Total no. of students	IV yr	B. Tech U/G	28	28	18	15
No. of boys	III yr	B. Tech U/G	36	28	28	30
No. of girls	III yr	B. Tech U/G	1	0	0	0
Total no. of students	III yr	B. Tech U/G	37	28	28	30
No. of boys	II yr	B. Tech U/G	36	36	30	30
No. of girls	II yr	B. Tech U/G	3	1	0	0
Total no. of students	II yr	B. Tech U/G	39	37	30	30

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

Item	CAY 2015-16		CAYm1 2014-15		CAYm2 2013-14		CAYm3 2012-13	
	Min.	Max.	Min.	Max.	Min.	Max.	Min	Max.
Teaching Staff in the department	6*(R) +1** +4***	6*(R) +1** +4***	5(R) +3***	6(R) +3***	6(R) +3***	6(R) +4***	7(R) +3***	7(R) +4***
Non-teaching Staff	9	9	9	9	7	7	7	7
Total	**20**	**20**	**17**	**18**	**16**	**17**	**17**	**18**

* includes two new recruitment . ** Adjunct Professor, ***visiting faculty

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

Figures in '000'

Items	Budget in CAY – 2015 -16	Actual expenses in CAY – 2015 -16	Budgeted in CAY m1 2014-15	Actual Expenses in CAY m1 2014-15	Budgeted in CAY m2 2013-14	Actual Expenses in CAY m2 2013- 14

Laboratory Equipment and Software purchase	3191.5	780.58 60.0	4031.00	583.07 956.60	2000.00	485.63 1294.63
Laboratory consumables	28.40	39.38	60.00	38.96	50.00	29.12
Maintenance and spares	256.79	274.07	120.00	181.08	35.50	247.38
Travel	13.09	100.38	25.00	100.03	20.00	70.28
Miscellaneous expenses for academic activities	10.09	23.91	5.00	16.47	5.00	1.85
Total	3499.87	1278.32	4241	1876.21	2110.5	2128.89

PART B

1. Vision, Mission and Programme Educational Objectives (100)

1.1. Vision and Mission (5)

1.1.1. State the Vision and Mission of the institute and department (1)
(List and articulate the vision and mission statements of the institute and department)

VISION (Institute)

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

MISSION (Institute)

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

VISION (Department):

To maintain the standard of mining education and commitment for basic research and applied research in the diverse fields of mining, excavation engineering and other interdisciplinary areas and continuously starving to be recognized internationally for education, research and service to the mining and allied industry.

MISSION (Department) :

To create an environment conducive for attaining professional competence in the field of Mining Engineering and to provide specialised training for developing need-based human resource, while fostering within students and staff committed to academic, social and professional development.

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

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

- Institute website (www.vnit.ac.in) and Notice boards.
- Department website, curricula book and at the main entrance of Department building and Mining workshop building.

1.1.3. Mention the process for defining Vision and Mission of the department (2)
(Articulate the process involved in defining the vision and mission of the department from the vision and mission of the institute.)

The department established the vision and mission through a consultative process involving the stakeholders, the future expansion plan, societal and global requirements. The process for establishing the vision and mission of the department can be explained in the following steps:

Step 1: Vision and Mission of the institute are taken as basis.

Step 2: Views are taken from stakeholders of the Department such as industry, Alumni, parents, professional bodies and research organisations.

Step 3 : The accepted views are analyzed and deliberated in departmental meeting to check the consistency with the vision and mission of the institute.

1.2. Programme Educational Objectives (15)

1.2.1. Describe the Programme Educational Objectives (PEOs) (2)

PROGRAMME EDUCATIONAL OBJECTIVES

The Programme Educational Objectives (PEO) of B.Tech. Mining Engineering are established as per the requirement of industry, in consultation with peer academicians and

alumni representatives. The Programme Educational Objectives of B.Tech. Mining Engineering are as follows:

The graduate shall be able to;

1. Demonstrate the knowledge in the areas of mining engineering processes, systems and technologies looking into industry and research needs by exposing them to the latest technology.
2. Understand the practical aspects of the mining industry and an appreciation for mining as a profession with regards to safety, technology, blasting and environment looking into economics and production.
3. Apply knowledge in the application of engineering principles pertaining to mine planning, decision making and systems and invoke the desire for continuing education, research, intellectual and professional development and creativity.

1.2.2. State how and where the PEOs are published and disseminated (2)
(Describe in which media (e.g. websites, curricula books) the PEOs are published and how these are disseminated among stakeholders)

The PEO are published at

1. Department website http://www.mng.vnit.ac.in
2. College website http://www.vnit.ac.in
3. Curriculum books
4. Notice boards

Apart from this, Programme Educational Objective (PEO) are made accessible to all the stakeholders of the program through education, faculty workshops, student awareness workshops, programs, student induction programs and faculty meetings.

1.2.3. List the stakeholders of the programme (1)
(List stakeholders of the programme under consideration for accreditation and articulate their relevance)

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

1.2.4. State the process for establishing the PEOs (5)

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

The Programme Educational Objectives of B.Tech. Mining Engineering are established considering various aspects in the form of feedback and suggestions given by various stake holders such as :

(a) Feedback from undergraduate students .
(b) Feedback and discussion session with Alumni.
(c) Suggestions received from mineral industry.
(d) Discussions at various forum of research organisations.

To establish Programme Educational Objectives, in the first step, various stakeholders are consulted and their views are obtained considering Vision & Mission of the department.

In the second step, views obtained from various stakeholders are summarized and documented in form of draft PEOs. These draft PEOs are then discussed in Departmental Advisory Board meeting and submitted to Board of Studies for final approval.

1.2.5. Establish consistency of the PEOs with the Mission of the Institute (5)

(Describe how the Programme Educational Objectives are consistent with the Mission of the department.)

PEO's	Institute Mission Satisfied
PEO1	Yes
PEO2	Yes
PEO3	Yes

1.3. Achievement of Programme Educational Objectives (30)

1.3.1. Justify the academic factors involved in achievement of the PEOs (15)

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

Programme educational objectives are achieved through curriculum, content delivery through course and continuous evaluation. The curriculum is primary tool to prepare and motivate students to achieve PEOs e.g. their responsibility towards betterment of society

and importance of lifelong learning. The curriculum is structured to accommodate core mining engineering, research capabilities and basic science courses as expressed in table given below:

Table : Distribution of courses

SN	Course Component PEOs Curriculum Content	PEOs	Total Credits	(% of total number of credits of the program)
1	**Basic Engineering Courses**	PEO 1, PEO 2, PEO3	42	13.125
2	**Basic Science and Mathematics Courses**	PEO 1	38	11.875
3	**Humanities and Social Science Courses**	PEO 3	10	3.125
4	**Departmental Core Engineering Courses which includes Guided field visits/camps and training**	PEO 1, PEO 2, PEO3	152	47.5
5	**Departmental Core Elective Courses**	PEO 1, PEO 2, PEO3	60	18.75
6	**Open Courses, Humanities(HM)**	PEO 1, PEO 2, PEO3	18	5.625
Total			**320**	**100.00**

1.3.2. Explain how administrative system helps in ensuring the achievement of the PEOs (15)
(Describe the committees and their functions, working process and related regulations.)

VNIT is governed by an autonomous Board of Governors which comprises of members nominated by Government of India, Government of Maharashtra, and other represented by people from academia, industry and institute faculty. The chairman is nominated by MHRD, Government of India. The Director of the Institute is member of the board. The Senate, Finance committee and Building and Works Committee are the statutory committees of the Institute. These Committees interact and maintain liaison via Department Head and Deans.

At the department level the following administrative setup is put in place to ensure the attainment of PEOs

- Board of Studies (BoS)
- Department Advisory Board (DAB)
- Faculty Advisors
- Course Coordinator
- Departmental Examination Committee (DEC)

➢ **Board of Studies (BoS)**

- Head of the department concerned (Chairman)
- All regular staff members of Mining engineering department
- One expert in the subject from outside the Institute.
- One expert to be nominated by the Director.
- Two representative from the industry/ corporate sector/allied area .

This BoS of the department shall

- Prepare syllabi for various courses keeping in view the objectives of the Institute, interest of the stakeholders and national requirement for consideration and approval of the Senate ;
- Suggest methodologies for innovative teaching and evaluation techniques ;
- Suggest panel of names to the Senate for appointment of examiners ;
- Meet at least once in a year to review the programs

➢ **Departmental Advisory Board (DAB)**

a. Head of the department
b. All faculty members

This committee shall

- Meet as and when necessary to review the programs
- Discuss current and future issues related to programs as per the guidelines received from time to time.
- Develop and recommend new or revised program goals and objectives.
- Discuss and review the feed back given by various stake holders and course coordinators.

  Any other matter as directed by HOD.

➢ **Faculty Advisors**

One each for UG and PG programme, as nominated by HOD. The faculty advisors are acting as guide and motivator to the students on various academic and non academic issues.

- **Departmental Examination Committee**
  - Departmental Examination Coordinator (DEC), As nominated by HoD
  - Co opted faculty member as and when required

This committee shall

- Meet to take up various issues related to test/ practical examination as and when required.
- Coordinate all activities for conduction of test/ practical examination.
- Prepare and display a copy of time table for test/practical examination.
- Receive the cases of misbehavior/malpractices, use of unfair means from the invigilator and forward it to the HoD.
- Instruct the concerned course teacher to complete the valuation work within the specified time and submit it to DEC.
- The DEC shall submit these marks to Associate Dean (Exams.)

- **Course coordinator (Concern faculty members)**
  - Responsible for preparation and assessment of the course outcomes
  - Coordinate and conduct teaching the assigned course
  - Recommend and facilitate workshops, faculty development programs, meetings or conferences to meet the course outcomes
  - Analyze results of particular course and recommend to the Head of the Department to take appropriate action
  - Coordinate with students, faculty and Head of the Department to determine priorities and policies

1.4. Assessment of the achievement of Programme Educational Objectives (40)

1.4.1. Indicate tools and processes used in assessment of the achievement of the PEOs (25) Describe the assessment process that periodically documents and demonstrates the degree to which the Programme Educational Objectives are attained. (10)

PEOs (Program Educational Objectives) relate to the career and professional accomplishments of passed out students after their graduation from the program. Consequently, assessment and evaluation of the objectives requires tools that can be applied after graduation. However, keeping the significance of contribution of the curriculum and the assessment opportunities such as examination and evaluation results, placement data, employer feedback and higher education entrance performance etc. are taken as tools for supplementary evidence to assess PEOs.

The curriculum is primary tool to prepare and motivate students to achieve PEOs e.g. their responsibility towards betterment of society and importance of lifelong learning. The curriculum is structured to accommodate core mining engineering, managerial skills and communication skills beside the basic science courses.

The curriculum is designed in such a manner so that it takes care of all possible options for mining engineering graduates to pursue their carrier as practicing engineers/entrepreneurs/researchers/academician. Field visits, compulsory training, seminar and projects make them aware about changing professional needs of mining engineering field.

1.4.2. Provide the evidences for the achievement of the PEOs (15)

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

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

c) How the results are documented and maintained.

The DAB members and with the help of course Coordinators, measure the level to which our program has met each of the PEOs independently. The evidences which are used to calculate the attainment of PEO's are as depicted below:

- Result analysis
- Alumni feedback
- Placement Records
- Higher education records
- Employer feed back

Al these evidences are critically examined by the DAB members and each evidence is rated on 4 point scale such as:

4---- Excellent
3---- Good
2 ---- Fair
1 ------ Poor

The rating for the above mentioned parameters as given by DAB members is as indicated in the table given below:

S. No.	Evidences	Rating
1	Result analysis	3
2	Alumni feedback	4
3	Placement Records	2
4	Higher education records	4
5	Employer feed back	4

Total rating = 3+4+2+4+4 = 17
% attainment of PEO = 17*100/20 = 85%

All these documental evidences are maintained by Head of the department office.

1.5. Indicate how the PEOs have been redefined in the past (10)
(Articulate with rationale how the results of the evaluation of PEOs have been used to review/redefine the PEOs)

Programme of BE Mining Engineering has started in year 1982 with the objective to impart fundamental knowledge in mining engineering. In year 2002, autonomous status was granted to the institute and the curriculum structure, including the syllabus of B. Tech Mining Engineering was revised considering the recent advancement and industrial requirement of Mining Engineering. Programme Education Objectives (PEO's) were documented in year 2011, taking into account curriculum structure. It was resolved that the revision in PEOs will be carried out as per the recommendations made by DAB and further approved by BOS. The process of revision of PEOs is defined similar to the process of establishment of PEOs.

Programme Outcomes (225)

2.1. Definition and Validation of Course Outcomes and Programme Outcomes (30)

2.1.1. List the Course Outcomes (COs) and Programme Outcomes (POs) (2)
(List the course outcomes of the courses in programme curriculum and programme outcomes of the programme under accreditation)

Programme Outcomes (POs):

1. An ability to design a safe mining practices through understanding various mining subjects.
2. Formulate a system, component, or process to meet desired needs of mining engineers within realistic constraints such as economic, environmental and social.
3. An ability to collaborate with multidisciplinary sciences and its application to mining.
4. Identify and formulate the scheme to solve technical problems.
5. Understanding of professional responsibility and skill.
6. Broad based mining education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context in long term.
7. Recognition of the need for conservation of reserves and development of safe technology survival in global environment.
8. Ability to use the techniques, skills, and modern engineering tools necessary for mining engineering practices.
9. To understand engineering and management principles and its application through most rational approaches for the extraction of minerals.

Course Outcomes:

Course Outcomes (CO's) of various courses of B.Tech Mining Engineering are as follows;

Code	Subject	Course Outcomes (CO's)
MNL263	Underground Metalliferous Mining (Departmental Core)	1. Students will gain the knowledge about various development headings, opening with their shape, locations and its driving technology 2. Students can will learn about the unit operations and stoping parameters through models and visuals 3. Students will develop a skill to select the method of metal mining based on geomining parameters
MNL464	Sub-MINING ECONOMICS(Departmental Core)	1. Students will have knowledge about various inventory of minerals and aspects of mineral economics 2. Students will develop some skill in financial managements of mineral industry

MNL474	Computer Applications In Mining (Departmental Core)	1. Students will have knowledge about various software application worldwide in the field of mining engineering 2. Students will develop some skill to use the software with cases
MNL472	MINE SAFETY ENGINEERING(Departmental Elective)	1 Students will gain the idea about preparation of safety management plan and risk calculation 2 Students can will learn the various steps of safety audit 3 Students will develop a initial skill to monitor the safety related to mining
MNL473	MINE MANAGEMENT INFORMATION SYSTEM (Departmental Elective)	1 Students will get initial knowledge about database and its preparation 2 Students can will develop skill handling database software 3 Students will get the idea about database and MIS application to mining
MNL480	ADVANCED UG METAL MINING & DESIGN(Departmental Elective)	1 Students will get ideas about the advancement of metal mining methods with regards to mechanization and automation 2 Students will be trained to select the method of mining based on geo-mining data 3 Student will develop initial skill to stope design
MNL261	Introduction to Mining Technology	The students will be able to understand the 1 Basic terminology of mining and mechanics of blasting 2 Various phases of underground and open cast mining 3 Various operations involved in drifting and shaft sinking 4 Various types of explosive and their use in mines
MNL364	Ground Control In Mines	The students will be able to 1 Classify the rock based on their engineering properties 2 Understand applicability of different types of supports. 3 Understand various phases of stowing and back filling. 4 Predict and control the subsidence, rock burst and bumps 5 Analyze the stability of slopes

MNL471	U/G space technology	The students will be able to 1 Understand the need and importance of underground space technology 2 Understand the applicability of various types of underground excavating machines and drilling patterns 3 Understand the hazards of underground excavations and environmental problems 4 Select and design the underground support for different mining conditions
MNL462	Mine Legislation and Safety	The students will be able to understand the 1 General principles of Mining Laws and their history 2 Salient features of Mines Act and mines rules 3 General provisions of CMR 1961 and MMR 1961 4 Legal aspects of safety and health of Mine workers.
MNL465	Mine System Engineering	1 Students will acquire knowledge about different modelling techniques for mining and allied applications 2 Students will acquire some simulation knowledge useful for decisions making and management 3 Students will acquire knowledge about Project Management with PERT & CPM
MNL477	Novel Mining Methods	The students will be able to understand the 1 Technology for methane drainage and coal gassification 2 Technology for hydraulic mining and deep sea mining. 3. Latest Mining methods such as Nuclear fragmentation, Mining in space dimensional mining etc.
MNC366	Survey Camp (Sessional)	The students will be able to understand the 1 Importance of team work 2 Methodology for converting field data into graphical form. 3 Various field problems associated with surveying.
MNC462	Training Seminar (Sessional)**	The students will be able to learn the 1 Various mining technologies – underground coal, underground metal and opencast 2 Development of workings, 3 Various practices in the use of explosives 4 Various strata control practices 5 Ventilation practices 6 Grade control techniques, management and financial matter of mines

MNL264	Mining Machinery - I	The students will be able to 1 Understand various surface layouts, wire ropes construction and size selection and its deterioration 2 Transport systems in mines – its various features in detail, safety devices, braking systems and related calculation. 3 Winding systems in mines – drum winder. There important features –construction, mechanical & electrical braking, safety features and torque time diagram. 4 Winding systems in mines – friction winder There important features –construction, mechanical & electrical braking, safety features and torque time diagram. 5 Aerial Ropeway – construction, safety features and calculation.
MNL362	Mining Machinery II	The students will be able to 1 Understand the necessity, construction, applications and selection of various winning machines in underground excavation including, coal formation and tunnels. 2 Understand the necessity, construction, applications and selection of various loading machines in underground excavation including coal formation and tunnels. 3 Understand the necessity, construction, applications and selection of various drilling machines in underground & surface excavation along with roof bolting machines. 4 Understand the necessity, construction, applications and selection of various surface mining machines. 5. Understand the necessity, construction, applications and selection of various ancillary equipments. Construction and selection of various type of pumps used in underground and opencast mines and calculations.

MNL265	Mine Ventilation and Climate Engineering	The students will be able to understand the 1 various gaseous pollutants including radon gas in metalliferous and coal mines. There toxic effects, detection and means of their reduction in mine atmosphere. Statutory requirement of ventilation standards to be maintained. 2 Salient features of heat and humidity, their effect on working efficiency of miners, measurement and reducing both to tolerable limits. 3 Natural ventilation and its limitations. Types of Mechanical ventilators, various ventilation devices, selection, installation, working and necessary calculation including expenditure and necessary statute. 4 Live case studies of mine ventilation, quantity & necessary pressure requirement, ventilation planning in underground coal and non-coal mines, auxiliary ventilation devices for improvement in ventilation. 5 Computer application in solving complicated ventilation circuits and special problems associated with deep underground and deep opencast mines.
MNL268	Surface Mining	The students will be able to understand the 1 Importance of surface mining in today's mineral requirement and world mineral production of various minerals from surface mines. 2 Understanding viability of surface mining and its design aspects. 3 Various systems of surface mining and their applications. Opening of deposits under various conditions and haul road design 4 Mining of deposits under various conditions using various equipment combination with layouts including in-pit-crushing technology. Problem solving of mine design covering – development, production, equipment capacity & strength calculation and layouts. 5 Blast design under various geo-mining conditions with live problem solving. 6 Conversion of underground developed to surface mines – its related problems and design of mines. 7 Construction of external and internal dumps with problems. 8 Reclamation and with real life problems.

MNL479	Advanced Surface Mining & Design	The students will be able to understand the 1 Cut-off grade, ultimate pit slope angle and break-even-stripping ratio. In the light of this information ultimate pit design they will learn. 2 Planning and design of opencast coal mines, opencast metal mines and hill mining – involves layout, equipment calculation. 3 Different loading and transport equipments – their technical combination based on output capacity. 4 Design of waste dumps, haul roads, drainage system. 5 Design of various blasting practices need based.
MNL467	Geostatistics	The students will be able to understand the 1 Statistical distributions – random, normal and lognormal and its importance in mining environment. 2 Variogram, co-variogram calculation. Different models of variogram like random spherical, spherical, exponential, Gaussian, Linear, logarithmic and Parabolic - their application, Nugget effect and its implication on model. 3. Grade and reserve estimation for mineral deposits. 4. Case studies on various geostatistical models, grade estimation
MNL302	Mine Hazards and Rescue	1. To familiarize with the concept of hazards in mines and rescue operations 2. To understand the basic mechanism of hazards 3. To develop the ability of analyzing complex engineering problems associated with hazards 4. To be competent in designing components and processes dealing with hazards.
MNL402	Surface Mine Environment	1. To be able to identify the need for environmental management and sustainability 2. To understand various components of environmental impacts 3. To design environmental management processes and prepare environmental management plans 4. To familiarize with the legal requirement related to environment.
MNL404	Mine Planning	1. To understand various components of mine planning 2. To learn general planning principles 3. Design of various components of mine system 4. Plan and design an overall mine
MNL430	Rock Slope Engineering	1. Learning basic slope stability in mining operations as well as civil excavation 2. Developing expertise in slope stability analysis 3. Expertise in management of slopes 4. Expertise in Dump Management

MND451	Project Phase 1	1. Student will be able to work in team for a common goal 2. Student will have attitude towards research 3. Student will develop skill in technical report writing and communication. 4. Develop capability to work independently including experimentation
MND452	Project Phase 2	1. Student will be able to work in team for a common goal 2. Student will have attitude towards research 3. Student will develop skill in technical report writing and communication 4. Develop capability to work independently including experimentation
MNL 468	Advanced Mine Surveying	1. Learn advanced tools for mine surveying 2. Students will be trained in handling the various advanced survey instruments 3. Learn various calculations required for planning 4. Will work with team spirit
MNL 469	Mass Production technology for Underground Coal Mines	1. Student will have in-depth knowledge of advanced techniques of underground coal mining 2. They will be able to design such systems 3. Develop technical skill for operation of such systems 4. Will be ready to take up advanced research in coal mining on long term basis
MNL 266-	Rock Engineering	1. To make students conversant with different types of rock mass with regard to design of excavations and methods of designing 2. To acquaint students with various types of supports and reinforcements as well as permanent supports of excavations 3 To make them conversant with ground control and subsidence problems and preventive measures. 4. To understand the knowledge basic of stress analysis, rock modelling and soil mechanics to be applied for design of rock structures.
MNL475 -	Blasting Technology for mining & Const.	1. to understand the basic characteristics of explosives 2. to know the mechanism of rock breakage utilization of explosives energy. 3. Conduction of blasting operation in mine and its safer aspects. 4. design of optimum blast and control measures

MNL463 -	Mine Management	1. To know managerial aspects of mines and its organization and structures, 2. To understand the fundamentals of principles of management 3. Application of management principles in mining industries 4. To study the behaviour science , industrial psychology and motivations etc human aspects
CEL284	Mining Gelology	The students will be able to 1. Understand the Internal structure of earth and structural geology 2. Know about the rocks and minerals and their properties. 3. Understand various geological structures and impacts on mining 4. Generate the sub surface profiles from geological maps and plotting structures.
MEL291	Mechanical Engineering	The students will be able to understand the 1. General Principles of Power Transmission 2. Concepts of Thermodynamics and Internal Combustion Engines 3. Air Standard Cycles and Air Compressors
MML385	Mineral Processing	The students will be able to 1. Understand the working principle and mechanism of Crushing and Grinding Operations 2. Understand the basic principles of separation of minerals by Jigging, Tabling and Heavy media separation 3. Understand froth flotation operation for up gradation of ores/minerals, Electrostatic/Magnetic separation operations
MNL262	Mine Surveying	The students will be able to understand the 1. Basic terminology of Surveying 2. Various types of levelling 3. Various operations involved field surveying and curve setting.
MNL267	Underground Coal Mining	The students will be able to understand the 1. Basic technology of coal mining 2. Various operations involved in depillaring 3. Various operations involved in Longwall Mining and Contiguous seam working

MNL461	Surface Mine Environment	The students will be able to understand the 1. Environmental issues in mineral industry 2. Issues related to air and water pollution 3. Environmental issues related to blasting 4. Management of environment
MNL466	Rock Excavation Engineering	The students will be able to understand the 1. Concepts of drilling and Blasting 2. Advanced blasting techniques 3. Theories of rock tool interaction and Rock Cutting
MNL478	Mine Automation	The students will be able to understand the 1. Scope and role of automation in mining operation 2. Data communication and modern computerised control systems 3. Use of latest techniques used for mine automation.
CEL 384	Advanced Mining Geology	The students will be able to understand 1. The Internal structure of earth, fundamental geomorphic and dynamic processes on the Earth 2. The rocks and minerals and their properties. 3. The various geological structures and impacts on mining 4. To Know prospecting and subsurface exploration methods 5. And generate the sub surface profiles from geological maps and plotting structures

2.1.2. State how and where the POs are published and disseminated (3)

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

The Program Outcomes are published at

- Department website http://www.mng.vnit.ac.in
- College website http://www.vnit.ac.in
- Curriculum books
- Notice boards

Apart from this, Program outcomes are made reachable through student induction programs and faculty meetings.

2.1.3 Indicate processes employed for defining of the POs (5)

The Programme Outcomes of BTech Mining Engineering are established through consultation with stake holders keeping the graduate attributes and Institute/Department Vision, Mission as basis.

The main constituents for the program are current students, alumni, faculty and the industry, having representation in different departmental meetings. Input from all the stake holders is obtained on various aspects of the program and deliberated in the DAB meeting of the

department. Once accepted by DAB, it is presented to BOS. After getting approval from BOS, the PO's are accepted.

2.1.4. Indicate how the defined POs are aligned to the Graduate Attributes prescribed by the NBA (10)

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

Graduate Attributes prescribed by NBA:

i. Engineering Knowledge
ii. Problem Analysis
iii. Design & Development of Solutions
iv. Investigation of Complex Problem
v. Modern Tools Usage
vi. Engineer and Society
vii. Environment & Sustainability
viii. Ethics
ix. Individual & Team work
x. Communication
xi. Lifelong Learning
xii. Project management & Finance

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

Table: Alignment of POs with the Graduate Attributes

GA	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
i	Y		Y						
ii		Y		Y					
iii	Y	Y	Y						
iv				Y					
v			Y		Y				
vi		Y				Y	Y	Y	
vii		Y				Y	Y	Y	
viii					Y		Y		Y
ix					Y				
x					Y				Y
xi						Y	Y	Y	Y
xii						Y		Y	Y

2.1.5. Establish the correlation between the POs and the PEOs (10)

The correlation between the POs and the PEOs OF THE B Tech programme is as given in the table below:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
PEO 1	Y	Y	Y	Y	Y	Y	Y	Y	Y
PEO 2	Y	Y	Y	Y	Y	Y	Y	Y	Y
PEO 3	Y	Y	Y	Y	Y	Y	Y	Y	Y

2.2. Attainment of Programme Outcomes (40)

2.2.1. Illustrate how course outcomes contribute to the POs (10)

The program outcomes are achieved through curriculum that offers a number of mandatory courses as well as elective courses. Each course has defined course outcomes that are mapped to the program outcomes is as shown in Table below. Strong correlation is indicated by letter "S" and moderate correlation is indicated by letter "M". Strong co-relation indicates that there is 80-100% mapping between the CO and PO and for moderate there is 60-80% mapping. For calculation of PO attainment average 90% and 70% is taken for strong and moderate mapping.

Table: Mapping between Course Outcomes to Programme Outcome

Code	Subject/ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
MNC462 TRAINING SEMINAR (SESSIONAL)	CO1	S	S	S	S	S	M	S	S	S
	CO2	S	S	S	S	S	M	S	M	S
	CO3	S	S	S	S	S	S	S	S	S
	CO4	S	S	S	S	S	M	S	S	S
	CO5	S	S	S	S	S	S	S	S	S
	CO6	S	S	S	S	S	M	M	S	S
MNL264 MINING MACHINERY – I	CO1	S	S	S	S	S	S	S	S	S
	CO2	S	S	S	S	S	S	S	S	S
	CO3	S	S	S	S	S	S	S	S	S
	CO4	S	S	S	S	S	S	M	M	S
	CO5	S	S	S	S	S	S	S	S	S
MNL362 MINING MACHINERY II	CO1	S	S	S	S	S	S	S	S	S
	CO2	S	S	S	S	S	S	S	S	S
	CO3	S	S	S	S	S	S	S	S	S
	CO4	S	S	S	S	S	S	S	S	S
	CO5	S	S	S	S	S	S	S	S	S
MNL265 MINE VENTILATION AND	CO1	S	S	S	S	S	S	S	S	S
	CO2	S	S	S	S	S	S	S	S	S
	CO3	S	S	S	S	S	S	S	S	S
	CO4	S	S	S	S	S	S	S	S	S

CLIMATE ENGINEERING	CO5	S	S	S	S	S	S	M	S	M
MNL268 SURFACE MINING	CO1	S	S	M	M	S	S	S	S	S
	CO2	S	S	S	S	S	S	S	S	S
	CO3	S	S	S	S	S	S	S	S	S
	CO4	S	S	S	S	S	S	S	S	S
	CO5	S	S	S	S	S	S	S	S	S
	CO6	S	S	S	S	S	S	S	S	S
	CO7	S	S	S	S	S	S	S	S	S
	CO8	S	S	S	S	S	S	S	S	S
MNL479 ADVANCED SURFACE MINING & DESIGN	CO1	S	S	S	S	S	S	S	S	S
	CO2	S	S	S	S	S	S	S	S	S
	CO3	S	S	S	S	S	S	S	S	S
	CO4	S	S	S	S	S	S	S	S	S
	CO5	S	S	S	S	S	S	S	S	S
MNL467 GEOSTATISTICS	CO1	S	S	S	S	S	M	M	S	M
	CO2	S	S	S	M	S	M	M	S	M
	CO3	S	S	M	M	S	M	M	S	M
	CO4	S	S	S	S	S	M	M	S	M
	CO5	S	S	S	S	S	M	M	S	M
MNL261 INTRODUCTION TO MINING TECHNOLOGY	CO1	S								
	CO2	S				S	S			
	CO3	S				S	S			
	CO4	S				S	S	S		
MNL364 GROUND CONTROL IN MINES	CO1	S						S		
	CO2	S						S		
	CO3	S						S		
	CO4	S		S	S	S		S	S	
	CO5	S	S	S	S	S	S		S	
MNL471 U/G SPACE TECHNOLOGY	CO1	S							M	S
	CO2	M	M	M	M				M	S
	CO3					S	S		M	S
	CO4		S	S	S				M	S
MNL462 MINE LEGISLATION AND SAFETY	CO1					S	S	S		
	CO2					S	S	S		
	CO3					S	S	S		
	CO4					S	S	S		
MNL465 MINE	CO1			S	S					
	CO2			S	S				S	S

SYSTEM ENGINEERING	CO3			S	S					
MNL477 NOVEL MINING METHODS	CO1		S				S		S	S
	CO2		S				S		S	S
	CO3		S				S		S	S
MNC366 SURVEY CAMP	CO1							S	S	
	CO2	S		S				S		
	CO3	S	S							
MNL404-MINE PLANNING	CO1	S	M	M		S		S		
	CO2	S	S	M	M	S	S	S		
	CO3	S	S	S	S	M	M	M	S	S
	CO4	S	S	M	S	S	M	M	S	S
MNL 266-ROCK ENGINEERING	CO1	S	S	S	M	M	S	S	M	S
	CO2	S	S	S	S	M	S	S	M	S
	CO3	S	S	S	S	S	S	S	S	M
	CO4	S	S	S	S	S	S	S	S	S S
MNL475-BLASTING TECHNOLOGY FOR MINING & CONST.	CO1	S	S	S	M	S	S	S	S	S
	CO2	S	S	S	S	S	S	S	S	M
	CO3	S	S	S	S	S	M	S	S	S
	CO4	S	S	S	S	M	S	S	M	S
MNL463-MINE MANAGEMENT	CO1	S	S	S	S	S	S	M	S	S
	CO2	M	S	S	S	S	S	S	M	M
	CO3	S	S	S	S	S	M	S	S	S
	CO4	S	S	S	S	S	S	M	M	S
MNL263 UNDERGROUND METALLIFEROUS MINING	CO1			S			S		S	
	CO2		S	M	S					M
	CO3	S				S		M	S	S
MNL464 SUB-MINING ECONOMICS	CO1	M	S	S	M		S	S		
	CO2				M	S		M		S
MNL474 COMPUTER APPLICATIONS IN MINING	CO1		S	S	M	M		M		M
	CO2	S		S			M		S	S
MNL472 MINE SAFETY ENGINEERING	CO1	S	M	M			S		S	
	CO2				M	S			S	M
	CO3	M	S				S	S		S

MNL473 MINE MANAGEMENT INFORMATION SYSTEM	CO1		S				S		S	S
	CO2				S	M	M			M
	CO3	M	M		M				S	S
MNL480 ADVANCED UG METAL MINING & DESIGN	CO1	S			S	M	M			S
	CO2		S	M		S		M	M	
	CO3	S		M	S		M		S	M

2.2.2. Explain how modes of delivery of courses help in attainment of the POs (10)

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

The faculty members have adopted various content delivery methods which are found to be most appropriate for the courses. Following are the methods which are often used.
Classroom Teaching: Besides the traditional chalk and board teaching, faculty also uses power point presentations and videos to explain the concepts in better manner.

Guest Lectures: Teaching is augmented by guest lectures by experts in their respective areas and pertaining to the course.

Students' Presentation: Verbal presentation by students constitutes an opportunity to increase, improve and provide alternate methods of learning in the classroom. The student has to substantiate the matter/content which is presented before the audience. Presentation team may comprise of individual student or group of students. The team is made to present their assignment, along with graphic representations projected on a screen, before the class/ faculties.

Home assignments: Course coordinators give assignments based on various case studies, topics of academic interest and monitor the progress on continuous basis to actively involve the students in the course.
Handouts/Websites: As per the requirement of the course, the course coordinator ensures that the handouts/notes of the lectures and other informative websites such as NPTL, Infomine, acusafe, edumine, etc. are made available to the students.

Group discussions: This aspect of collaborative and cooperative learning is a common feature of classroom teaching process. It helps in discussing the course content from different perspectives. The teacher facilitates the discussion and validates the ideas or statements made by group members and clarifies the concepts or the questions raised by the students.

Site visits: Visits at ongoing Mining projects such as Open cast and underground coal and metal mines help the students to understand the various applications of theoretical aspects of mining engineering practices.

Summer/Winter Training: Three months training to the students during summer and winter vacations helps them to understand the various practical problems associated with the mining industry.

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 (10)

Direct assessment Tools

Sessional I and Sessional II

Sessional are being conducted twice in a semester (30 % weight). This assessment tool is used for attainment of course outcomes and program outcomes using a descriptive exam.

Teacher Assessment

This is a qualitative performance assessment tool (10% weight) designed to assess students' knowledge of engineering practices, framework, and problem solving skills.

End semester examination

End semester examination (60 % weight) is more focused on attainment of course outcomes and program outcomes using a descriptive exam.

Indirect assessment Tools

Course end survey

Course surveys are used as an Indirect assessment Tool for the attainment of course outcomes and program outcomes through Class Committee meetings. At the end of each semester students feedback is conducted.

2.2.4. Indicate the extent to which the laboratory and project course work are contributing towards attainment of the POs (10)

A proper balance between theory and practical subjects has been maintained for all the semesters of the programme as indicated in the table given below:

			Balance between theory and practical					
Semester	Total credits (Theory and Practical)	Total contact hours (Theory and Practical)	Theory			Practical		
			Credits	Contact hours	Credit %	Credits	Contact hours	Credit %
III	30	18	24	12	80	6	6	20
IV	32	18	24	12	75	8	8	25
V	42	24	36	18	85.71	6	8	14.28
VI	36	21	30	15	83.33	6	6	16.66

VII	44	19	30	15	68.18	14	10	31.81
VIII	28	12	24	12	85.71	4	0	14.28
Total	**212**	**112**	**168**	**84**		**44**	**38**	

2.3. Evaluation of the attainment of the 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.

Include information on: (50)

a) 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 assessment process:

The steps involved in assessment of the PO are given below:

Step 1: The individual faculty member collects the qualitative and quantitative data required for the assessment.

Step 2: For each Program Outcome the assessment criteria and its target is set by individual faculty member.

Step 3: Program outcomes are assessed through the data collected in continuous evaluation. The course outcomes are mapped to program outcomes in strong and moderate relationship. Attainment of program outcome is calculated through course outcome attainment.

Program outcomes are assessed by direct assessment tool. The direct assessment is done on the basis of internal and end semester evaluation. The detailed procedure for calculation of direct assessment of a PO is explained below.

- Each course is defined with certain number of CO by respective faculty.
- For theory courses each question of all assessment papers are mapped to appropriate COs. Target marks for each question are set by respective faculty for the attainment of CO.
- Overall CO attainment for courses is calculated as average of attainment of all questions mapped to each CO in all examinations. This is taken as direct assessment.
- These COs are mapped with POs of program, either strongly or moderately.
- The direct PO attainment is calculated on the basis of weighted average of CO. A 90% weightage (80 – 100%) is given for strong mapping and 70% (60 – 80%) weightage is for moderate mapping.

b) The frequency with which these assessment processes are carried out

This exercise is carried out by the individual faculty member as soon as any evaluation activity (Such as Sessional exam, teacher's assessment, end semester exam and course exit feedback etc) is over. However, overall PO attainment is calculated at the end of every semester.

2.3.2. Indicate results of evaluation of each PO (50)

c) The expected level of attainment for each of the program outcomes;

Every course is expected to attain at least 75% PO. However, liberty is given to each faculty member to modify this expectation level of PO attainment based on the requirement of the course.

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

The procedure adopted for calculation of PO attainment is as indicated below by an example:

Subject: Mine Planning

Course code: MNL-404

Expected attainment level: 75%

From the tabulated courses, as shown in table above one course from VIII semester Mine planning is considered as an example for assessment of PO. This course consists of 4 CO as explained above. The mapping between CO and PO is also indicated in the table above.

The table given below describes the mapping of different questions asked in sessional and end semester examination for the academic session 2015-16.

Table : Mapping of questions with the CO.

Assessment tool	**Sessional -I**		**Sessional -II**		**End semester exam**					
Q. No.	1	2	1	2	1	2	3	4	5	6
CO1	Y				y			y		
CO2	Y	Y	Y	Y	y	y				
CO3				Y		y	y	y	y	y
CO4							y	y	y	y

Table : Mapping of questions with the CO.

Assessment tool	Sessional –I (15 Marks)		Sessional –II (15 Marks)		End semester exam (60 Marks)						Teachers Assessment (10 Marks)
Q. No.	**1**	**2**	**1**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	
Max. Marks	**45**	**15**	**40**	**20**	**10**	**10**	**10**	**10**	**10**	**10**	**10**
BT12MIN009	13		12	5	3.5	7	5	9	6	4.5	7
BT12MIN027	31	15	26	10	6	7.5	2	8.5	7.5	2.5	8
BT12MIN017	37	12	36	20	6.5	8	9.5	8	8	6.5	8
BT12MIN016	20	15	18	10	4	8		7.5	6.5	4	9
BT12MIN010	42	15	36	12	5.5	8.5	4	8.5	5.5	5	7
BT12MIN012	20	8	28	5	3	5	7	8	9	4.5	7
BT12MIN025	30	12	26	12	3.5	8	3.5	8.5	7.5	6.5	6
BT12MIN031	34	15	36	20	5.5	9	8.5	9	8.5	5	7
BT12MIN004	14		18	5	1.5	4.5	2.5	7.5	5.5	5.5	10
BT12MIN026	12	10	14	8	4.5	7	2	5.5	5	4.5	7
BT10MIN012	23		10		3	3	3	4.5	1	5	7
BT12MIN028	27	7	28		7	6.5	6	8	5	5	7
BT12MIN001	19		14	8	4	5.5	0	8	4	4	6
BT12MIN023	39	12	33		8.5	9.5	8.5	8.5	6.5	7	7
BT12MIN019	40	15	36	12	8.5	9	9.5	10	9	5.5	10
BT12MIN024	20		16		5	4	2.5	3.5	5	6	8
BT12MIN002	21		34	12	5.5	12	3.5	8.5	9	5.5	10
BT12MIN005	21	5	32	5	6	5.5	0	8.5	8.5	3.5	7
BT12MIN007	27		17	8	7	2.5	2.5		8.5	2	6
BT12MIN008	20		13	4	1.5		2	5	8.5	3	9
BT12MIN014	15	8	14		7.5	5	6	5	3.5	6.5	7
BT12MIN018	18	15	27	10	4.5	5	6	8	6	5.5	9
BT10MIN010	6	6	12	0	4	2.5	3	6	5.5	8	6
BT12MIN020	26		18	10	5.5	4.5	1.4	3.5	4.5	5	9
BT12MIN022	12		18						4.5	2	8
BT12MIN011	17	2	24		2	7.5	5	6.5	3.5	5	10
BT12MIN006	22		14	5	5.5	0	2	2	5	2.5	7
BT12MIN013	10	2	28	10	2.5	5	5	6	5.5	4	7
Target Marks for Attainment	**18**	**8**	**18**	**8**	**4**	**5**	**5**	**5**	**5**	**4**	**7**

Table : Direct Assessment of CO attainment

Academic year	Direct Assessment Tool	CO1	CO2	CO3	CO4
2015-16	Sessional Assessment	78.57	72.40	77.86	85.71
	End semester Assessment	77.49	73.19	72.72	71.90
Overall CO Assessment		**78.03**	**72.79**	**75.29**	**78.81**

This subject is mapped with all the nine PO and based on the mapping between CO and PO, the attainment of PO as calculated is depicted in the table given below.

Table : PO attainment

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
% attainment	76.23	76.12	76.17	75.86	75.38	75.63	76.13	77.05	77.05

It can be concluded from the table that Mine planning has attained the expected level of attainment. Similarly attainments for all the courses are calculated.

Once PO attainment of all the courses is over, all these attainments are discussed in department meeting. In the Department of mining almost all the courses, successfully achieved upto satisfaction level.

The details of PO attainment are maintained by corresponding faculty member and the final results are maintained by Head of the department.

e) How the results are documented and maintained.

All the evidences such as answer sheets, question papers, mapping and calculations etc are maintained by the individual course coordinator.

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

2.4.1. Indicate how the results of evaluation used for curricular improvements (5)

After each semester, faculty analyzed and evaluated the collected data from each course. The PO attainment for all courses in programe were discussed in Departmental meeting based on the feedback given by the faculty members. It was found that the POs were achieved up to

satisfactory level. Therefore the course coordinators were advised to maintain the attainment level and take measures to further improve the attainment.

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

Specified delivery methods like mining methods videos and animations , simulations of mine operations, models studies, site visits etc. were implemented according to need of the courses to improve the PO attainment level.

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

Process used for revising/redefining the POs

The following procedure is used for revising/redefining the POs

- Feedback from the alumni, Industry, program exit feedback, inputs from the faculty members are collected.
- Faculty members deliberate on various issues related to PO and if need arises, they suggest the revision of PO and forward their recommendations to BOS.
- BOS examines the various recommendations and revision is made accordingly.
- PO are revised as per the need.

3. Programme Curriculum (125)

3.1. Curriculum (20)

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

Table : Structure of the curriculum.

Course Code	Course title	Total number of contact hours				Credits
		Lecture (L)	Tutorial (T)	Practical# (P)	Total Hours	
CEL284	Mining Geology	3	0	2	5	8
MNL261	Introduction to Mining Technology	3	0	0	3	6
MNL262	Mine Surveying	3	0	2	5	8
MNL263	Underground Metalliferous Mining	3	0	0	3	6
MNL264	Mining Machinery	3	0	2	5	8
MNL473	Mine Management Information System	3	0	0	3	6
MNL264	Mining Machinery - I	3	0	2	5	8
MAL404	Probability and Statistics	3	0	0	3	6
CEL384	Advanced Mining Geology	3	0	0	3	6
EEL285	Industrial Electrical Engg	3	0	0	3	6
MNL362	Mining Machinery II	3	0	0	3	6
MNL265	Mine Ventilation and Climate Engineering	3	0	0	5	8
MNL266	Rock Engineering	3	0	2	5	8
MML385	Mineral Processing/Dressing	3	0	0	3	8
MNL469	Mass Production Technology for underground Coal	3	0	0	3	6
MNL267	Underground Coal Mining	3	0	0	3	6
MNL268	Surface Mining	3	0	0	3	6
MNL363	Mine Hazards and Rescue	3	0	0	3	6
MNL364	Ground Control In Mines	3	0	0	3	6
MNC366	Survey Camp (Sessional)		0	0	0	2
MNL467	Geostatistics	3	0	0	3	6
MNL 475	Blasting Technology for Min & construction	3	0	0	3	6
MNL461	Surface Mine Environment	3	0	2	5	8

MNL475	Computer Applications in Mining	3	0		3	6
MNL464	Mining Economics	3	0	0	3	6
MND451	Project Phase -I	0	0	2	2	4
MNL473	Mine Visits (Sessional)*	0	0	0	0	2
MNL264	Mine System Engineering	3	0	0	3	6
MNL404	Rock Excavation Engineering	3	1	0	4	8
CEL384	Rock Slope Engineering	3	0	0	3	6
MNL462	Mine Legislation and Safety	3	0	0	3	6
MNL463	Mine Management	3	0	0	3	6
MNL470	Mine Planning	3	0	0	3	3
MND452	Project Phase -II	0	0	2	2	8
MNC462	Training Seminar (Sessional)**	0	0	0	0	4
MNL472	Mine Safety Engineering	3	0	0	3	6

3.1.2. Give the Prerequisite flow chart of courses (5)

After first year of the programme, remaining courses are graded as first level, second level and advanced courses as indicated in the Table below. Efforts are made to keep first level courses in 3rd and 4th semester, second level courses in 5th and 6th semester and advanced level courses in 7th and 8th semester, as far as possible. Since the courses are mapped semester-wise and students have to take these courses semester-wise, it is assumed that students are taking these courses sequentially. Faculty Advisers also counsel students in this matter.

Table : Classification of courses

3.1.2	Course	Pre-requisite	Course	Pre-requisite
First level courses	CEL284		MNL473	
	MNL261		MNL264	
	MNL262		MAL404	
	MNL263		CEL384	
	MNL264			
Second level courses	EEL285		MNL363	
	MNL362	MNL264	MNL364	MNL266
	MNL265		MNC366	
	MNL266		MNL467	
	MML385		MNL267	
	MNL469	MNL267		
	MNL268			
Advance level courses	MNL 475		CEL384	
	MNL461		MNL462	
	MNL475		MNL463	

	MNL464		MNL470	
	MND451		MND452	
	MNL473		MNC462	
	MNL264		MNL472	
	MNL404	MNL261	MNL467	CEL284

3.1.3. Justify how the programme curriculum satisfies the program specific criteria (10)

First level courses introduce students to Engineering and Technology aspect of the courses. So students learn the relevance of the courses and learn necessary skills required for higher level courses. In the second level courses the level of complexity and difficulty is even more. Students are also introduced to industrial practices. Course at this level also create awareness in students as to how new knowledge is created and research is carried out to tackle industrial problems. In the advanced level courses students learn as to how knowledge is created in research activities and from observation in industries and, as to how knowledge used to analyse and solve industrial problems., plan testing and other studies; this give them exposure to the way industrial or research problems are tackled. These courses together impart students necessary skills needed in industries and encourage them for higher studies, R&D and teaching profession.

3.2. State the components of the curriculum and their relevance to the POs and the PEOs (15)

Table : Programme curriculum grouping based on different components

SN	**Course Component**	**PEOs**	**PO**	**Total Credits**	**(% of total number of credits of the program)**
1	**Basic Engineering Courses**	PEO 1, PEO 2, PEO3	PO1, PO3	42	13.125
2	**Basic Science and Mathematics Courses**	PEO 1	PO1, PO3	38	11.875
3	**Humanities and Social Science Courses**	PEO 3	PO6, PO7	10	3.125
4	**Departmental Core Engineering Courses**	PEO 1, PEO2, PEO3	PO1, PO2,PO3, PO4,PO5,PO6, PO7,PO8,PO9	152	47.5
5	**Departmental Core Elective Courses**	PEO 1, PEO2, PEO3	PO1, PO2,PO3, PO4,PO5,PO6, PO7,PO8,PO9	60	18.75

6	**Open Courses, Humanities(HM)**	PEO 1, PEO2, PEO3	PO6, PO8, PO9	18	5.625
		Total		**320**	**100.00**

3.3. State core engineering subjects and their relevance to Programme Outcomes including design experience (10)

(Describe how the core engineering subjects in the curriculum are giving the learning experience with the complex engineering problems)

List of core subject is given in Table above. These courses impart basic engineering knowledge, teach them analysis of the problem and way to tackle those. In advanced level courses they learn to analyse complex engineering problems apply basic knowledge and find solutions. During project work they learn to conduct investigation of complex problems. They also learn to use equipments, which are computer controlled and use modern IT tools for communication, data processing and presentation. These courses also focus on environmental issue related to depletion of mineral resources and effect of metal production on environment. During project work they learn to take instructions from supervisor, work in team, prepare reports and present their findings.

3.4. Industry interaction/internship (10) :

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

- The industry especially our alumni in industry are actively involved.
- Field training of three months in opencast, UG coal and Metal Mining is compulsory as a part of curriculum.
- Three guided field visits are compulsory to 2nd, 3rd and final year students.
- Guest lectures are delivered by industry experts.
- Visiting faculty from the field are engaged.
- Field based final year projects.
- Mine survey camp.

3.5. Curriculum Development (15)

3.5.1 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)

The program curriculum is designed based on the kind of job a mining engineer shall have to perform. It also takes into account, syllabus of GATE, so that our students are encouraged to undertake higher studies and research. Inputs are also taken informally from alumni. Members from industry are nominated in the BOS, so that their inputs are considered in framing and modifying syllabus. A Professor from IIT is also nominated to

BOS in Mining so that his inputs are taken in framing and modifying syllabus of courses and to know any changes they have made.

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

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

For improvement in the curriculum the following process is adopted

- Feedback from the Alumni, student feedback (course exit feedback), industry are considered.
- The course coordinators identify new portion to be included and obsolete portion to be dropped by continuously updating based on technologies and latest development.
- Once change or modifications required in the curriculum are identified by the course coordinator, it is submitted to HoD.
- All such modifications required are discussed in DAB meeting.
- If approved in DAB, are submitted to BOS and senate for final approval.

3.6. Course Syllabi (5)

(Include, in **Appendix -1,** a syllabus for each course used. Syllabi format should be consistent and shouldn't exceed two pages.)

The syllabi format may include:

- Department, course number, and title of course
- Designation as a 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

4. Students' Performance (75)

Admission intake in the programme

Item	CAY 2015-16	CAYm1 2014-15	CAYm2 2013-14	CAYm3 2012-13
Sanctioned intake strength in the program (N)	40	40	40	32
Total number of admitted students in first year minus number of students migrated to other programs at the end of 1st year (N1)	32	39	37	30
Number of admitted students in 2nd year in the same batch via lateral entry (N2)	-	-	-	-
Total number of admitted students in the program (N1+N2)	32	39	37	30

4.1 Success Rate (20)

Year of entry (in reverse	Number of Students admitted in 1st year + admitted via lateral entry in 2nd year (N1+N2)	Number of students who have successfully completed*			
		1st year	2nd year	3rd year	4th year
CAY 2015-16	32	25			
CAYm1 2014-15	39	22	14		
CAYm2 2013-14	37	29	28	28	
CAYm3 12-13(LYG)	30	20	20	20	20
CAYm4 11-12 (LYGm1)	31	26	24	24	24
CAYm5 (LYGm2)10-11	19	14	14	14	14
CAYm6 9-10	11	10	10	10	10

*: Successfully completed implies zero backlogs

Success rate = 20 × mean of success index (SI) for past three batches

SI= (Number of students who graduated from the programme in the stipulated period of course duration)/(Number of students admitted in the first year of that batch and admitted in 2nd year via lateral entry)

Item	**LYG 2012-13**	**LYGm1 2011-12**	**LYGm2 2010-11**
Number of students admitted in the corresponding First year + laterally admitted via lateral entry in 2nd year	30	31	19
Number of students who have graduated in the stipulated period	28	24	14
Success Index (SI)	**0.93**	**0.77**	**0.73**

Average SI = 0.81
Success Rate = 20* Average SI = 20*0.81 = 16.2

4.2. Academic Performance (20)

Assessment = 2 x API
Where API = Academic Performance Index
= Mean of Cumulative Grade Point Average of all successful Students on a 10 point CGPA system
or
= Mean of the percentage of marks of all successful students / 10

Approximating The API by the following mid-point Analysis	**LYG 2015-16**	**LYGm1 2014 -15**	**LYGm2 2013 -14**
9<Number of Students with CGPA<10	4	2	-
8<Number of Students with CGPA<9	6	4	5
7<Number of Students with CGPA<8	10	11	7
6<Number of Students with CGPA<7	3	9	3
5<Number of Students with CGPA<6	5	2	1
Total	28	28	16
Mean of Cumulative Grade Point Average of all	7.53	7.3	7.5

successful Students on a 10 point CGPA system			
Assessment = 2 x API	15.06	14.6	15.0
Avg. Assessment for three years	**14.88**		

4.3 Placement and Higher Studies (20)

Assessment Points = 20 × (x + 1.25y)/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 including lateral entry subject to maximum assessment points = 20.

Item	**LYG**	**LYGm1**	**LYGm2**
Number of admitted students corresponding to LYG including lateral entry (N)	30	31	19
Number of students who obtained jobs as per the record of placement office (x1)	13	19	5
Number of students who found employment otherwise at the end of the final year (x2)	-	-	-
x = x1 + x2	13	19	5
Number of Students who opted for higher studies with valid qualifying scores/ranks (y)	10	3	4
Assessment Point	17	14.67	10.52

Average assessment points = 14.06

4.4 Professional Activities (15)

4.4.1. Professional societies / chapters and organising engineering events (3) (Instruction: The institution may provide data for past three years).

Sr No	**Name of faculty**	**Details of events organized**	**Date**	**Organised by**
1	Dr. N. R. Thote	National Conference was organized on "Advances in Explosive and Propellants (co- Convenor)	22nd March 2014	Department of Chemical engineering VNIT
2	Dr. N. R. Thote	National Summit on " Challenges Before Mining Industry for sustainable development"	Novem ber 2014	TEQIP & Mining Alumni Association
3	Dr. N. R. Thote	Workshop on Global Mining Trends	9 Oct. 2014	Under TEQIP

4	Dr. Rajendra Yerpude	Workshop on E-governance	12 Feb 2014	VNIT
5	Dr. Rajendra Yerpude	National Summit on " Challenges Before Mining Industry for sustainable development"	Nov 2014	TEQIP & Mining Alumni Association
6	Dr I L Muthreja	Curriculum Development Workshop	Feb 2016	TEQIP
7	Dr I L Muthreja	National Summit on " Challenges Before Mining Industry for sustainable development"	Novem ber 2014	TEQIP & Mining Alumni Association

4.4.2. Organisation of paper contests, design contests, etc. and achievements (3) (Instruction: The institution may provide data for past three years).

Sr. No	Year	Name of students	Achievements
1	2015-16	AbhishekMurlidharan	Won 1st Prize in Debate organized by SIDBI
2	2015-16	A. Laxman	Won 3rd Prize in dance comptt of AROHI'16
3	2014 - 15	Ashish Singh	Organized Wall street event in AXIS'15
4	2015-16	AniketLande	Organizer of Consortium'16
5	2015-16	Jai Jain	Organiser of E-CELL
6	2015	Rushikesh Pande	AXIS Logistics Head
7	2015	Rutwik Baxy	AXIS Logistics Head
8	2015-16	Veena Bharane	E-CELL Manager
9	2013	Sonu Kumar Jha	Won 1st Prize in Pascal Trouble Event of AXIS'13
10	1.2016 2.2014 3. 2015	Rajat Jain	City Co-ordinator of an event of Consortium'16 Organizer of Axis'14-informals OraganizedRenaissance'15
11	1.2015 2.March 2015	Sandesh Agrawal	1 Founder of Fab-Tees Co. 2 Secured 1st position in the Labrynth& Quest event of SURANG'15(Anna University)
12	1. Jan 2015 2. March 2016	KoustubhHaridas	1 Winner of BizMantra- A marketing and sales competition of VNIT in the year 2014. 2 Runner Up at Startup Weekend, Nagpur powered by Google for Entrepreneurs
13	1. 26 Jan 2016 2. Mar 2015	Mohan Kakde	1 Academic Excellence Prize for 2ndyrB.Tech Mining 2 Secured 1stposition in the

			Labrynth of SURANG'15(Anna University)
14	1. Aug 2013 2. Mar 2015	Yash Zanwar	1 certified Ethical Hacking Expert (Level 1.0) by Techdefence at AXIS'13 2 1st prize in Papyrus & runners up in Robotron event of SURANG'15(Anna University)
15	Mar 2015	Mohit Butani	1 Got1st prizein Papyrus,1st prize in Labyrynthquiz,2 Second runner ups in M17anagement Psyche of SURANG'15(Anna University)
16	Mar 2016	Ankur Raj	won 2nd Prizein Inter-NIT Volley Ball Competition
17	Jan 2016	Rupak Bose	Won 1st Prize in Urbanismo event of Consortium'16
18	2013	Singaram Harish	Won 1st place in CHESS COMPETITION held in VNIT
19	Jan 2016	Yogesh Gidwani	Chosen as Indian delegateto Harvard US-India initiative Conference,an International Youth Dialogue
20	2015-16	Krishnamohan	Bagged 3rd Position in Inter-NIT Kabaddi Competition'2015 and 2016
21	2015	Chaitanya Malla	Bagged 3rd Position in Inter-NIT Kabaddi Competition'2015
22	2015	Jayesh Mahure	AIR 65 in GATE'15
23	2015	Sarang Gotmare	AIR 75 in GATE'15
24	2016	Saurabh Singh	AIR 24 in GATE'16
25	2016	Kshitij Sharma	AIR 36 in GATE'16(Got admission in IISC Bangalore)
26	2016	Amish Kumar	AIR 75 in GATE'16
27	2016	Karunakar kompally	AIR 97 in GATE'16, IIT Kharagpur
28	2016	Mayank Kumar	AIR 110 in GATE'16
29	2016	VikramTak	AIR 141 in GATE'16
30	2016	MD Shahnawaz Alam	AIR 181 in GATE'16
31	2016	Ashwin Avinash Joshi	AIR 210 in GATE'16
32	2016	Prince kumar singh	AIR 251 in GATE'16
33	2016	Yogesh Shinde	AIR 254 in GATE'16
34	2016	KuhateMadhur Ghahshyam	AIR 259 in GATE'16
35	2016	Mokadam Shreyas Dinesh	AIR 283 in GATE'16
36	2016	Ramkishor Jani	AIR 305 in GATE'16
37	2016	Gandhe Saurabh Ravindra	AIR 310 in GATE'16

38	2016	Malviya Abhiraj Ashok	AIR 355 in GATE'16
39	2016	Hirale Kuldeep Yograj	AIR 443 in GATE'16
40	2015	L Paohao Khongsai	CAT 2014 IIM Shillong (Batch 2015-17)
41	2014	Ravi Jeengar	CAT 2014 IIM Kashipur (Batch 2015-17)
42	2016	Shreyas Kulkarni	CMAT 2016 KJ Somaiya Institute Of Management Studies And Research (Batch 2016-18)
43	2016	Saurabh Mitra	XAT 2016 Xavier Institute of Management, Bhubaneswar (Batch 2016-18)
44	2014	Mahip Raj	IISC Bangalore
45	2014	Kshitij Sharma	IISC Bangalore
46	2014	Mayank Dixit	IIT Delhi
47	2013	Saurabh Kumar	CAT, IIM Kozhikode (2014-16)
48	Jan'2014	Mining Department Bagged 3rd Position in Institute Gathering'14among 9 departments(Annual Inter-Department Cultural & Sports Competition)	
49	Jan'2014	Won Enthu Trophy(1st Position) in Institute Gathering'14among 9 departments(Annual Inter-Department Cultural & Sports Competition)	
50	Jan'2015	Mining Department Bagged 5th Position in Institute Gathering'15 among 9 departments (Annual Inter-Department Cultural & Sports Competition)	
51	Jan'2016	Mining Department Bagged 3rd Position in Institute Gathering'16 among 9 departments (Annual Inter-Department Cultural & Sports Competition)	

4.4.3. Publication of technical magazines, newsletters, etc. (3)

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

Students are regularly participating in various magazines every year.

4.4.4. Entrepreneurship initiatives, product designs, and innovations (3)

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

Students are taking initiatives for the start up having application to mining through institute incubation center. Institute is encouraging the entrepreneurship by offering open courses by the alumni having industry. Institute has Entrepreneurship Cell which conducts consortium, seminars etc.

4.4.5. Publications and awards in inter-institute events by students of the programme of study (3)

(Instruction: The institution may provide a table indicating those publications, which fetched awards to students in the events/conferences organised by other institutes. A tabulated list of all other student publications may be included in the appendix.)

Sr No	Name of student	Details of papers published		Date , Page number
1	Rajatjain, SonukumarJha, Vivekkumar	Paper presentation on 'Continuous Miner & Its Scope in Future of Mining'in Surang'15 in **Anna University, Chennai**	Paper presentation	6 March 2015
2	Mohan Kakde, YashZanwar, MohitButani	Paper presentation on 'Tell Tale Meter' in Surang'15 in Anna University, Chennai	Paper presentation	6 March 2015
3	SahilNagulwar	Paper presentation on 'The Difference between the social & economical behavior of beggars & roadside vendors' under HOD of humanities department VNIT, Nagpur	Paper presentation	June 2016
4	ChaitanyaMalla, KompallyKarunakar	Paper Presentation On "Slope Stability Analysis of Open Cast Mines by UDEC software" in Indo Rock '2016(IIT Bombay)	Paper presentation	18 June 2016

5. Faculty Contributions (175)

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

Name of the faculty member	Qualification university, and year of graduation	Designation and date of joining the institution	Distribution of teaching load(%)			Number of research publication in journals and conferences since joining	IPRs	R & D and consultancy work with amount	Holding an incubation unit	Interaction with outside world
			1st year	UG	PG					
Prof. S.B. Shringarputale,	M.Sc 1987, DIC-1987, B.E.- 1972	Professor, 23.11.2000	-	100 %	0 %	35	-	20 Lakhs R&D-shared 40 Lakhs consultancy -shared	-	Interaction with CIMFR, MOIL, WCL etc.
Dr. N. R. Thote	Ph.D-2002, M.Tech-1989, B.E. -1987	Professor, 6.6.1988	-	50 %	50 %	129		40 Lakhs shared, R&D 40 Lakhs shared Consultancy	-	Interaction with CIMFR, MOIL, WCL RMC etc. BOS members for NIT, State Engg. Colleges, UPSC, MPSC, IMEJ, Visfotak
Dr. Rajendra Yerpude	Ph D.-2001, M.Tech-1988, MBA, LLB AMIE-1983, , LLB, MBA	Professor 15 Nov. 1990	-	50 %	50 %	44		55 Lakhs shared R&D, 40 lakhs shared Consultancy	-	Interaction with CIMR, MOIL, WCL, IBM etc.
Dr I. L. Muthreja	M.Tech-1988, B.E. -1979 PhD-2014	Associate Professor, 1983		100 %	0 %	58		80 Lakhs shared R&D 45 lakhs Consultancy	-	Interaction with CIMFR, MOIL, WCL etc.
Dr. S. S. Gupte	Ph.D-2013,	Associate	-	50 %	50 %	27		40 Lakhs shared,	-	Interaction with CIMR,

	M.Tech-1992, B.E. -1977	Professor						R&D, 40 Lakhs shared Consultancy		MOIL, WCL, IIT etc.
Shri Sandeep Panchal	Ph D (Pursuing) M.Tech-20 08 B.E. -2006	Assistant Professor July 2008	-	100 %	0 %	1		12 Lakhs shared		Interaction with CIMR, MOIL, WCL, IBM etc.
Dr. A. K. Agarwal	Ph D - 2015 M.Tech – 1989 M.E. 2010 B.E. -1986	Assistant Professor May 2016	Recent Appointment							
Dr. Ritesh D. Lokhande	Ph D - 2013 B.E. -1999	Assistant Professor July 2016	Recent Appointment							

(Instruction: The institution may complete this table for the calculation of the student-teacher ratio (STR). Teaching loads of the faculty member contributing to only undergraduate programme (2nd, 3rd, and 4th year) are considered to calculate the STR.)

5.1 Student Teacher Ratio (STR) (20)

STR is desired to be 15 or superior

Assessment = 20 × 15/STR; subject to maximum assessment of 20

STR = $(x + y + z)/N1$

where, x = Number of students in 2nd year of the programme

y = Number of students in 3rd year of the programme

z = Number of students in 4th year of the programme

$N1$ = Total number o f faculty members in the programme (by considering fractional load)

Year	X	Y	Z	X+Y+Z	N1	STR	Assessment
CAYm2	30	28	18	76	9	8.4	20
CAYm1	37	28	28	93	8	11.62	20
CAY	39	37	28	104	11	9.4	20
Average assessment							20

For Item nos. 5. 2 to 5. 8, the denominator term (N) is computed as follows:

N = Maximum {$N1$, $N2$}
$N1$ = Total number of faculty members in the programme (considering the fractional load)
$N2$ = Number of faculty positions needed for student-teacher ratio of 15.

Year	N1	N2	N = Max{N1, N2}
CAYm2	9	5	9
CAYm1	8	6.2	8
CAY	11	6.9	11

5.2Faculty Cadre Ratio (20)

Assessment = 20 × CRI
where, CRI = Cadre ratio index
= 2.25 × (2x + y)/N; subject to max. CRI = 1.0
where, x = Number of professors in the programme
y = Number of associate professors in the programme

	X	Y	N	CRI	Assessment
CAYm2	**1**	**4**	9	**1**	**20**
CAYm1	**1**	**4**	8	**1**	**20**
CAY	**2**	**2**	11	**1**	**20**
Average Assessment					**20**

5.3. Faculty Qualifications (30)

Assessment	=		3 x FQI
Where FQI	=		Faculty Qualification Index
	=		(10x + 6y+2 Z_0)/ *N2* Such that, x + y+ $z_0 \leq N2$; and $z_0 \leq z$
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

	X	Y	Z	N	FQI	Assessment
CAYm2	**6**	**2**	**0**	5	14.40	43.20
CAYm1	**6**	**1**	**0**	6.2	10.65	31.94
CAY	**6**	**4**	**0**	6.9	12.17	36.52
Average Assessment						**37.22**

5.4 Faculty Competencies correlation to Programme Specific Criteria (15)

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

Name of faculty	Specializations
Prof. S.B.Shringarputale	Rock mechanics, Ground Control, Mine Legislation and Mine Economics
Dr. N. R. Thote	Rock engineering, rock blasting, rock excavation, Mine management
Dr. Rajendra Yerpude	Safety, Metal mining , System engineering
Dr. I. L. Muthreja	Mine Environment, Mine planning, surface mine climate, Slope stability
Dr. S. S. Gupte	Opencast mining, slope engineering, mining machinery
Shri Sandeep Panchal	(On deputation) Rock Mechanics, Geotechnical Engineering
Dr. A. K. Agarwal	Rock engineering, Soil Mechanics, Water Pollution
Dr. Ritesh D. Lokhande	Rock mechanics and Ground Control

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

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

Participant/resource person in two week faculty development programme : 5 points
Participant/resource person in one week faculty development programme : 3 Points

Name of the faculty	Max. 5 per faculty		
	CAYm2	CAYm1	CAY
Prof. S.B.Shringarputale	0	0	0
Dr. N. R. Thote	5	5	5
Dr. Rajendra Yerpude	5	5	5
Dr. I. L. Muthreja	5	5	5
Dr. S. S. Gupte	0	0	0
Sandeep Panchal	0	0	3
SUM	15	15	18
N (Number of faculty positions required for an STR	5	6.2	6.9
Assessment = 3 × Sum/*N*	9.0	7.25	7.82
Average assessment			**8.02**

5.6. Faculty Retention (15)

Assessment = 3 × RPI/N

where RPI = Retention point index = Points assigned to all faculty embers

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

Item	CAYm2	CAYm1	CAY
Number of faculty members with experience of less than 1 year(x_0)	nil	nil	nil
Number of faculty members with 1 to 2 years experience x1	1	nil	nil
Number of faculty members with 2 to 3 years experience x2	nil	1	1

Number of faculty members with 3 to 4 years experience x3	nil	nil	nil
Number of faculty members with 4 to 5 years experience x4	nil	nil	nil
Number of faculty members with more than 5 years experience (x_5)	8	7	10
N	9	8	11
RPI = x_1+ 2x_2+ 3 x_3+ 4 x_4+ 5 x_5	41	37	52
Assessment	13.67	13.88	14.18
Average Assessment			**13.90**

5.7. Faculty Research Publications (FRP) (30)

Assessment of FRP = 4 × (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)		
	CAY m2	CAY m1	CAY
Prof. S.B.Shringarputale	0	0	0
Dr. N. R. Thote	5	5	5
Dr. Rajendra Yerpude	5	5	5
Dr. I. L. Muthreja	5	5	5
Dr. S. S. Gupte	5	-	-
Sandeep Panchal	0	0	2
SUM	18	11	14
N (Number of faculty positions required for an STR of 15)	5	6.2	6.9
Assessment of FRP = 4 × Sum/*N*	14.40	7.10	8.12
Average Assessment			**9.87**

5.8. Faculty Intellectual Property Rights (FIPR) (10)

Assessment of FIPR = 2 × (Sum of the FIPR points scored by each faculty member)/N
(Instruction: A faculty member scores maximum five FIPR points each year??. FIPR includes awarded national/international patents, design, and copyrights.)

Dr. I L Muthreja: Two patents are published and waiting to be examined.

Name of faculty (contributing to FIRP)	FRP points (Max. 5 per faculty)		
	CAYm2	CAYm1	CAY
Sum			
N			
Assessment FIPR = 2x Sum/N	0	0	0
Average assessment			0

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

Assessment of R&D and consultancy projects = 6 × (Sum of FRDC by each faculty member)//N
(Instruction: A faculty member scores maximum 5 points, depending upon the amount.)
A suggested scheme is given below for a minimum amount of Rs. 1 lakh:
Five points for funding by national agency, Four points for funding by state agency, Four points for funding by private sector, and Two points for funding by the sponsoring trust/society.

Name of faculty (controlling to FIPR)	FRP points (max. 5 per faculty)		
	CAYm2	CAYm1	CAY
Prof. S.B. Shringarputale	**5**	**5**	**5**
Dr. N. R. Thote	**5**	**5**	**5**
Dr. Rajendra Yerpude	**5**	**5**	**5**
Dr. I. L. Muthreja	**5**	**5**	**5**
Dr. S. S. Gupte	**5**	**5**	**5**
Sandeep Panchal	**0**	**0**	**0**
Sum	**25**	**25**	**25**
N	**9**	**8**	**11**
Assessment of FRP = 6 x Sum/N	16.67	18.75	13.64
Average Assessment			16.35

5.10. Faculty Interaction with Outside World (15)

FIP = Faculty interaction points

Assessment = 2 × (Sum of FIP by each faculty member)/N
(Instruction: A faculty member gets a maximum of five interaction points, depending upon the type of institution or R&D laboratory or industry, as follows)
Five points for interaction with a reputed institution abroad, institution of eminence in India, or national research laboratories,
Three points for interaction with institution/industry (not covered earlier).

Points to be awarded, for those activities, which result in joint efforts in publication of books/research paper, pursuing externally funded R&D / consultancy projects and/or development of semester-long course / teaching modules.

Name of faculty (controlling to FIP)	FIP points (max. 5 per faculty)		
	CAYm2	CAYm1	CAY
Prof. S.B.Shringarputale	0	0	0
Dr. N. R. Thote	5	5	5
Dr. Rajendra Yerpude	5	5	5
Dr. I. L. Muthreja	5	5	5
Dr. S. S. Gupte	1	0	5
Sandeep Panchal	0	0	0
Sum	16	15	20
N	9	8	11
Assessment of FRP = 2 x Sum/N	**3.56**	**3.75**	**3.64**
Average Assessment			**3.64**

6. Facilities and Technical Support (75)

Description of classrooms, faculty rooms, seminar, and conference halls: (Entries in the following table are sampler entries)

Room Description	**Usage**	**Shared/Exclusive**	**Capacity**	**Rooms Equipped with PC, Internet, Book rack, meeting space...**
No. of Class Rooms (04)	Second Year Room Third Year Room Final Year room M. Tech Room	Exclusive Exclusive Exclusive Exclusive	40 40 40 20	All Equipped with LCD projector
No. of Seminar Rooms (01)	Seminar Room	Shared	80	Equipped with LCD projector & Multi Media Facility
No. of Meeting/ audio visual Room (01)	Meeting Room	Shared	15	Equipped with LCD projector
No. of Faculty Rooms (09)	Faculty rooms	Exclusive		All Rooms equipped with P C, Internet & LAN
Internal library (1)	For referring the books and Project reports	Exclusive	10	Equipped with suitable furniture
Research Scholar room (1)	For carrying out research activates by the students.	Exclusive	10	Equipped with computer, suitable furniture etc
Girls common room (1)	For Girls	Exclusive	5	Equipped with attached toilet and suitable furniture

6.1. Classrooms in the Department (20)

6.1.1. Adequate number of rooms for lectures (core /electives), seminars, tutorials, etc., for the program (10)

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

An adequate number of class rooms for lectures (core/electives), seminars, tutorials are available in the department

6.1.2. Teaching aids multimedia projectors, etc. (5)
(Instruction: List the various teaching aids available)

All the above rooms are equipped with LCD projector.

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

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

the inspection thereof.)

The acoustics, size, state of furniture, air circulation, lighting, cleanliness, entry / exit & overall ambience is very good & fit for the purpose.

6.2. Faculty Rooms in the Department (15)

6.2.1. Availability of individual faculty rooms (5)

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

Individual rooms are available for each Faculty in the department.

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

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

All faculty rooms are equipped with computers, Internet & LAN & have a white / board.

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

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

Individual Faculty rooms as well as the Seminar / Meeting rooms are routinely used for interactions such as counselling / discussions with individual students or small groups.

6.3. Laboratories in the Department to meet the Curriculum Requirements and the POs (25)

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

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

Adequate, well-equipped laboratories to meet the curriculum requirements and the P O's are available in the Department.

S.No.	Name of the Lab.	Available floor area (sq.m)
1	Rock Mech	104
2	Mine Environ	104
3	Mining Machinery	52
4	Mine Survey	52
5	Mine systems	70
6	Rock Blasting	10

7	Mining W/S 1	512
8	Mining W/S2	55

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

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

Good computing facilities are available in the department.

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

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

Availability of laboratories with technical support within and beyond working hours when needed.

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

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

Good Equipment & facilities to run experiments, their maintenance, number of student per experimental setup, size of the laboratories, overall ambience etc are all good.

6.4. Technical Manpower Support in the Department (15)

Name of the Technical Staff	Designation (Pay-Scale)	Exclusive /Shared Work	Date of Joining	Qualification		Other Technical skills gained	Responsibility
				At joining	Now		
Mr V.R. Barai	Technician, GR II, 4600 / Grade Pay	Shared	07/ 06/ 1987	B.Com, I.T.I,	Same	I.T.I, Machinist	Conduct of Laboratory experiments, UG / PG & Research students, R & D projects, Testing & Consultancy work, maintenance of Lab.
Mr Y.G. Ghonge	Sr. Lab. Assistant Rs 2800/ Grade Pay	Shared	27/ 06 / 1991	S.S.C., I.T.I. Turner	same	I.T.I. Machinist, CNC Machine	As Above
Shri M.D.	Sr. Lab.	Shared	7 / 04 /	SSC	same	.	As above

Katole	Assistant Rs 2800/ Grade Pay		1992				
Mr P.S. Kubde	Sr. Lab. Assistant Rs 2400/ Grade Pay	Shared	16 / 07 1999	B.Sc.	same	I.T.I. Computer	As Above
Mr. Sairam T. Rao	Tech. Assistant Rs. 4200/- Grade Pay	Shared	26/08/ 2014	Diploma in Civil, B.E. (Civil)	Same	Auto Cad Design	As Above
Mr. J. M. Khande	Lab. Assistant Rs. 2000/- Grade Pay	Shared	22/08/ 2014	Diploma in Elec. & comm.	Same	Diploma in Ind. Safety	As Above

6.4.1. Availability of adequate and qualified technical supporting staff for program specific laboratories (10)
(Instruction: Assessment based on the information provided in the above table)

- Well qualified & Well Trained Technical supporting staff are available in the department.

- Sufficient technical staff is available to run the course laboratories.
- Each course specific lab has a qualified supporting staff.

6.4.2. Incentives, skill-up gradation and professional advancement (5)
(Instruction: Assessment based on the information provided in the above table)

- Technical staff is provided with sufficient time and support to upgrade their skills.
- Once they upgrade their qualification and skills, they are considered for promotion by higher authorities.
- The TEQIP & such other facilities are made use of for training & skill up-gradation of staff.

7. Academic Support Units and Teaching-Learning Process (75)

Students' Admission

Admission intake -UG (for information only)

Item	CAY 2015-16	CAYm1 2014-15	CAYm 2 13-14	CAY CAYm3 12-13
Sanctioned Intake Strength in the Institute (N)	746	746	746	738
Number of students admitted on merit basis (N1)	708	722	701	713
Number of students admitted on management quota / **otherwise** (N2)	40 (DASA/ICCR/MEA)	38	30	48
Total number of admitted students in the Institute (N1+N2)	748	760	731	761

Admission quality (for information only)

Divide the total admitted ranks (or percentage marks) into **five** or a few more meaningful ranges

Sr. No.	Rank range (AIEEE Ranking)	2015-16	2014-15	2013-14	2012-13	2011-12	2010-11	2009-10
01	1-20000	387	425	403	410	436	411	367
02	20000-40000	155	115	138	136	137	130	105
03	40000-60000	43	47	32	49	30	47	29
04	60000-80000	39	37	33	48	38	38	36

05	80000-100000	25	18	18	27	37	29	22
06	100000-150000	30	39	45	21	19	26	25
07	150000-200000	13	19	07	8	12	10	14
08	200000-300000	07	10	11	9	6	4	11
09	300000-400000	05	05	07	1	3	4	1
10	400000-500000	01	01	02	1	2	3	0
11	500000-600000	01	03	01	2	1	2	0
12	600000-700000	01	01	03	1	1	0	0
13	Admitted without AIEEE ranks (foreign nationals)	40	38	30	48	15	45	53
	Total	**748**	**760**	**731**	**761**	**737**	**749**	**663**

Tabular data for estimating student-teacher ratio and faculty qualification for first year common courses

List of faculty members teaching first year courses

Sr. No.	Name of the faculty	Qualification	Designation	Date of joining the institution	Department with which associated	Distribution of teaching load (%)		
						1st year	UG	PG
1.	Dr. J.D. Ekhe	Ph.D	Professor	24/07/1996	Chemistry	--	50	50
2.	Dr. S.S. Umare	Ph.D	Professor	23/08/1996	Chemistry	21	31.7	47.3
3.	Dr. (Mrs.) Anupama Kumar	Ph.D	Associate Professor	06/01/2000	Chemistry	14.2	42.8	43
4.	Dr. Sujit Kumar Ghosh	Ph.D	Associate Professor	04/07/2012	Chemistry	--	--	100
5.	Dr. (Mrs.) Ramani V. Motghare	Ph.D.	Assistant Professor	17/05/2006	Chemistry	100	--	--
6.	Dr. Chayan Das	Ph.D/	Assistant Professor	30/05/2006	Chemistry	25	--	75
7.	Prof. Atul V. Wankhede	Ph.D/	Assistant Professor	26/05/2009	Chemistry	62.5	--	37.5
8.	Dr. Sangesh P. Zodape	Ph.D	Assistant Professor	02/04/2012	Chemistry	25	--	75
9.	Dr. Umesh Rohidas Pratap	Ph.D/M. Sc.	Assistant Professor	02/05/2012	Chemistry	62.5	--	37.5
10.	Dr. Susanth K. Nayak	Ph.D	Assistant Professor	20/01/2015	Chemistry	52	48	--
11.	Dr. S. Laxmi Gayatri	Ph.D	Assistant Professor	06/02/2015	Chemistry	53.8	--	46.2

12.	Dr. Abhishek Banerjee	Ph.D	Assistant Professor	18/06/2016	Chemistry	100	--	--
13.	Dr. Sandipan Haldar	Ph.D	Assistant Professor	23/06/2016	Chemistry	85	15	--
14.	Dr. V.K. Deshpande	Ph.D	Professor & Head	08/03/1988	Applied Physics	30	35	35
15.	Dr. R.S. Gedam	Ph.D	Associate Professor	28/08/1998	Applied Physics	20	45	35
16.	Dr. B.R. Snkapal	Ph.D	Associate Professor	10/05/2012	Applied Physics	--	--	100
17.	Dr. G. Hemachandra	Ph.D	Associate Professor	23/05/2012	Applied Physics	100	--	--
18.	Dr. (Mrs.) S.R. Patrikar	Ph.D/M. Sc.	Assistant Professor	16/05/2006	Applied Physics	70	--	30
19.	Dr. (Mrs) A. V. Deshpande	Ph.D.	Assistant Professor	16/05/2006	Applied Physics	50	25	25
20.	Dr. (Mrs.) S.M. Giripunje	Ph.D	Assistant Professor	07/10/2008	Applied Physics	60	--	40
21.	Dr. K. Mohan Kant	Ph.D	Assistant Professor	14/06/2012	Applied Physics	30	--	70
22.	Dr. M.S. Ramkartik	Ph.D.	Assistant Professor	26/12/2014	Applied Physis	70	--	30
23.	Dr. Poorva Singh	Ph.D.	Assistant Professor	11/05/2015	Applied Physis	60	10	30
24.	Dr. Aviroop Das	Ph.D.	Adjunct Assistant Professor	01/08/2016	Applied Physis	100	--	--
25.	Dr. G.P. Singh	Ph.D.	Professor	27/03/1995	Mathematic	--	--	100

					s			
26.	Dr. P. Pramod Chakravarthy	Ph.D.	Associate Professor	31/05/2006	Mathematics	--	50	50
27.	Dr. M. Devakar	Ph.D.	Assistant Professor	24/11/2008	Mathematics	--	50	50
28.	Dr. Pallavi Mahale	Ph.D.	Assistant Professor	27/11/2008	Mathematics	--	50	50
29.	Dr. G. Naga Raju	Ph.D.	Assistant Professor	01/07/2010	Mathematics	50	--	50
30.	Dr. R. P. Pant	Ph.D.	Assistant Professor	25/07/2012	Mathematics	50	--	50
31.	Dr. Pradip Roul	Ph.D.	Assistant Professor	13/08/2012	Mathematics	50	--	50
32.	Dr. Deepesh Patel	Ph.D.	Assistant Professor	23/01/2015	Mathematics	50	--	50
33.	Dr. V V Awasthi	Ph.D.	Assistant Professor	19/07/2016	Mathematics	50	50	--
34.	Dr. Jyoti Singh	Ph.D.	Assistant Professor	22/07/2016	Mathematics	50	--	50
35.	Dr. Ashutosh Singh	Ph.D. thesis submitted	Adjunct Assistant Professor	01/08/2016	Mathematics	100	--	--
36.	Mr. Krishna Kumar	Ph.D.	Adjunct Assistant Professor	25/07/2016	Mathematics	100	--	--
37.	Mr. Anup Kumar Sharma	Ph.D. thesis submitted	Adjunct Assistant Professor	25/07/2016	Mathematics	--	100	--

38.	Mr. Dinesh Kumar	Ph.D. thesis submitted	Adjunct Assistant Professor	01/08/2016	Mathematics	50	50	--
39.	Mr. V. B. Borghate	Ph.D.	Professor	01/08/1985	Electrical Engg.	25.93	55.56	18.52
40.	B. S. Umre	Ph.D.	Associate Professor	02/07/1984	Electrical Engg.	14.82	74.7	11.11
41.	M. R. Ramteke	Ph.D.	Associate Professor	05/03/1995	Electrical Engg.	33.33	55.56	11.11
42.	A. S. Junghare	Ph.D.	Associate Professor	07/03/1995	Electrical Engg.	16.00	84.00	--
43.	S. R. Tambay	Ph.D.	Assistant Professor	03/08/1981	Electrical Engg.	7.41	2.96	29.62
44.	Prof. Mrs. R. J. Satputaley	M.Tech.	Assistant Professor	18/07/2008	Electrical Engg.	31.03	58.62	10.34
45.	Dr. A. Dhabaley	Ph.D.	Assistant Professor	16/05/2005	Electrical Engg.	27.59	44.83	27.59
46.	N. R. Patne	Ph.D.	Assistant Professor	18/05/2006	Electrical Engg.	31.03	68.96	--
47.	Dr. S. V. Bopshetty	Ph.D	Associate Professor	18/07/1980	Mech. Engg.	--	100	--
48.	Mr. A. A. Thakre	M.Tech.	Assistant Professor	03/08/2006	Mech. Engg.	50	50	50

49.	Mr. M. S. Kotambkar	M.Tech.	Assistant Professor	27/07/2006	Mech.Engg.	55	55	55
50.	Prof. D. A. Jolhe	M.Tech.	Assistant Professor	15/09/2008	Mech. Engg.	68	--	32
51.	Prof. N. K. Lature	M.Tech.	Assistant Professor	15/09/2008	Mech. Engg.	78	--	22
52.	Dr. T.V.K. Gupta	Ph.D.	Assistant Professor	16/12/2014	Mech. Engg.	78	--	22
53.	Prof. P. V. Kane	M.Tech.	Assistant Professor	02/12/2008	Mech. Engg.	--	100	--
54.	Dr. Trushar Gohil	Ph.D.	Assistant Professor	30/04/2015	Mech. Engg.	--	52	47
55.	Prof. Ravikumar Dumpala	Ph.D.	Assistant Professor	01/06/2015	Mech. Engg.	--	81	19
56.	Dr. L. M. Gupta	Ph.D.	Professor	18/10/1989	Applied Mechanics	20	20	60
57.	Dr. M. M. Mahajan	Ph.D.	Professor	18/08/1992	Applied Mechanics	--	53.8	46.2
58.	Dr. R. K. Ingle	Ph.D.	Professor	14/09/1992	Applied Mechanics	15.4	38.5	46.2
59.	Dr. G. N. Ronghe	Ph.D.	Professor	29/06/1987	Applied Mechanics	--	16.7	83.3
60.	Dr. O. R. Jaiswal	Ph.D.	Professor	30/10/1998	Applied Mechanics	22.2	55.6	22.2
61.	Dr. R. S. Sonparote	Ph.D.	Associate Professor	11/08/1992	Applied Mechanics	--	37.5	62.5
62.	Dr. S. V. Bakre	Ph.D.	Associate Professor	16/05/2006	Applied Mechanics	--	58.3	41.7

63.	Dr. Sangeeta Gadve	Ph.D.	Associate Professor	08/06/2012	Applied Mechanics	--	58.3	41.7
64.	Dr. D. Datta	Ph.D.	Assistant Professor	15/06/2010	Applied Mechanics	23.1	38.5	38.5
65.	Dr. Ratnesh Kumar	Ph.D.	Assistant Professor	17/04/2012	Applied Mechanics	38.5	46.2	15.4
66.	Mr. S. B. Borghate	M.Tech.	Assistant Professor	30/08/1998	Applied Mechanics	56.3	31.3	12.5
67.	Mr. A. Y. Vyavhare	M.Tech.	Assistant Professor	14/06/2006	Applied Mechanics	--	57.1	42.9
68.	Mr. A. P. Khatri	M.Tech.	Assistant Professor	28/11/2008	Applied Mechanics	69.2	15.4	15.4
69.	Dr. M. D. Goel	Ph.D.	Assistant Professor	15/07/2016	Applied Mechanics	69.2	15.4	15.4
70.	Mr. M. Rahul	M.Tech.	Adjunct Professor	25/07/2016	Applied Mechanics	100	--	--
71.	Ms Rutuja Wanjari	M.Tech.	Adjunct Professor	25/07/2016	Applied Mechanics	100	--	--
72.	Mr. C S Chaudhary	M.Tech.	Adjunct Professor		Applied Mechanics	--	100	--
73.	Dr. M. Ghosal	Ph.D.	Associate Professor	16/08/1988	Humanities & S. Science	50	--	50
74.	Dr. G. N. Nimbarte	Ph.D.	Associate Professor	24/11/2008	Humanities & S. Science	100	--	--
75.	Navneet Utlawar	M.A.	Adjunct Assistant Professor	19/07/2013	Humanities & S. Science	100	--	--
76.	Mr. Jaipal	M.A.	Adjunct Assistant	25/07/2016	Humanities & S.	100		

			Professor		Science			
77.	Priyanka Bansod	M.A.	Teaching Assistant	15/07/2013	Humanities & S. Science	100	--	--
78.	A. S. Mokhade	M.Tech.	Associate Professor	23/08/1996	Computer Science & Engineering	84.62	15.38	--
79.	Mrs. Deepti Shrimankar	Ph.D.	Assistant Professor	26/11/2008	Computer Science & Engineering	28.57	71.43	--
80.	Dr. P.A. Sharma	Ph.D.	Assistant Professor	21/06/2015	Computer Science & Engineering	25	75	--
81.	Dr. Praveen Kumar	Ph.D	Assistant Professor	22/06/2016	Computer Science & Engineering	58.33	41.66	--
82.	Mr. Bharat Kapse (Ad-hoc)	M.Tech.	Adjunct Assistant Professor	01/08/2016	Computer Science & Engineering	73.33	26.66	--
83.	Ms. Monali Ramteke	M.Tech.	Adjunct Assistant Professor	27/07/2016	Computer Science & Engineering	100	--	--

7.1. Academic Support Units (35)

7.1.1. Assessment of First Year Student Teacher Ratio (FYSTR) (10)

Data for first year courses to calculate the FYSTR:

Year	Number of students (approved intake strength)	Number of faculty members (considering fractional load)	FYSTR	Assessment = (10x15)/FYSTR (Max. is 10)
CAYm2(13-14)	731	22	33.23	4.51
CAYm1 (14-15)	760	24	31.67	4.74
CAY (15-16)	748	36	20.78	7.22
Average		27	28.56	5.49

7.1.2. Assessment of Faculty Qualification Teaching **First Year Common Courses** (15)
Assessment of qualification = $3 \times (5x + 3y + 2z0)/N$, where $x + y + z0 \leq N$ and $z0 \leq Z$

x = Number of faculty members with PhD
y = Number of faculty members with ME/MTech/NET-Qualified/MPhil
z = Number of faculty members with BE/BTech/MSc/MCA/MA
N = Number of faculty members needed for FYSTR of 25

Year	x	y	z	N	Assessment of faculty qualification
CAYm2(13-14)	17	04	01	22	13.50
CAYm1 (14-15)	19	04	01	24	13.62
CAY (15-16)	27	08	01	36	13.42
Average Assessment of faculty qualification					13.51

7.1.3. Basic science/engineering laboratories (adequacy of space, number of students per batch, quality and availability of measuring instruments, laboratory manuals, list of experiments) (8)

Lab Description	Space, Number of students	Software used	Type of Experiments	Qualify of Instruments	Lab Manuals
First Year Basic Electrical Engineering Lab. (EEP101)	100 square meters Around 18 students per practical batch	This is a hardware laboratory	Hands-on experiment where students first wire-up and then conduct the experiment. Experiments are designed to verify circuit laws and demonstrate and reinforce concepts taught in theory classes	Good quality instruments are used. Adequate numbers of instruments are available.	Lab manuals are available for all the experiments.
B.Tech First Year General Lab	Two labs For General and optics experiments separately	NIL Demonstration through LCD Projector	Basic General Physics Experiments	Adequate Quality Four SET for each experiment	Yes, for each experiments
B.Tech 1st Year General Lab	One general Lab covers all experiment	Nil	Basic General Applied Chemistry Experiments	Adequate & High Quality Ample sets for each experiment	Yes, for each experiment.
Engineering Drawing Lab.	Three classrooms (each 400 sq-feet area	Nil	Sheet Work	Wooden Models	NA

	18 students in each batch Four batches for each section.				
Computer Programming Lab	2000 Sq.Ft 20	Turbo C	Programming	Available and adequate	Available and adequate

(Instruction: The institution needs to mention the details for the basic science/engineering laboratories for the first year courses. The descriptors as listed here are suggestive in nature.)

7.1.4. Language laboratory (2)

Lab Description	Space, Number of students	Software used	Type of Experiments	Qualify of Instruments	Guidance
Language learning facility	100 licences on Internet	Lingo fx x 25	Language learning 25 foreign languages	Computer	Self learning

(Instruction: The institution may provide the details of the language laboratory. The descriptors as listed here are not exhaustive).

7.2. Teaching - Learning Process (40)

7.2.1. Tutorial classes to address student questions: size of tutorial classes, hours per subject given in the timetable (5)

(Instruction: Here the institution may report the details of the tutorial classes that are being conducted on various subjects and also state the impact of such tutorial classes).

Provision of tutorial classes in timetable: YES
Tutorial sheets provided: YES
Tutorial classes taken by faculty/teaching assistants/senior students/ other: Faculty

7.2.2. Mentoring system to help at individual levels (5)

(Instruction: Here the institution may report the details of the mentoring system that has been developed for the students for various purposes and also state the efficacy of such system).

Type of mentoring: Professional guidance / career advancement / course work specific / laboratory specific / total development

Number of faculty mentors: One

Number of students per mentor: 30 - 40

Frequency of meeting: Every 15 days

Faculty Advisors – Dr N.R. Thote

7.2.3. Feedback analysis and reward / corrective measures taken, if any (5)

(Instruction: The institution needs to design an effective feedback questionnaire. It needs to justify that the feedback mechanism it has developed really helps in evaluating teaching and finally contributing to the quality of teaching).

Feedback collected for all courses: YES

Specify the feedback collection process: A standard feedback is collected from all the students before the start of end semester examination. The system of feedback collection is manual. Collected feedback is scrutinized by Head of Department. All the parameters related to comprehensive ability of teacher is analyzed. All the feedback written by students is communicated to respective teacher by Head of department.

Percentage of students participating: 80 to 90%

Specify the feedback analysis process: The feedback analysis is done manually. All the parameters related to teacher performance is graded out of common marks. Ability of teaching with respect to each item is analyzed. All the comments written by students is communicated to respective teacher by the Head of the Department.

7.2.4. 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.)

- The curriculum offers field training for open cast and underground Mines, during their summer and winter vacations. During these training students gets an opportunity to learn beyond class rooms.
- Many e-learning material, e-books, journal and magazines are collected and made available to the students at the Institute Library and Departmental library to help the students to build the habit of self-learning.
- Periodic seminars and expert lectures are regularly organised to encourage the student to know about newly published papers and journals.

7.2.5. 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 program planned weekly time table and facilities in such a way that the students have space and time to explore and implement their ideas.
- Digital library is provided in central library where students can access all kinds of e journals.
- Provision of Internet in the hostels is facilitated to help the students to learn beyond what is taught in the classroom.

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

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

The department is taking following measures for students Career Guidance, Training, Placement, and Entrepreneurship activities:

- Regular Counselling for higher studies, is provided by the faculty members.
- The students are guided and motivated to participate in various placement drives in campus and off campus as per their choice.
- The Training and Placement cell is established at institute level to arrange placement activities related to branch specific and in general.

- The Entrepreneurship Cell is established at institute level to counsel the students on various issues related to entrepreneurship.

7.2.7. Co-curricular and Extra-curricular Activities (5)

(Instruction: The institution may specify the Co-curricular and extra-curricular activities, e.g., NCC/NSS, cultural activities, etc)

NSS/NCC activities exist in the institute and students can opt these activities voluntarily as per their interest. In addition to this, students also conduct two mega events named as AXIS and Aarohi. These events are mainly managed by the students. A number of technical and cultural activates are conducted by the students. Brief description of the two events is as follows:-

AXIS

It is a national-level technical festival held at the Visvesvaraya National Institute of Technology in Nagpur, India. One of the largest technical festivals in India, the festival is organized annually at the end of September. Events at the festival include coding competitions (Cypher), architectural event (DEVISE), robotics event (Robotix), and paper presentations (Technodox).

AAROHI

It is the annual cultural festival (Cultfest) of Visvesvaraya National Institute of Technology, Nagpur, India. It is the most anticipated youth event of the year in Central India. It is a week long event organised every year, usually, during winter in February end. Students from all over the region take part in the events organised and gather in large numbers to witness the spectacles.

7.2.8. Games and Sports, facilities, and qualified sports instructors (5)

(Instruction: The institution may specify the facilities available and their usage in brief)

Sports and games are essentials components of human resource development, holding 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. Coaching facilities are provided to the selected students (selected by conducting the selection trials of various games). Specialized coaches are appointed

to train the students going to participate in various West Zone, All India and Inter-Nit Tournaments. Well qualified sports instructors are regularly instruct the students.

Games and Sports Facilities:-

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

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

8.1. Campus Infrastructure and Facility (10)

8.1.A Campus

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 us 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.

Boys hostel:

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 18 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., 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, Excavation Engineering, Chemical Engineering. The Institute also offers M.Tech. by research program in all engineering departments, Ph.D.(Full/Part Time).

Institute has stared 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	7	2582	2211
Hostel for Girls	4	886	860

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 it's own wells. To ensure regular and uninterrupted supply to all user a network of 9 underground sumps (reservoirs) are created having total storage capacity of 12-85 lakh litres of Potable Drinking Water. The average daily consumption is 6.50 lakh litres, mains water supply is limited to daytime hours from 7.45 am to 11.00 a.m. to individual Buildings overhead tanks.

8.1.4 C Campus Security Section:

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

8.2. Organisation, Governance, and Transparency (10)

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

(A) **Board of Governors**

S. N.	NAME	Designation
1.	**Mr. Vishram Jamdar,** **Industrialist,** Kinetic Gears E-19/1, MIDC Area, Hingna Road, Nagpur – 440 028	Chairman
2.	**Shri S P Goyal,** Joint Secretary Department of Higher Education, Ministry of HRD, Govt. of India, "C" Wing, Shastri Bhavan, NEW DELHI – 110 115	Member
3.	**Jr. Secretary & Financial Adviser (HRD),** Deptt. of Higher Education (IFD), 118-C, Shastri Bhawan, NEW DELHI – 110 115	Member
4.	**Shri Sanjeev Sharma,** Director NITs, MHRD, NEW DELHI – 110 115	Member
5.	**Shri Rajesh Singh,** Director, Deptt. of Higher Education (IFD), 118-C, Shastri Bhawan, NEW DELHI – 110 115	Member
6.	**Prof. (Ms.) Joyashree Roy,** Professor of Department of Economics, Jadavpur University, Kolkata, 11, Central Park, KOLKATA – 700 032	Member
7.	**Prof. S. C. Sahasrabudhe,** Director, Dhirubhai Ambani Institute of Information & Communication Technology, Gandhinagar, Near Indroda Circle, GANDHINAGAR – 382 007	Member
8.	**Prof. Uday N. Gaitonde,** Deptt. of Mechanical Engineering, Indian Institute of Technology, Bombay Powai, Mumbai – 400 076	Member
9.	**Dr. J. D. Ekhe,** Associate Professor, Department of Chemistry,	Member

	VNIT, Nagpur	
10.	**Dr. Laxmikant M. Gupta** Professor, Department of Applied Mech., VNIT, Nagpur	Member
11.	**Dr. Narendra S. Chaudhari,** Director, VNIT, Nagpur	Member
12.	**Dr. S. R. Sathe** Registrar, V.N.I.T., Nagpur	Member-Secretary

(B) **Senate**

S. N.	Name	Design.
1	**Dr. Narendra S. Chaudhari**, Director, VNIT, Nagpur	Chairman
2	**Prof. Milind Atrey,** Professor and In-charge SINE, Department of Mechanical Engineering, IIT Bombay, Powai, MUMBAI – 400076	Member
3	**Dr. (Ms.) Kamal Singh,** Rtd. Vice-Chancellor of Amravati University Nelco Society, NAGPUR	Member
4	**Prof. Meenakshi Gupta,** Department of Humanities and Social Science, IIT Bombay, Powai, MUMBAI – 400076	Member
5	**Prof. O. R. Jaiswal** Dean (Academics), VNIT, Nagpur	Member
6	**Dr. S. R. Sathe** Dean (Planning & Development), VNIT, Nagpur	Member
7	**Dr. P. M. Padole** Dean (Faculty Welfare), VNIT, Nagpur	Member
8	**Dr. H. M. Suryawanshi** Dean (Research & Consultancy), VNIT, Nagpur	Member
9	**Dr. G. P. Singh** Dean (Students Welfare), VNIT, Nagpur	Member

10	**Dr. R. K. Ingle** Head, Deptt. of Applied Mechanics, VNIT, Nagpur	Member
11	**Prof. L. M. Gupta** Professor of Applied Mechanics, VNIT, Nagpur	Member
12	**Dr. M. M. Mahajan** Professor of Applied Mechanics, VNIT, Nagpur	Member
13	**Dr. G. N. Ronghe** Professor of Applied Mechanics, VNIT, Nagpur	Member
15	**Dr. V. K. Deshpande** Head, Deptt. of Applied Physics, VNIT, Nagpur	Member
16	**Dr. (Mrs.) Rajashree Kotharkar**, Head, Dept. of Architecture, VNIT, Nagpur	Member
17	**Dr. V. S. Adane** Professor of Architecture, VNIT, Nagpur	Member
18	**Dr. (Mrs.) Alpana Dongre,** Professor of Architecture, VNIT, Nagpur	Member
19	**Dr. K. L. Wasewar** Head, Chemical Engg. Deptt., VNIT, Nagpur	Member
20	**Dr. S. S. Umare** Head, Deptt. of Chemistry, VNIT, Nagpur	Member
21	**Dr. A. R. Tembhurkar** Head, Civil Engg. Deptt., VNIT, Nagpur	Member
22	**Dr. V. A. Mhaisalkar** Professor of Civil Engineering, VNIT, Nagpur	Member
23	**Dr. Rajesh Gupta** Professor of Civil Engineering, VNIT, Nagpur	Member
24	**Dr. Y. B. Katpatal** Professor of Civil Engg., VNIT, Nagpur	Member
25	**Dr. P. S. Deshpande** Professor of Computer Sc. & Engg., VNIT,	Member

	Nagpur	
26	**Dr. M. V. Aware** Professor of Electrical Engg., VNIT, Nagpur	Member
27	**Dr. K. D. Kulat** Assciate Dean, Edu. Tech. and Library, VNIT, Nagpur	Member
28	**Dr. R. B. Deshmukh** Professor, Centre of VLSI and Nano Technology, VNIT, Nagpur	Member
29	**Dr. Avinash G. Keskar** Professor of Electronics Engg., VNIT, Nagpur	Member
30	**Dr. Rajendra M. Patrikar** Head of Electronics & Engg., VNIT, Nagpur	Member
31	**Dr. Abhay S. Gandhi** Head of Electronics Engineering, VNIT, Nagpur	Member
32	**Dr. Yogesh M. Deshpande,** Head, Deptt. of Humanities, VNIT, Nagpur	Member
33	**Dr. P. P. Chakravarthy** Head, Deptt. of Mathematics, VNIT, Nagpur	Member
34	**Dr. Shashikant B. Thombre** Professor. of Mechanical Engg., VNIT, Nagpur	Member
35	**Dr. Animesh Chatterjee** Professor of Mechanical Engg., VNIT, Nagpur	Member
36	**Dr. N. R. Thote** Professor of Mining Engineering, VNIT, Nagpur	Member
37	**Dr. A. M. Kuthe** Head Mechanical Enggineering, VNIT, Nagpur	Member
38	**Dr. S. R. Bhide** Head, Deptt. of Electrical Engg., VNIT, Nagpur	Member

39	**Dr. D. R. Peshwe** Head, Deptt. of MMEl , VNIT, Nagpur	Member
40	**Dr. I. L. Muthreja** Head, Deptt. of Mining Engg., VNIT, Nagpur	Member
41	**Dr. K. M. Bhurchandi** Professor, Deptt., ECE, VNIT Nagpur	Member
42	**Dr. S. G. Sapate** Professor, Deptt. MME, VNIT Nagpur	Member
43	**Dr. A. P. Patil** Professor, Deptt., MME, VNIT, Nagpur	Member
44	**Dr. Manish Kurhekar** Assciate Dean, MIS Network and Website, VNIT, Nagpur	Member
45	**Dr. V.S. Kale** Assciate Dean, Electrical Works, VNIT, Nagpur	Member
46	**Dr. S.V. Bakre** Assciate Dean, Procurements and Stores, VNIT, Nagpur	Member
47	**Dr. P. S. Kulkarni** Assciate Dean, Exams, VNIT, Nagpur	Member
48	**Dr. R. S. Sonparote** Assciate Dean, Civil work, VNIT, Nagpur	Member
49	**Dr. Jatin Bhatt** Assciate Dean, T & P, VNIT, Nagpur	Member
50	**Dr. J. D. Ekhe** Assciate Dean, Students activity and Sports, VNIT, Nagpur	Member
51	**Dr. D. H. Lataye** Assciate Dean, Hostel Affairs, VNIT, Nagpur	Member
52	**Dr.Yogesh Deshpande** Assciate Dean, Public Relations, VNIT, Nagpur	Member
53	**Dr. V.R. Kalamkar** Assciate Dean, III Cell & Alumni Activities,	Member

	VNIT, Nagpur	
54	**Dr. S. R. Sathe** Registrar, VNIT, Nagpur	Member-Secretary

(C) **Finance Committee**

S. N.	NAME	Designation
1.	**Mr. Vishram Jamdar,** **Industrialist,** Kinetic Gears E-19/1,MIDC Area,Hingna Road,Nagpur – 440 028	Chairman
2.	**Shri. S. P. Goyal** Joint Secretary , Department of Higher Education, Ministry of HRD, Govt. of India, "C" Wing, Shastri Bhavan, NEW DELHI – 110 115	Member
3.	Joint Secretary & Financial Advisor, (HRD), Ministry of HRD, Deptt. of Higher Education (IFD), 118-C, Shastri Bhawan, NEW DELHI – 110 115	Member
4.	**Shri Sanjeev Sharma,** Director NITs, MHRD, NEW DELHI – 110 115	Member
5.	**Shri Rajesh Singh,** Director, Deptt. of Higher Education (IFD), 118-C, Shastri Bhawan, **NEW DELHI – 110 115**	Member
6.	**Prof. S. C. Sahasrabudhe,** Director, Dhirubhai Ambani Institute of Information & Communication Technology, Gandhinagar, Near Indroda Circle, GANDHINAGAR – 382 007	Member
7.	**Prof. Uday N. Gaitonde,** Deptt. of Mechanical Engineering, Indian Institute of Technology, Bombay Powai, Mumbai – 400 076	Member
8.	**Dr. Narendra S. Chaudhari,** Director, VNIT, Nagpur	Member
9.	**Dr. S. R. Sathe** Registrar, V.N.I.T., Nagpur	Secretary

(D) **Building & Works Committee**

S. N.	**NAME**	**Designation**
1.	**Dr. Narendra S. Chaudhari,** Director, VNIT, Nagpur	Chairman
2.	Addl. Secretary (HRD), Ministry of HRD, Deptt. of Higher Education (IFD), 118-C, Shastri Bhawan, NEW DELHI – 110 115	Member
3.	**Shri Sanjeev Sharma,** Director NITs, MHRD, NEW DELHI – 110 115	Member
4.	**Shri Rajesh Singh,** Director, Deptt. of Higher Education (IFD), 118-C, Shastri Bhawan, **NEW DELHI – 110 115**	Member
5.	**Prof. S. C. Sahasrabudhe,** Director, Dhirubhai Ambani Institute of Information & Communication Technology, Gandhinagar, Near Indroda Circle, GANDHINAGAR – 382 007	Member
6.	**Dr. R. R. Yerpude** **Dean (P&D),** V.N.I.T., Nagpur	Member
7.	**A. A. Sagne / Rajesh K. Khatke** **Chief Engineer, (Civil)** Public Works Department (PWD) Bandhkam Sankul, B.No.39/I, Civil Lines, NAGPUR – 440001	Member
8.	**R. R. Akulwar / V. N. Singne** **Supdt. Engineer (Electrical),** Public Works Department, Bandhkam Sankul, B.No.39/I, Civil Lines, NAGPUR – 440001	Member
9.	**Dr. S. R. Sathe** Registrar, V.N.I.T., Nagpur	Member-Secretary

Other information is as under -

Statutory Committees -

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

Other than the above Committees, there 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: VNIT Nagpur has constituted Special Cell for faculty & staff. The regular meetings are conducted. To ascertain the Goal reservation policy is observed scrupulously.

2) Stores Purchase Committee: Stores Section is dealing with all kinds of Indigenous as well as Imported goods required for research purpose. There is centralized purchase procedure in the Institute. The procedure to be adopted for the purchase of diverse kind of equipments and stores required by the various users of the institute should be in consonance with the procedure approved by the BOG, of the Institute.
There is Stores Purchase Committee (SPC) constituted by the Competent Authority. All the purchases above the purchase value Rs.10,00,000/- (Rs. Ten Lakh Only) has to take the approval from the Stores Purchase Committee (SPC) before awarding the purchase order. Apart from the purchase activities, Stores Section also deals with the disposal/auction of the unserviceable materials after taking the approval of the Director in form GFR-17.

3) Grievance Cell: VNIT Nagpur has constituted Grievance Cell for faculty & staff. The regular meetings are conducted & the various Grievances of staff are addressed. The authority of the Institute is kept informed regarding Grievances & attempt is made to address the same. The Grievances is received from CPGRAMS are addressed online & the replies is provided.

4) Women's Cell: To address the Grievances related to sexual harassment of women and girl students of the Institute.

1) To celebrate the Women's Day in March each year.
2) To arrange workshops on health related issues.
3) To arrange workshop for general wellness of women.
4) To arrange talks on self defence'.
5) To arrange instructors to train girls/women for self protection.
6) To arrange camps on osteoporosis and distribution of free Calcium sachet provided by Health Centre.

No of meetings from 2012 to Dec. 2016 – Around 10 meetings conducted on various dates

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 Power
01.	All kinds of expenditure under plan and non plan budget	Director	Up to 8 Crores
02.	All kinds of expenditure under plan and non plan budget	Deputy Director	Upto 50 Lakhs
03.	All kinds of purchases & other expenditure from Sponsor Research, Projects, Schemes and Consultancy Funds	Dean (R&C)	Upto 10 Lakhs
04.	For Purchase of Consumables from Projects, Schemes and Consultancy Fund	Principal Investigator	Upto 2 Lakhs (for Consumables only)
05.	1. Stores, spares, accessories under allotted operating grant (Non Plan) 2. Purchases under allotted Plan Grant,	Heads of Deptts. Prof-in-Charge (T&P), Librarian	Upto 2 Lakhs
06.	All Expenditure related to student's activities, including sports.	Dean (St. Welfare)	Upto 2 Lakhs
07.	Purchases, Payments of scholarship & other allied expenditure within approved & allotted grant of the year. All related expenditure of PG students & research scholars within approved budget.	Dean (Academics)	Upto 10 Lakhs
08.	Expenditure related to their operational expenses (Office, small equipment, consumables etc.	All Deans	Upto Rs. 2 Lakhs
09.	Expenditure for campus development, minor repairs, cleaning, minor repair of roads, parks, convocation and miscellaneous for which the administrative approval is accorded and fund is allotted for the purpose.	Dean (P&D)	Upto Rs. 2 Lakhs

10.	Purchases of Journals, consumables, spares and accessories etc. form budgetary allocation of the year	Chairman, Library Committee	Upto Rs. 2 Lakhs
11.	Expenditure for medicine/consumabl -es/equipments directly related to Health Service expense.	Medical Officer	MO: upto Rs. 1 Lakhs in each case, with Celling of Rs. 5 lakhs per year
12.	[i] Payment of Telephone bill FAX, Bill Electricity/bill, Water bill etc., [ii] Purchases of equipment, uniform, consumables, stationeries, spares & accessories. for registry/requirement for departments not covered above within allotted grant of the year.	Registrar	Full power of [i] and Upto Rs. 2 Lakh
13.	For contingency expenditure	Dy. Registrar, Ass. Registrar (Independent Charges)	Up to Rs. 10000

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

Deans

* Dean (Planning and Development) -- Dr. Rajendra Yerpude
* Dean (Faculty Welfare) -- Dr. P. M. Padole
* Dean (Research and consultancy) -- Dr. A. K. Chatterjee
* Dean (Academics) -- Dr. V. K. Deshpande
* Dean (Students Welfare) -- Dr. V. B. Borghate

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. S r. Sathe, Registrar
First Appellate Authority -- Dr. R. K. Ingle, HoD AM
Second Appellate Authority -- Dr. N. S. Chaudhari,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.

Rs in lakhs

Item	**Budgeted in CFY (2015-16)**	**Expenses in in CFY (2015-16)**	**Budgeted in CFY (2014-15)**	**Actual Expenses in CFY (2014-15)**	**Budgeted in CFY (2013-14)**	**Actual Expenses in CFY(2013-14)**
Infrastructural built-up	12600.00	3411.18	10464.00	2808.48	5773.00	3303.08
Library	500.00	23.83	175.00	16.4	150.00	136.9
Laboratory equipment	3191.50	780.58	4031.00	583.07	2000.00	485.63
Stipend	1500.00	1591.16	-	-	-	-
Laboratory consumables	28.40	39.38	60.00	38.96	50.00	29.12
Teaching and non teaching staff salary	6536.05	6121.44	6185.00	5839.6	6005.00	5202.06
R&D	4631.51	2850.00	1256.00	1394.95	678.40	560.14
Training & travel	13.09	14.38	25.00	8.03	20.00	17.28
Other, specify	973.40	848.46	1340.50	853.23	1077.60	932.54
Total	**29973.95**	**15680.41**	**23536.05**	**11542.72**	**15754.00**	**10666.75**

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 budget is utilized based on the project priority. Accommodation of students and faculty has been accorded top priority besides creating academic infrastructure (class rooms, laboratories etc.) as the sudden increase in students' intake necessitated the creation of more hostels and faculty residences.

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

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

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

8.4. Programme Specific Budget Allocation, Utilisation (10)

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

Item	Budgeted in CFY 2015-16 as on 31 Dec. 15	Budgeted in CFY 2014-15	Actual Expenses in CFY 2014-15	Budgeted in CFY 2013-14	Actual Expenses in CFY 2013-14	Budgeted in CFYm 2012-13	Actual Expenses in 2012-13
Laboratory equipment							
Software							
R&D							
Laboratory consumables							
Maintenance and spares							
Training & travel							
Miscellaneous expenses for academic activities							
Total							

* The amounts shown under expenditure does not include many items of routine expenses met from Centralised Institutional Source 'such as AMC/Computer Consumables and student related travel expenditure which, however, are aggregated in The Institutional Income Expenditure statement in Part I - item I-10.
(Instruction: The preceding list of items is not exhaustive. One may add other relevant items if applicable.)

8.4.1. Adequacy of budget allocation (5)

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

8.4.2. Utilisation of allocated funds (5)

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

8.5. Library (20)

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

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

Carpet area of library (in m2) Reading space (in m2) = 6400 m^2

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

Number of users (issue book) per day = 512

Number of users (reading space) per day =468

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

Number of library staff = 23 (08 permanent)

Number of library staff with degree in Library Management = 21

Computerisation for search = 21

indexing, issue/return records Bar coding used = yes

Library services on Internet/Intranet INDEST or other similar membership

Archives

8.5.2. Titles and volumes per title (4)

Year	**Number of new titles added**	**Number of new editions added**	**Number of new volumes added**
CAYm2 2012-13	1060	1060	6049
CAYm1 2013-14	1398	1398	4953
CAYm 2014-15	369	0369	1056
CAYm 2015-16	2630	2630	260

SUBJECT WISE TITLE (TILL 31ST MARCH 2012)

Sr.No.	Subject	Title	Volume
01.	Applied Mech.	355	605
02.	Architecture	5154	8937
03.	Chemical	2512	4352
04.	Chemistry	3182	6398
05.	Civil	8667	15016
06.	Computer Sci.	7990	11286
07.	Electronics	5093	8347
08.	Electrical	6475	14130
09.	Humanities	1476	2307
10.	Maths	3176	5911
11.	Mechanical	7055	13710
12.	Metallurgy	6193	9526
13.	Mining	4661	6461
14.	Physics	1793	6665
15.	L.S. & H.	155	155
TOTAL		**63937**	**113806**

SUBJECT WISE TITLES (TILL 31ST MARCH 2013)

Sr.No.	Subject	Title	Volume
01.	Applied Mech.	440	2176
02.	Architecture	5265	9350
03.	Chemical	2634	4986
04.	Chemistry	3261	8079
05.	Civil	8780	15730
06.	Computer Sci.	8079	14130
07.	Electronics	5267	9962
08.	Electrical	6531	15165
09.	Humanities	1488	2744
10.	Maths	3236	6548
11.	Mechanical	7118	14449
12.	Metallurgy	6239	10114
13.	Mining	4676	6856
14.	Physics	1806	7145
15.	L.S. & H.	177	177
TOTAL		**64997**	**127311**

SUBJECT WISE TITLES (TILL 31ST MARCH 2014)

Sr.No.	Subject	Title	Volume
01.	Applied Mech.	481	2297
02.	Architecture	5406	9804
03.	Chemical	2679	5158
04.	Chemistry	3397	8797
05.	Civil	8849	15951
06.	Computer Sci.	8140	14471
07.	Electronics	5363	10143
08.	Electrical	6628	16014
09.	Humanities	1748	3037
10.	Maths	3263	6622
11.	Mechanical	7196	14945
12.	Metallurgy	6293	10489
13.	Mining	4707	6911
14.	Physics	1874	7307
15.	L.S. & H.	371	390
TOTAL		**66,395**	**1,32,336**

SUBJECT WISE TITLES (TILL 31ST MARCH 2015)

Sr.No.	Subject	Title	Volume
01.	Applied Mech.	496	2333
02.	Architecture	5418	9862
03.	Chemical	2705	5201
04.	Chemistry	3409	8820
05.	Civil	8876	15978
06.	Computer Sci.	8172	14669
07.	Electronics	5372	10152
08.	Electrical	6644	16250
09.	Humanities	1782	3140
10.	Maths	3265	6624
11.	Mechanical	7212	14962
12.	Metallurgy	6303	10512
13.	Mining	4708	6912
14.	Physics	1878	7320
15.	L.S. & H.	524	657
TOTAL		**66,764**	**1,33,392**

SUBJECT WISE TITLES (TILL 31ST MARCH 2016)

Sr.No.	Subject	Title	Volume
01.	Applied Mech.	496	2333
02.	Architecture	5418	9862
03.	Chemical	2705	5201
04.	Chemistry	3409	8820
05.	Civil	8876	15978
06.	Computer Sci.	8188	14693
07.	Electronics	5373	10172
08.	Electrical	6644	16250
09.	Humanities	1782	3140
10.	Maths	3265	6624
11.	Mechanical	7212	14962
12.	Metallurgy	6303	10512
13.	Mining	4708	6912
14.	Physics	1878	7320
15.	L.S. & H.	524	657
TOTAL		**66781**	**133436**

8.5.3 Scholarly journal subscription (3)

Details		**CFY 2016**	**CFY1 2015**	**CFYm2 2014**	**CFY m3 2013**
Science	As soft copy	--	41	41	41
	As hard copy	--	13	15	12
Engg. And Tech.	As soft copy	2559	1757	358	736
	As hard copy	33	38	48	57
Architecture	As soft copy	Nil	00	00	00
	As hard copy	Nil	16	15	16

(1) 05 Subject collection with 694 title of Elsevier.

(2) ACS 41 title of Chemical Engg. Web editions for the year 2013.

8.5.4. Digital Library (3)

Availability of digital library contents: Available

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

Availability over Intranet/Internet: **Yes**

Availability of exclusive space/room: **Yes**

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

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

Year	**Expenditure**				**Comments, if any**
	Book	Magazines/journals (for hard copy subscription)	Magazines/journals (for soft copy subscription)	Misc. Contents	
CFYm3 2012	53.32 Lacs	49,73,906.00	1,56,054.00		
CFYm2 2013	97.82 Lacs	21,61,376.00	60,62,510.00		
CFYm12014	82.14 Lacs	24,95,955.00	84,80,762.00		
CFY 2015	9.60 Lacs	21,31,141.00	7,03,873.00		
CFY 2016	1.00 Lac	12933.00	12754705.00		

<u>Virtual Class Room:</u>

DETAILS ;-

Money Given By National Informatics Center (NIC);-

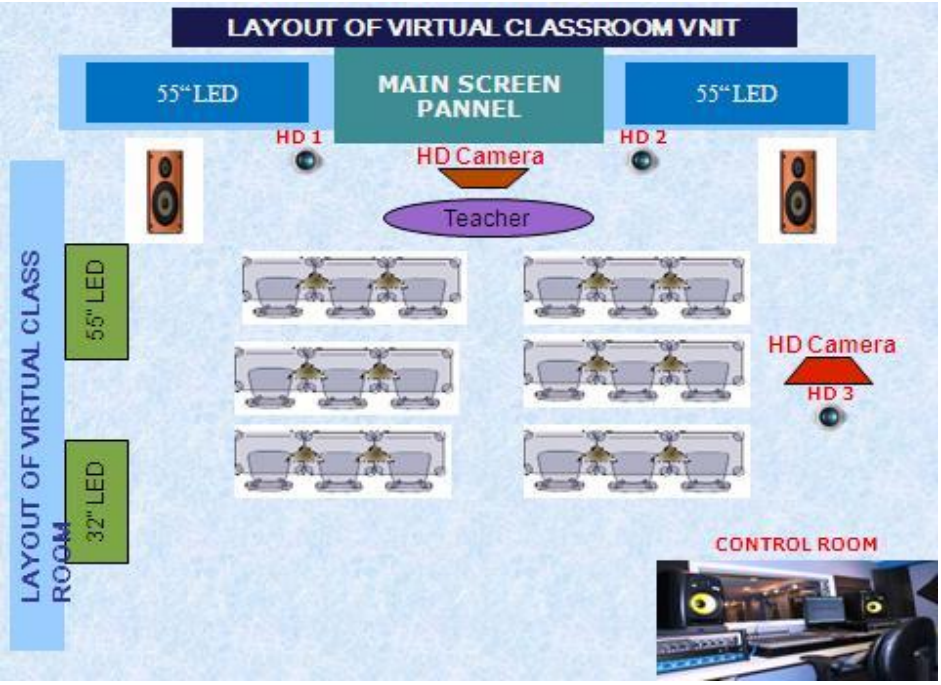
- Total Project Cost of Virtual Class-Room -- Rs. 32,26,524/-
- Civil Work for Virtual Class Room -- Rs.10,00,000/-
- Technical Assistant for Virtual Class Room -- Rs. 1,80,000/-
- Bandwith;-

Speed for Video only 50 mbps
Speed for net only 50 mbps
Total Bandwidth 100 mbps

- Portal of NKH http;/www.nkn.in/
- IP Address for NKN;-
- 10.119.19.194
- 10.119.19.192/27 such Range is also allocated

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

8.5.5.1 Layout of Virtual Classroom



8.6. Incubation facility (5)

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

Center for Innovation- VNIT Nagpur (CIVN), a section 25 (non-profit) company is set up to promote innovation and entrepreneurship by converting and translating technology ideas and innovation in various disciplines of science and engineering into products, processes and services for commercial exploitation and the benefit of society.

Thus, CIVN came into existence in 2012 to administer the technology incubator and accelerate the growth of entrepreneurship in VNIT campus and people of the region.

CIVN under assistance of Rajiv Gandhi Science and Technology Commission Government of Maharashtra (RGSTC) runs and manages a Technology Incubator (TI) at VNIT, Nagpur to facilitate incubation of new enterprises with innovative technologies by admitting them in TI and providing them physical, technical and networking supports and services.

VNIT has been carrying research in cutting edge technologies which have potential to generate large amount of wealth, provided the gap between research and commercialization of the research output is bridged. Center for Innovation is able to address this gap by providing platform for the entrepreneurs to setup high wealth generating industries in Maharashtra using such cutting edge research.

Industry Institute Interaction Cell (III) at VNIT 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 would like to support a thriving and knowledge based business community in the Vidarbha area. We expect CIVN to produce responsible business enterprises and entrepreneurial leadership that will not only make a valuable contribution to the local economy, but also increase awareness in the region about a highly productive carrier option available.

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 ,Vodafone,NKN
- Available bandwidth: Leased Line
- Access speed: 1 Gbps and 170Mbps(BSNL+Vodafone): 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;-

- The Network Centre (NC) primarily caters to the Internet Access requirements throughout the institute that includes Departments, Sections, Centers, Main Administrative Building, Hostels, Guest House, and CDEEP. Connectivity is also provided to remote locations like the Health Center, Security Cameras installed on the Gates, Quarter Wi-Fi network, etc. The institute has a Campus-wide fiber optic gigabit network with High End Central Core switch at the Network Centre.
- VNIT is a member of the National Knowledge Network (NKN) of the Government of India through which connectivity of 1 Gbps is provisioned. The internet access to the institute is also available from various service providers, through which the bandwidth available is around 170 Mbps.
- The Network Centre manages the annual maintenance of the desktops of the entire institute. It also operates and maintains the well-equipped Online Virtual Classroom created under the NKN project.
- The Network Centre has developed and is maintaining the institute and department websites. The Network Centre also manages institute mail server and provide e-mail services to all staff and students.
- The Network Centre has a Cisco Servers,10 Blades. Various Servers like Web Server, Mail Server, Proxy servers, DNS Servers, etc. are hosted.

- VNIT 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 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 Processo

8.7.2 Physical Layout of Fiber Optic Cable of VNIT

Figure I

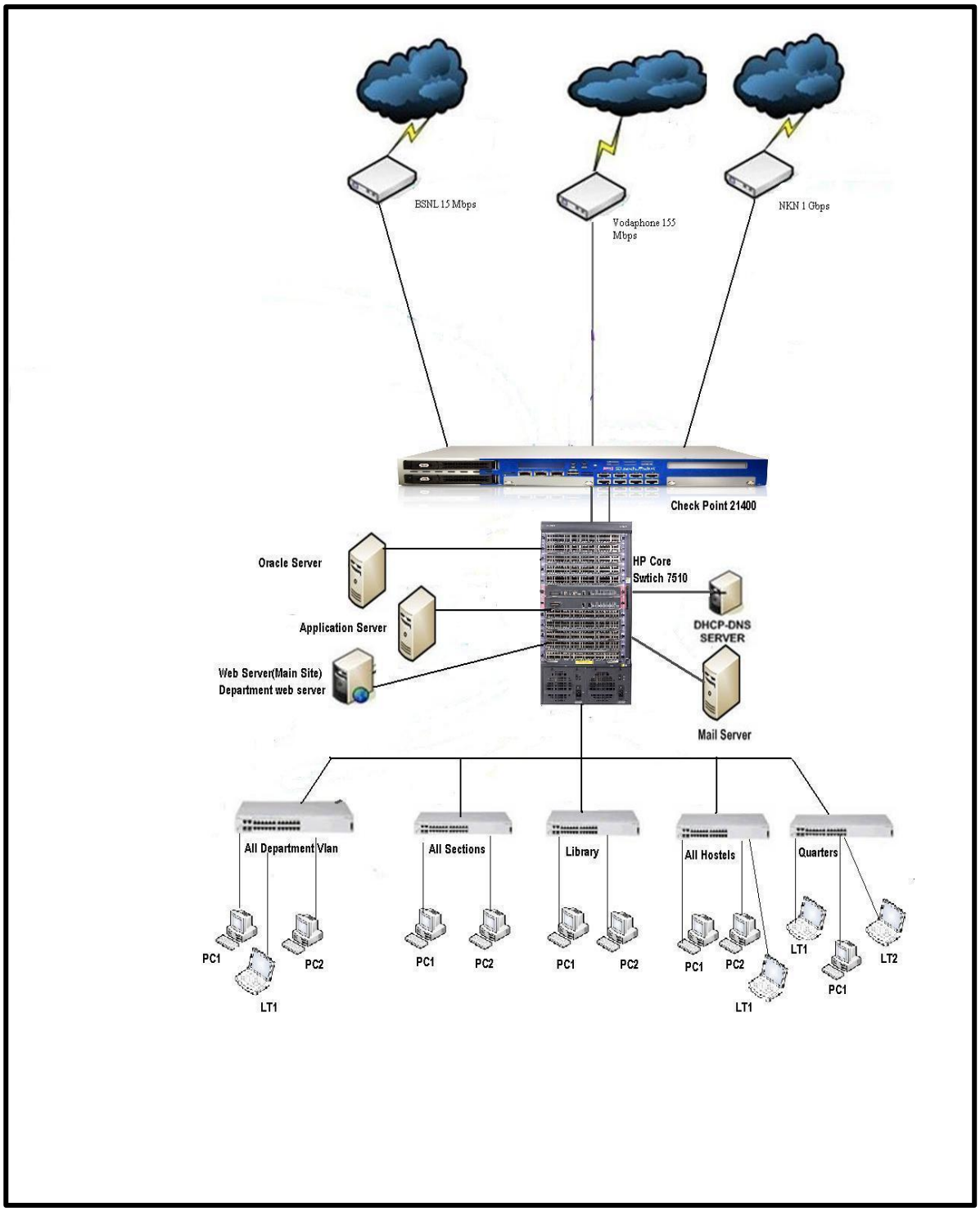
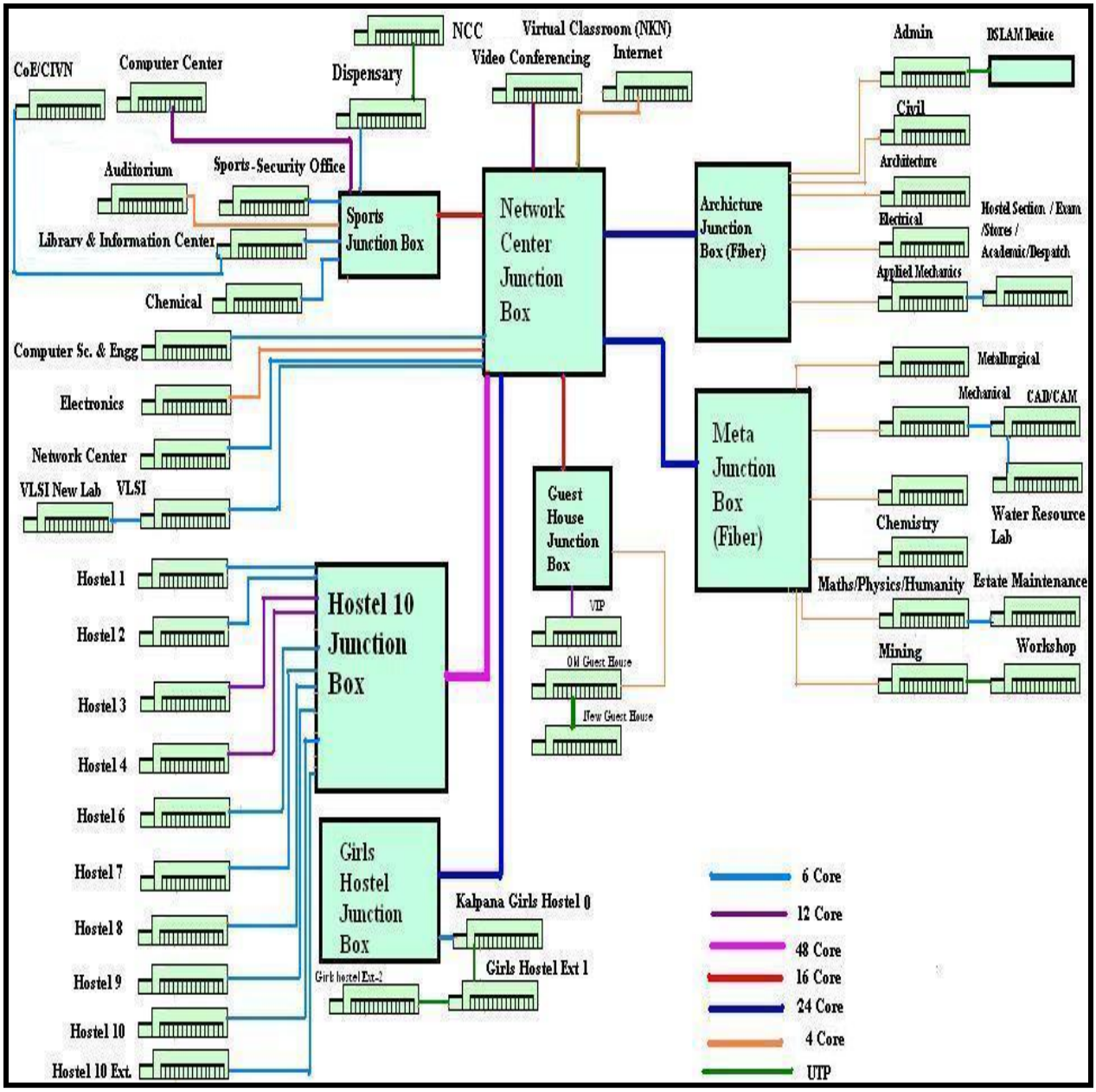


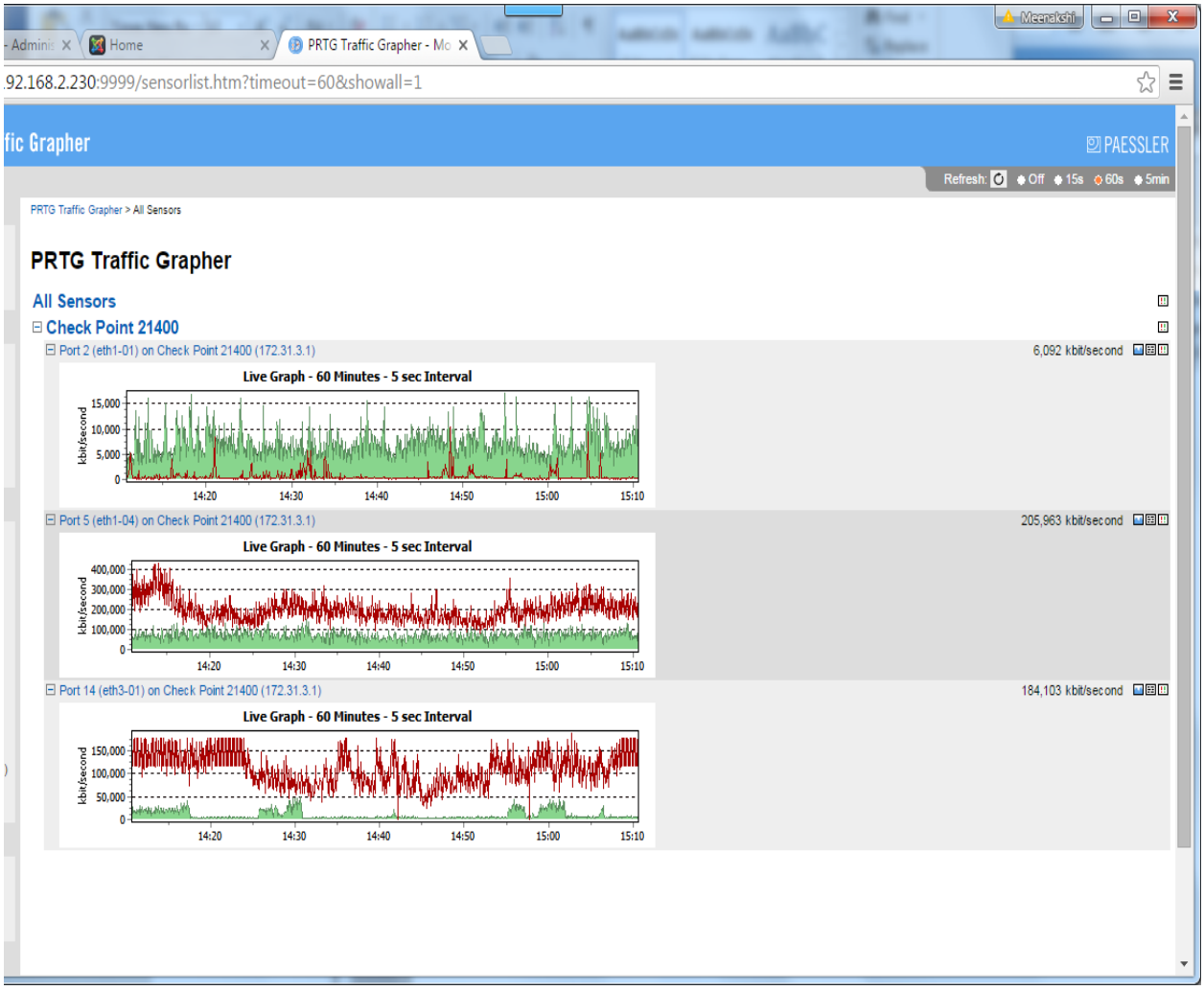
Figure II B



Physical Layout of Fiber Optic cable of VNIT Campus

8.7.3 PRTG Traffic Grapher

Figure III



8.8 Safety Norms and Checks (5)

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

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

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

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

Fire Fighting Measures:

1] We have fire extinguishers (mega mess, hostel blocks, in CAD/CAM, Department,

some are still in propose)

2] As per chief advisor of fire audit committee S.T. Chaudhari's advice we have DCP,

CO2 pressure extinguishers are placed (fire hydride system is not there)

3] Emergency safety arrangements: No

4] Multiple exits and ventilation/exhausts in auditorium and large labs/classrooms: Yes

5] A number of fire extinguishers are located at various sensitive locations throughout the campus. A total of 16 stations containing different types of Fire fighting media such as Foam, Coz, W/C and DCP are functional and under continuous surveillance for dealing with any fire related emergency.

240 fire extinguishers of different types (CO2 , W/C, DCP , Foam) and capacity (2 kg , 4.5 kg , 5 kg ,6.5 kg and 10 kg, 9 Ltrs and 50 Ltrs) all over the Institute were installed after thorough inspection and fire safety audit by Mr. HT Chaudhary, Fire Advisor & Chief fire officer (Maharashtra State power Generation Company Limited).

Some new buildings which have recently come up are to be equipped with Fire extinguishing facilities. This is in process after specialist advice by Fire Advisor.

Regular refilling is done after expiry date and of the empty cylinders used in incidents.

Institute has engaged services of security agency which have their own training centre and are provide trained guards. Regular refresher training is also provided in security section by the security agency for effective fire extinguishing preparedness.

Institute had completed the formalities of mobile fire extinguisher (bike mounted) to effectively deal with all types of fire at any place in the Campus. However the procurement could not be completed but will be procured for better fire safety.

Need cropping up from time to time is taken care of viz. fire extinguisher CO 2 Type; 4.5 kg capacity has been installed in EDA lab in November 2015.

8.8.3. Safety of civil structure (1)

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

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

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

Date : 10/07/2013

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

8.8.4. Handling of hazardous chemicals and such other activities (2)

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

8.9 Counselling and Emergency Medical Care and First aid (5)

Availability of counselling facility (1) Arrangement for emergency medical care (2) Availability of first-aid unit (2) (Instruction: The institution needs to report the availability of the facilities discussed here.)

8.9.1 Medical Care:

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

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

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

Referral for Ayurvedic services is available. Physiotherapy services promote fitness & address sports related problems.

Speciality Clinics for eyes & skin problems is available. Mental health services are provides though counsellors & Psychiatrist. First aid facility is provided at all hostels.

8.9.2 Games and Sports-General

Research indicates that regular physical education, included in curriculum, produces physical, psychological, and intellectual benefits. Physical education may help prevent degenerative disease, improve overall physical condition, maintain emotional balance, promote a sense of social effectiveness, contribute to academic performance, and establish positive recreation habits. Therefore, physical education must be supported as an integral part of comprehensive education.

Sports and Games are essentials components of Human Resource Development, holding 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.

Further, excellence in sports enhances the sense of achievements, national pride and patriotism. Sports being practical way of education facilitate beneficial recreation, improve productivity, foster social harmony inculcating sense of discipline and dedication in general life. Sports give a strong message of peace, friendship and understanding among the people of participants. Today, sports are prime need in a civilized society, as it helps to promote national integration, emotional integrity and professional intellect among the participants.

According to UNESCO General Conference (1978) Article 1; which advocates that practice of physical education and sport is a fundamental right for all:

Every human being has a fundamental right of access to physical education and sport, which are essential for the full development of his personality. The freedom to develop physical, intellectual and moral powers through physical education and sport must be guaranteed both within the educational system and in other aspects of social life.

Every one must have full opportunities, in accordance with his national tradition of sport, for practicing physical education and sport, developing his physical fitness and attaining a level of achievement in sport which corresponds to his gifts.

The Article 2; further endorse that Physical education and sport form an essential element of lifelong education in the overall education system:

2.1 Physical education and sport, as an practice of sports must be ensured throughout life by means of a global, lifelong and democratized education.

2.2 At the individual level, physical education and sport contribute to the essential dimension of education and culture, must develop the abilities, will-power and self-discipline of every human being as a fully integrated member of society. The continuity of physical activity and the maintenance and improvement of health, provide a wholesome leisure-time occupation and enable man to overcome the drawbacks of modern living. At the community level, they enrich social relations and develop fair play, which is essential not only to sport itself but also to life in society.

2.3 Every overall education system must assign the requisite place and importance to physical education and sport in order to establish a balance and strengthen links between physical activities and other components of education.

National Institutions play a major role in physical education and sport.

It is essential that public authorities at all levels and specialized non-governmental bodies encourage those physical education and sport activities whose educational value is most evident. Their action shall consist enforcing legislation and regulations, providing material assistance and adopting all other measures of encouragement, stimulation and control. The public authorities will also ensure that such fiscal measures are adopted as may encourage these activities.

It is incumbent on all institutions responsible for physical education and sport to promote a consistent, overall and decentralized plan of action in the framework of lifelong education so as to allow for continuity and co-ordination between compulsory physical activities and those practiced freely and spontaneously.

Thus in tune with above ideology, the faculties of Physical Education at this institute exploit all the possible dimensions of physical education & sports through the variety of activities in our Institute:

01) Physical Education is an audit course at the institute and they are taught sports skills, strategic preparation, and tactical preparation. Faculties of physical education work to increase the physical fitness of first year students (more than 750 in number) through various physical fitness programs. Apart from this teaching on play fields, they are also taught Physiological, Psychological, Sociological and Emotional aspects associated with sports and physical activities through talks and seminars.

02) Health club facilities are also provided to the students where they practice various health related Gymnasium activities in the allotted Morning and Evening hours under the guidance of a trained coach.

03) Sports medicine Research Lab: Physiological parameters related with physical fitness of staff and students are also examined through Sports Medicine Lab equipments. Suitable Physical Fitness programs are advised to the students as well as staff members of the institute after evaluating their physical fitness. Overweight and underweight students are also given appropriate weight gain and weight loss programs by the faculties of physical education.

04) Coaching facilities are also made available to the students selected by conducting the selection trials of various games. Specialized Coaches are appointed to train the students going to participate in various in Inter-NIT Tournaments.

05) Another attractive sporting activity is the Institute Gathering which is organized every year by the students under the supervision of the Physical Education section. This is an event, where various inter-departmental sports activities are conducted with overwhelming response where the participants are students institute teaching and non-teaching staff.

Participation of students in different games

The Institute encourages the students by exposing them to various Inter-NIT tournaments and also in local inter-collegiate tournaments. All the selected students are motivated by providing them with track suits and playing kits. Blazers are provided to all the student council members of the institute as a token of appreciation

Participation in All India Inter NIT Tournaments:

Through All India Inter NIT Tournament a student can exhibit his/ her talent in front of students of all the NITs in India. This year total 126 students, 85(M) & 41 (W) participated in various All India Inter NIT Tournaments organized by various NITs in India. The following table shows the detail of participation by the institute in various All India Inter NIT Tournament organized by various NITs in India during the year 2014-15.

Sr. No	Game	Tournament organized by	Duration	Total participants		Position
				Men	Women	
1	Athletics	NIT Rourkela	23rd to 25th of January 2014	20	9	2 silver Medals & 3 Bronze Medals
2	Cricket	NIT Allahabad	13th to 15th of February 2015	15	0	S/F
3	Kho-Kho	NIT Agartala	19th to 21st February 2015	12	0	Winner
4	Table Tennis	NIT Bhopal	21st to 23rd of March 2015	4	3	Women - Runner up
5	Volleyball	NIT Kurukshetra	28th to 31st of March 2015	12	12	Participation
6	Basketball	NIT Surat	3rd to 5th of April 2015	12	12	Participation
7	Badminton			5	0	Men- Individual event - Sahil Akhtar :- Winner
8	Chess			5	5	Men- Third Position, Women- Runner Up
Total Participants				85	41	126

Local Tournaments:

The Institute also understands the importance of local tournaments and exposes the students in various local tournaments whenever it is possible as per the Academic Calendar. This year the Institute participated in Dr. Punjabrao Deshmukh Sports Festival in the disciplines of Cricket, Basketball and Football tournament.

Krik Mania:

Through this Invitational 50 limited over Cricket Tournament a platform is provided to the upcoming Cricketers of local colleges. Since last 22 years through this particular event students of the institute are learning various skills of organizing a sporting event under the guidance of Physical Education department. In present edition of Krik Mania Dr. Ambedkar College, Nagpur won the tournament by defeating the Dhanwate National College, Nagpur where as our institute team reached up to S/F.

Intramural and Krida Diwas(National Sports Day):

It is very important to provide maximum participation to the student community in sports, to keep the overall atmosphere of the institute healthy and sporting. Through this event students get all the opportunities to interact with each other and explore their hidden talent in sports. With this point of view and to encourage sports, the Physical Education Section celebrates the birth anniversary of the great Hockey legend Major Dhyanchand on 29th of August every year. This year following sports were organized under Annual Intramural program: Football, Cricket, Volleyball, Throw ball, Kho-Kho Table-Tennis, Kabaddi and Chess. This year's Krida Diwas was inaugurated by honorable Director of the institute, Dr. N. Chaudhary , all the students were distributed sweets on this occasion.

The objective of organizing such events in the campus is to involve the engineering students in some physical activities and teach them sportsmanship, team spirit and help them in socialization through sports activities. The Biggest advantage of organizing such event, especially for the first year B. Tech. students is that every student of the first year know each other. It also helps to provide solid platform for their healthy social relationship throughout their academic course; students also learn skills of organization, administration, officiating and coaching.

Medical examination:

Medical Examination is compulsory for all the first year B. Tech. /B. Arch. students in first semester itself. This examination is done by our Medical Officer Dr. S. Batra. and his team with the coordination of Physical Education section. This particular examination provides the data of students with postural deformities, obesity, underweight, stress, hypertension and some other medical problems. Thus with readily available data such students are provided individualized suitable physical fitness program.

Physical Efficiency Test:

Physical Fitness is an ability to carry out the daily tasks of the job with vigor and alertness, without undue fatigue, with ample energy to engage in leisure time pursuits and to meet the above average physical stresses in emergency situations.

The Physical Efficiency of every first year B. Tech. / B. Arch. students is measured by applying suitable tests of Physical Fitness. Components such as abdominal strength, respiratory endurance, flexibility of hip joint & hamstring muscles and speed are measured. PET is an important tool through which a student can know about his/ her physical efficiency as they have to perform all the below mention tests in one day itself. All the students they appreciate this unique physical activity as it helps them to know their capability to do strenuous job tasks.

Module of Physical Efficiency Test:

Sr. No.	Component	Tests	Time/Distance	Score
1	Respiratory Endurance	Cooper's Test	12 minute	Total distance covered during 12 minute is recorded with the help of stop watch, and VO2 Max is calculated by applying suitable formula
2	Speed	100 meter flat race for boys/ 60 meter flat race for girls	100 meter/ 60 meter	Timing 100Mt/ 60 Mt. is recorded in seconds for each student
3	Abdominal Strength	Bent Knee Sit Ups	One Minute	Maximum legal sit ups performed in one minute is recorded for each student
4	Shoulder Strength	Push Ups/Modified push ups for girls	----	Maximum push ups performed by is recorded for each student
5	Flexibility of Hp Joint and Hamstring Muscles	Sit And Reach	Centimetre	Maximum stretching is recorded in centimetre with the help of measuring scale for each student

NBA Visit:

The members of NBA team visited physical education section on 5th of January 2015 and inspected various facilities being provided by to the students. The team members were informed about various physical education program offered to the students.

Wellness and Weight Management program:

Overweight and obesity in the youth is on increase. It is the result of physical inactivity, and cause for poor physical fitness. It also carries high risk of developing chronic diseases like diabetes, blood pressure, heart trouble, joint problems etc. in the peak of their career.

On the basis of students identified through Medical Examination having postural deformities, overweight and underweight; a week long integrated program during second week of January 2015 by the team of Physician, Physiotherapist, Dietician, Counseller along with faculties of Physical Education was conducted for such students at Cricket pavilion.

Run for Unity:

Hundreds of students along with large number of staff members of the institute solemnly pledged on the occasion of Rashtriya Ekta Diwas on October 31 to dedicate themselves to preserve the Unity, Integrity and Security of the nation. Later we all joined the "Run for Unity" programme organized by Physical Education Section at the institute campus. The program was inaugurated by the Registrar of the institute.

Swachata Bharat Abhiyan:

"Swachhta Shapath/Cleanliness Oath" was administered by faculties of physical education along with the student council members at 9.45 AM on 2nd October 2014.

Fitness talk in Hindi Workshop:

A fitness talk was organized by Dr. Robin Simon a faculty in Physical Education for the teaching and non teaching staff of the institute as one of the programme of Hindi Workshop. Different dimensions of physical fitness, various training principles, and effects of physical activities on different physiological systems were discussed in the workshop. Later various health related physiological parameters such as BMI, Rate of Respiration, Resting Pulse Rate, Visceral Fat, BMR, Flexibility etc. were tested. Appropriate physical fitness programme was also suggested according to individual's need.

Sports facilities available on the Campus :

One Cricket Ground with six Turf wickets.
One Football Ground with flood light arrangement.
Two Volleyball Courts with flood light arrangement
Three Lawn Tennis Courts.
One Flood light Basketball Court.
One Kho- Ko ground with flood light arrangement
One Kabaddi ground with flood light arrangement
Well equipped Gymnasium
Separate Gym for girls in the girl's hostel
Table Tennis Hall
Cricket pavilion with the seating capacity of 500 students
Indoor Badminton Stadium with four Wooden sprung Surfaced Badminton courts
A big hall to accommodate at least 12 Table Tennis Tables
A hall to practice Yoga Class room

****

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

Assessment = (b-a) + (c-b) + 5/3 (a+b+c)

9.1. Improvement in Success Index of Students (5)

From 4. 1

Items	LYG(c)	LYGm1(b)	LYGm2(a)	Assessment
Success Index	**0.93**	**0.77**	**0.73**	**4.25**

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

From 4. 2

Items	LYG(c)	LYGm1(b)	LYGm2(a)	Ave. Assessment
API	15.06	14.6	15.0	**14.88**

9.3. Improvement in Student - Teacher Ratio (5)

From 5. 1

Items	CAY(c) 2012-2013	CAY m1(b) 2011-2012	CAY m2(a) 2010-2011	Average of 3 years
STR	**9.4**	**11.62**	**8.4**	**9.81**

9.4. Enhancement of Faculty Qualification Index (5)

From 5. 3

Items	LYG(c) 2012-2013	LYGm1(b) 2011-2012	LYGm2(a) 2010-2011	Average of 3 years
FQI	**12.17**	**10.65**	**14.4**	**12.4**

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

From 5.7and 5.9

Items	LYG(c) 2012-2013	LYGm1(b) 2011-2012	LYGm2(a) 2010-2011	Average of 3 years
FRC(Research)	**13.64**	**18.75**	**16.67**	**16.35**
FPPC(publications)	**8.12**	**7.10**	**14.4**	**9.87**

9.6. Continuing Education (10)

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

Module description	Any other contributory institute / industry	Developed/organized	Duration	Resource persons	Target audience	Usage and citation etc.
Ill effects of blasting (2013)	WCL	Organized	3 days	Dr. N. R. Thote,	WCL , Middle level Executives	Up gradation of knowledge
National Conference was organized on "Advances in Explosive and Propellants (co-Convenor)	Department of Chemical engineering VNIT	Organized	1 day	Dr. N. R. Thote	Students and Executives from the Industry	Knowledge upgradation
National Summit on " Challenges Before Mining Industry for sustainable development"	TEQIP & Mining Alumni Association	Organized	1 day	Dr. N. R. Thote	Students and Executives from the Industry	Knowledge upgradation
Workshop on Global Trends in Mining	Under TEQIP	Organized	1 day	Dr. N. R. Thote	Students and Executives from the Industry	Knowledge upgradation
Workshop on E-governance	VNIT	Organized	1 day	Dr. Rajendra Yerpude	Students and Faculty and staff	Knowledge upgradation
National Summit on " Challenges Before Mining Industry for sustainable development"	TEQIP & Mining Alumni Association	Organized	1 day	Dr. Rajendra Yerpude	Students and Executives from the Industry	Knowledge upgradation
Simulation of LHD/SDL for repair and cost optimisation.	Department of Mining	Developed	During academic year 2013-14	Dr. Rajendra Yerpude	Students	Knowledge upgradation
Curriculum Development Workshop	TEQIP	Organized	1 day	Dr I L Muthreja	Students and Executives from the Industry	Knowledge upgradation
National Summit on " Challenges Before Mining Industry for sustainable development"	TEQIP & Mining Alumni Association	Organized	1 day	Dr I L Muthreja	Students and Executives from the Industry	Knowledge upgradation

Lecture by Industrial expert during the field visit	Department	Organized	-	Faculty Coordinator	Students	Imparting the field knowledge

Assessment = 9

9.7. New Facility Created (15)

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

1. Total Survey Stations
2. 8 channel Seismograph
3. U.T.M. for rock testing
4. Human Vibration Meter
5. Microwave digester
6. VOD meter
7. Prop testing set up
8. Gas chromatograph
9. Software such as Flac 2D, Flac slope, Rock Science.

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

The last accreditation is conducted in 2009. This department is accredited for 5 years with very good remarks. Members were satisfied with progress of the department and some suggestions were also given. A action plan was prepared and it was implemented in the last five years. Some of improvements are given below.

Specify the strength / weakness	**Improvement brought in**	**Contributed by**	**List of PO(s), which are strengthened**	**Comments, if any**
CAY	1. Research outputs 2. Institute & Industrial Collaboration 3. Revenue generation 4. Organisation of Continuing education programs. 5. Development of support systems for academic development.(visits, expert lectures , use of modern teaching tools) 6. Participation of students at national.	Dept. Of Mining	PO1 ,PO2,PO3, PO4, PO5,PO6,PO7, PO8, PO9	
CAYm1	1. Research outputs 2. Institute & Industrial Collaboration 3. Revenue generation 4. Organisation of Continuing education programs. 5. Development of support systems for academic development.(visits, expert lectures , use of modern teaching tools) 6. Participation of students at national.	Dept. Of Mining	PO1 ,PO2,PO3, PO4, PO5,PO6,PO7, PO8, PO9	

CAYm2	1. Research outputs 2. Institute & Industrial Collaboration 3. Revenue generation 4. Organisation of Continuing education programs. 5. Development of support systems for academic development.(visits, expert lectures , use of modern teaching tools) 6. Participation of students at national.	Dept. Of Mining	PO1 ,PO2,PO3, PO4, PO5,PO6,PO7, PO8, PO9	

Declaration

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

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

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

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

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

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

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

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

Place:
Date:

Annexure - 1

MINING DEPARTMENT

(AS PER SCHEME IMPLEMENTED WITH EFFECT FROM ADMISSION BATCH 2012)

B.TECH. MINING ENGINEERING: Syllabus

Sub code – CEL284 (3-0-0)
Sub- Mining Gelology

Course Objectives :

To Understand the Internal structure of earth
Teach fundamental geomorphic and dynamic processes on the Earth
To know about the rocks and minerals and their properties.
To study various geological structures and impacts on mining
To Know prospecting and subsurface exploration methods
To generate the sub surface profiles from geological maps and plotting structures.

Content: Introduction to science of Geology; its various branches and its application in mining engineering. Geotectonics: internal structure of earth, Continental Drift theory and Plate Tectonics, Isostacy, Earthquakes, Earthquake and seismic zones in India and Volcanism.
Structural Geology: Mode of rock failure and mechanism of deformation. Attitude of strata, Dip : True and apparent, Strike. Folds : Elements, terminology, descriptive, morphological and genetic classification. Joints : Classification, joint mapping, frequency diagrams. Faults: Mechanism of formation, elements, terminology, geometric and genetic classification.

Mineralogy: Definition and classification of Minerals. Silicate structures. Structure, chemical and physical properties of following mineral groups; Silica, Felspar, Pyroxene, Amphibole, Mica and Clay minerals.

Petrology : Introduction to Petrology, Rock Cycle, Rock forming Minerals. Igneous petrology; Elementary knowledge of Magma and its consolidation & rock formation. Mode of occurrence, textures, structure, classification of Igneous, Sedimentary and Metamorphic rocks.

Stratigraphy: Principles of stratigraphic Correlation, Stratigraphic units and Geological Time Scale.

Principles of Prospecting and Exploration, Geophysical and geochemical prospecting

Economic Geology, Study of important metallic and non-metallic deposits of India. Introduction to geology of Indian Coalfields

Reference Books

1. Engineering Geology : B.S.S. Narayanswamy
2. Principles of Engineering Geology : KVGK Gokhale
3. Fundamentals of Engineering Geology : F.G.Bell
4. Structural Geology : M.P. Billings
4. Principles of Stratigraphy : Ravindra Kumar
6. Courses in Mining : RNP Arogyaswamy

Course Outcomes:

The students will be able to

1. Understand the Internal structure of earth and structural geology
2. Know about the rocks and minerals and their properties.
3. Understand various geological structures and impacts on mining
4. Generate the sub surface profiles from geological maps and plotting structures.

Sub code-MNL261(3-0-0)

Sub – INTRODUCTION TO MINING TECHNOLOGY

Course Objectives :

Students will be made aware about the rudimentary aspects of mining engineering
Imparting knowledge of basic mining operations and unit operations about the mechanisation

Contents:

Introduction: Important mineral resources, Importance of Mining and its consequences.

Basic terminology : Surface Mining, Underground coal and metal such as Mine, Mining, surface mining, underground mining, mineral, rock, ore, mineral deposit, beds, coal seam, veins, strike and dip, hanging wall, footwall, bench, haul road, bench slope, pit slope, overburden, dump, stripping ratio, shaft, adit, incline, tunnel, cross cut, drift, level, winze, raise, stope, dip and rise, level, face, panel, pillar, gallery, roadway .

Phases of mining: Prospecting to reclamation
Brief description of elements of an opencast mine; ramp, haul roads, benches, production cycle, dumping of overburden and backfilling. Brief description of Board and Pillar development, and Longwall (advancing and retreating) methods of coal mining.
Introduction to underground metal mining methods. Brief description of underhand, overhand, cut and fill, and sub level stoping methods of metal mining.
Introduction to Oil Mining Opening up of deposits; mode of entry- adit, shaft, decline, and combined model ; their applicability and comparison.

Drifting : Small and medium size tunneling and drifting; drivage work in varying ground conditions using conventional methods – drilling, blasting, mucking, transportation, supports, services and cycle of operations
Mechanical methods of drivage of roadways and tunnels

Shaft sinking : site selection, shaft sinking preparatory arrangements, drilling and blasting, mucking, hoisting, ventilation, pumping, lighting, supporting of sides, complete cycle of operations, special methods of sinking to be used in difficult ground conditions, deepening and widening of shafts, modern techniques of shaft sinking
Drilling for production of minerals from surface and underground mines, rotary, percussive and rotary-percussive drilling, short and long hole drilling equipment, mechanism of drilling, different types of bits, bit wear, drilling performance
Explosives; types of explosives- their composition and properties; selection of explosives; manufacture, transport, storage and handling of explosives; testing of explosives, destruction of explosives

Blasting: Mechanism of rock fragmentation by blasting; blasting accessories, exploders; blasting practices in opencast and underground mines

Reference Books

Introductory Mining Engineering :H L Hartman
Coal Mining Methods :S K Das
SME Mining Engineer's Handbook :Hustrulid

Course Outcomes:

The students will be able to understand the

1. Basic terminology of mining and mechanics of blasting

2. Various phases of underground and open cast mining
3. Various operations involved in drifting and shaft sinking
4. Various types of explosive and their use in mines

Sub code-MEL291 (3-0-0)

Sub-MECHANICAL ENGINEERING

Contents:

Power Transmission General Principles; Power transmission by belts [flat and V], ropes, chains and gears. Ratio of tensions, centrifugal tension, slip and creep in belts [explanation of terms only.] Power transmitted by belts. [When C.F. tension is neglected] and chain drives; power transmitted by chains, simple problems; Belt and rope materials, power transmitted by gears, type of gears. Brakes and Dynamometers: Band brake, block brake, band and block brake, single and multiple disc clutches, transmission and absorption type dynamometers.
Bearings and Couplings: Main types of bearings and couplings, anti friction bearings.

Lubrication: Laws of friction for dry and lubricated surfaces, methods of lubrication of bearings

Thermodynamics : Laws of thermodynamics, concept of entropy, methods of heating and expansion of gases, internal energy, external work done, total heat of gas, change of entropy during different methods, representation on PV and TQ diagram.

Air Standard Cycles : Carnot, Otto, Diesel and Joule's cycles. Air Standard efficiencies, and mean effective pressure, representation of PV and TQ diagram.

Internal Combustion Engines : Classification based on types of fuel and working cycles, working of four stroke and two-strokes cycles. IC Engines; Their merits and demerits, study of parts of petrol and diesel Engine viz. fuel pump, injector and carburetor, Brief description of ignition system, cooling system, and lubrication system of IC Engines. Study of multi-cylinder engines. PV diagram, testing of IC engines, and thermal efficiencies, simple problems.

Air Compressors : Reciprocating and Rotary compressors single and multistage compressors, inter cooler, after cooler, receiver clearance volume and volumetric efficiency. Refrigeration and air conditioning: Bale –Coleman refrigerators, vapor compression and absorption refrigerators, psychrometry charts, introduction to comfort air-conditioning

Reference Books

Theory of Machines	: S.S.Ratan
Theory of Machines	: Shigley
Engineering Thermodynamics	: P.K.Nag
Thermal Engineering	: P.L.Ballaney
Thermal Engineering	: V.M.Domkundwar
Theory of Machines	: R.S.Uhurmi

Course Outcomes:

The students will be able to understand the

1. General Principles of Power Transmission
2. Concepts of Thermodynamics and Internal Combustion Engines
3. Air Standard Cycles and Air Compressors

Sub code-MNL262 (3-0-0)

Sub-MINE SURVEYING

Course Objectives :

Students will be given the basic idea of principles of surveying and mine surveying
Students will be trained in handling the various survey instruments used in general and mine survey, through practicals and demonstrations.

Contents:

Surveying: Definition, objective, classification and principles of surveying. Linear measurement: Instruments for measuring distances, ranging survey lines. EDM: Principle of measurement; types; corrections; selection of equipment; total station. Miner's Instrument: Miners' Dial, Abney level, Clinometers, Suspension Compass, and Gyro-theodolite:
Angular measurement: Prismatic compass - principle and construction; bearing of lines; local attraction; magnetic declination. Theodolite: Essentials of the transit and modern micro-optic theodolite; measurement of horizontal and vertical angles; theodolite traversing, traverse calculations, adjustment of the traverse; computation of co-ordinates; temporary and permanent adjustments.

Levelling: Definition of leveling terms; leveling instruments; different types of leveling; booking and reduction methods; differential, profile, cross-sectional and reciprocal leveling; underground leveling; shaft depth measurement. Contours: Characteristics, methods of contouring and uses of contours; problem solving.

Control Surveys: Tacheometry:- Principle and classification of tachometry; stadia tachometry; distance and elevation formulae. Triangulation: classification, reconnaissance, measurement, procedures for angles and base-line; GPS and its application in mine surveying. Theory of errors, Calculation of most probable values, adjustment of observations.

U/G Surveying: - Correlation: Methods of correlation - direct traversing in inclined shaft, correlation in vertical, single and two shafts. Stope Surveying: Purpose, methods of survey in moderately and steeply inclined ore bodies, flat and vertical ore bodies/seams.

Curve setting: Elements, laying of simple circular curves on surface and belowground. Transition curve and super elevation. Development surveys: Setting a point of known coordinate, control of direction and gradient in drifts, tunnels, raises and winzes; application of lasers; Problems of underground traversing. Legal requirements as to mine plans in India, preparation and preservation of plans and sections, representation of geological and other features on mine plans and sections

Reference Books

1. Surveying Vols. I, II, III :Dr. B.C.Punmia
2. Surveying Vol I and II :Dr T.P.Kanetkar
3. Metalliferous Mine Surveying :Winniberg

Course Outcomes:

The students will be able to understand the

1. Basic terminology of Surveying
2. Various types of levelling
3. Various operations involved field surveying and curve setting.

Sub code-MNL263(3-0-0)

UNDERGROUND METALLIFEROUS MINING

Course Objectives:
- Gives understanding of metal mining methods with respect to development and extraction

- Provides methodology for selection of metal mining methods, methods of driving underground openings
- To appraise the special mining techniques and problems

Contents:

Present status of Indian metal mining industry, scope and limitations of underground mining; classification and choice of stoping methods
Choice of level interval and block length- shape, size, position ; excavation and equipping of shaft station, grizzly, ore/waste bin, main orepass system, underground crushing and loading stations, underground chambers, sump and other subsidiary excavations; arrangements for dumping into main orepass
Cross-cuts, drifts, and declines: their shape, size and position
Raises and winzes - their shape, size and position; excavation process -ground breaking, mucking, ventilation and support; modern methods of raising - Alimak and longhole method including vertical crater retreat method of raising, raise boring - systems and their details; modern methods of winzing; Secondary breaking at grizzly - conventional and mechanized methods
Open stoping – room and pillar, sublevel, large diameter blast hole/DTH, shrinkage and vertical crater retreat methods - their applicability, stope layouts, stope preparation, ground breaking, mucking, ventilation and supporting, haulage and dumping
Supported stoping – post and pillar, square set, longwall, cut and fill- their applicability, stope layouts, stope preparation, ground breaking, mucking, ventilation and supporting, haulage and dumping
Caving stoping – top slicing, sublevel caving, and block caving; their applicability, stope layouts, stope preparation, ground breaking, mucking, ventilation and supporting, haulage and dumping
Mining of parallel and superimposed veins Pillar recovery
Dilution, loss and recovery in stoping
Specialised methods : Solution mining, in-situ leaching, borehole mining, underground retorting
Problems of deep mining and their remedial measures, design and layout of stopes in rock burst prone areas

Reference Books: \

1 Introductory mining engg :by H.L.Hartman
2. Underground mining methods handbook, :by Hustrulid SME publication
3. Metalliferrious mining of ores :by Borosov et.al.
4. SME Mining Engineering Handbook, Edited :by H.L.Hartman SME publication

Course Outcomes:

1. Students will gain the knowledge about various development headings, opening with their shape, locations and its driving technology
2. Students can will learn about the unit operations and stoping parameters through models and visuals
3. Students will develop a skill to select the method of metal mining based on geomining parameters

Sub code-MNL264(3-0-0)

Sub-MINING MACHINERY-I

Course Objectives :

Students will be imparted the knowledge about mining machinery used for transport of mineral and materials on surface and underground.
students will be trained through assignments, demonstration and practicals through study of models

Contents:

Pit-Top and Pit-Bottom Circuits : Simple pit-bottom circuits, pit-top circuits, tippers, screening and handling plants, railway sidings.

Wire Ropes : Wire ropes of different types and their construction and selection, space factor, fill factor, bending factor and factor of safety. Rope deterioration, estimation of size of rope, rope capping, recapping and rope splicing.
Heat Treatment: Heat Treatment of steel and steel alloys, properties, uses and application. Rope

Haulages : Types of rope haulages, selection, computations, and safety devices. Mine tubs, mine cars, links, clips and rope capel. Application of rope haulages. Track laying and maintenance.

Locomotives: Different types ; diesel, electric trolley wire , construction and operation, application and maintenance. Locomotive haulage computations, safety devices. Track laying and maintenance Manriding systems in underground mines: Types, construction and safety devices. Conveyors: Construction and operation of belt, chain and cable belt conveyors. Conveyor computations. High angle conveyors, shiftable conveyors, Head frames; types and fittings. Shaft fittings; signals, guides, Keps, tilting platform, cage receivers, protective roofing. Suspension gear, cages, and skips.

Winding : Drum and friction winding with their variations and limitations, duty cycle, torque time diagrams and computations. Multilevel and deep winding. Drives for winding.
Safety devices on winders; emergency braking, over speed control, slow banking, depth indicators, automatic contrivances. Aerial ropeways: Types, construction, application and operation, safety devices.

Reference Books

Mine Winding & Transport	: Walker
SME Mining Engineer's Handbook	: Hustrulid
Underground Mining Methods Handbook	: Hustrulid
Mine Hoisting	: M.A.Ramlu, Oxford & IBH, 1996

Course Outcomes:

The students will be able to

1. Understand various surface layouts, wire ropes construction and size selection and its deterioration
2. Transport systems in mines – its various features in detail, safety devices, braking systems and related calculation.
3. Winding systems in mines – drum winder. There important features –construction, mechanical & electrical braking, safety features and torque time diagram.
4. Winding systems in mines – friction winder There important features –construction, mechanical & electrical braking, safety features and torque time diagram.
5. Aerial Ropeway – construction, safety features and calculation.

Sub code-MNL265 (3-0-0)

Sub-MINE VENTILATION AND CLIMATE ENGINEERING

Course Objectives :

To develop expertise in designing ventilation system for an underground mine.
To develop cost effective planning of a ventilation system.

Contents:
Composition of Mine Atmosphere: Mine gases - production, properties, effects and detection; sampling and analysis of mine air; methane content; methane drainage; methane layering; flame

safety lamp and its uses; methanometer; radon gas and its daughter products; continuous monitoring of gases

Heat and humidity : Sources of heat in mines; effects of heat and humidity; psychrometry, kata thermometer; heat stress, air-conditioning

Natural ventilation : Seasonal variations, calculation of NVP from air densities and thermodynamic principles

Air Flow through Mine Openings: Laws of flow, resistance of air ways, equivalent orifice, distribution of air; flow control devices; automation and remote control of ventilation installations; ventilation surveys; permissible air velocities in different types of workings

Mechanical Ventilation : Types of mine fans; theory, characteristics and suitability of fans; selection, testing and output control; fans in series and parallel; forcing and exhaust configurations; reversal of flow; fan drifts, diffusers, evasees

Ventilation planning: Planning of ventilation systems and economic considerations; ventilation layouts for mining of coal and ore deposits; ventilation of workings/stopes using heavy blasting; calculation of air quantity required for ventilating a mine; calculation of total mine head; network analysis principles and computer applications

Booster fans, auxiliary ventilation, recent developments in mine ventilation,
venturi blowers; ventilation of deep mines - underground and open pit; standards of ventilation; ventilation cost calculations

Reference Books:

Mine Ventilation : G. B. Mishra
Sub-surface mine ventilation : Macperson
Mine ventilation and air-conditioning in mines : Harman

Course Outcomes:

The students will be able to understand the

1. Various gaseous pollutants including radon gas in metalliferous and coal mines. There toxic effects, detection and means of their reduction in mine atmosphere. Statutory requirement of ventilation standards to be maintained.
2. Salient features of heat and humidity, their effect on working efficiency of miners, measurement and reducing both to tolerable limits.
3. Natural ventilation and its limitations. Types of Mechanical ventilators, various ventilation devices, selection, installation, working and necessary calculation including expenditure and necessary statute.
4. Live case studies of mine ventilation, quantity & necessary pressure requirement, ventilation planning in underground coal and non-coal mines, auxiliary ventilation devices for improvement in ventilation.
5. Computer application in solving complicated ventilation circuits and special problems associated with deep underground and deep opencast mines.

Sub code-MNL266 (3-0-0)

Sub-ROCK ENGINEERING

Course Objectives :

Mining structures are made in the rock hence rock characterization and support design becomes immense need of mining graduates. Behaviour of rock is governed by rock properties and structural discontinuities in the rock.
The students are acquainted with the determination of the strength properties of, both absolute and index properties

Contents :

Introduction, Intact rock and Rock mass Properties: Introduction to Rock Mechanics; Determination of physical properties, strengths, strength indices and static elastic constants; parameters influencing strength; abrasivity, hardness .
Concept of stress and strain in rock, Analysis of stress, strain and constitutive relations in isotropic and anisotropic rocks. Introduction to elementary rock mass classifications based on strength, hardness, RQD.

Static and Dynamic properties of rock and rock mass, Determination of strength properties of rock, determination of dynamic properties of rock Propagation of elastic wave in rock media; determination of properties and elastic constants. Creep deformation and strength behaviour, creep test and rheological models, Failure criteria for rock and rock mass : theories of rock failure; Coulomb, Mohr and Griffith criteria; empirical criteria.

Stresses in Rock and Rock reinforcement techniques: In situ stresses, methods of determination including over-coring and hydro-fracturing methods. Terminology used in rock reinforcement, pressure arch theory, support and reinforcement principles and design; classification of mine supports

Distribution of stress patterns around mine openings. Introduction to methods of stress analysis. Predictive methods for mine design, principles of classical stress analysis, closed form solutions for simple excavation shapes

Introduction to computational methods of stress analysis - rock modeling, analytical and physical modeling, finite element, boundary element, distinct element methods and hybrid computational schemes.

Physico-mechanical properties of soil: Physical properties including consistency and gradation; classification of engineering soils; engineering properties of soils, compressibility, consolidation, compaction and strength.

Reference Books:

Manual on rock mechanics : Ramamurthy & Sharma , CBIP Publ.
Rock Engineering : John Franklin and Maurice Dusseault, McGraw-Hill Publ. comp
Rock Mechanics for hard rock mining : Jumikis

Course Outcomes:

1. To make students conversant with different types of rock mass with regard to design of excavations and methods of designing

2. To acquaint students with various types of supports and reinforcements as well as permanent supports of excavations

3. To make them conversant with ground control and subsidence problems and preventive measures.

4. To understand the knowledge basic of stress analysis, rock modelling and soil mechanics to be applied for design of rock structures.

Sub code-MNL362 (3-0-0)

Sub-MINING MACHINERY-II

Course Objectives :

To acquaint the students with various types of surface and underground mining and modern mechanical excavation machines

Contents:

Coal cutting machines, shearers, coal ploughs, lump breakers, road headers, TBMs, raise and shaft borers, continuous miners, stage loaders; their main features and applicability
Loading machines - rocker shovel, SDL, LHD, gathering arm loader, shuttle car, LPDTs, scraper ; their main features, applicability, selection and production capacities
Opencast Machinery - Shovels, draglines, dumpers, wheel loaders; their main features, applicability, selection and production capacities;
Underground coal and rock drills, jumbo drills, rock bolting machines.
Small and large diameter surface blasthole drills, rippers and scrapers, road graders, dozers; their construction, application, selection, and operation
Continuous surface mining equipment- bucket wheel excavators, surface miners, spreaders, dredging equipment; their main features, applicability, selection and production capacities
Pumps : Types of mine pumps, application and related computations.
Miscellaneous Mining Equipment: Power pack and Hydraulic System, Truck Despatch System, Stacker Reclaimer, Rock Breakers, Impact Hammers, Slurry Pumps, Equipment used in Shaft Sinking, In-pit Crushers

Reference Books :

SME Vol on Underground Mining Methods Handbook Ed. Hustrulid
E. Lopez Jimeno, C. Lopez Jimeno, Ayala Carcedo

Drilling and Blasting of Rocks, 1995, CRC Press
Ratan Raj Tatiya

Surface and Underground Excavations – Methods, Techniques and Equipment, Taylor & Francis (2005)

Surface Mining Equipment by JW Martin, TJ Martin, TP Bennett, KM Martin; Publ – Martin Consultants, Inc, Golden Colorado 80402

Course Outcomes:

The students will be able to

1. Understand the necessity, construction, applications and selection of various winning machines in underground excavation including, coal formation and tunnels.

2. Understand the necessity, construction, applications and selection of various loading machines in underground excavation including coal formation and tunnels.

3. Understand the necessity, construction, applications and selection of various drilling machines in underground & surface excavation along with roof bolting machines.

4. Understand the necessity, construction, applications and selection of various surface mining machines.

5. Understand the necessity, construction, applications and selection of various ancillary equipments. Construction and selection of various type of pumps used in underground and opencast mines and calculations.

Sub code-MML385 (3-0-0)

Sub-MINERAL PROCESSING

Course Objectives : To acquaint the students with
identification of Ores/Minerals
working principle and mechanism of Crushing and Grinding Operations
separation of minerals by Jigging, Tabling and Heavy media separation
froth flotation operation for upgradation of ores/minerals, Electrostatic/Magnetic separation operations

Contents:

Mineral beneficiation and its role in mineral exploration and conservation with special reference to Indian economic minerals

Theory and practice of crushing and grinding, conventional units and their performance and choice

Laboratory techniques, interpretation and plotting of data, industrial screens and classifiers, dry and wet processes

Importance of sampling and methods used in mills

Picking, washing and classification

Theory and applications of sinks and float, jigging and flowing film concentration-methods and equipment used.

Physico-chemical principles, flotation reagents, floatation machines and circuits, application to common sulfide, oxide and oxidized minerals

Principles, operation and field of application.

Dewatering and drying : thickening, filtration and drying.

Methods of coal washing, washability curves

Simplified flowsheets for the beneficiation of coal and typical ores of copper, lead, zinc, iron and manganese with special reference to Indian deposits

Brief description of leaching methods.

Course Outcomes:
The students will be able to

1. Understand the working principle and mechanism of Crushing and Grinding Operations
2. Understand the basic principles of separation of minerals by Jigging, Tabling and Heavy media separation
3. Understand froth flotation operation for up gradation of ores/minerals, Electrostatic/Magnetic separation operations

Sub code-MNL363 (3-0-0)

Sub-MINE HAZARDS AND RESCUE

Course Objectives:

to make students conversant with types of hazards viz. Fires, Explosion and Inundation which can take place in underground mines
to give knowledge in details about the causes and mitigation measures for each of the hazard
to provide details of rescue operations to be conducted in mines after disasters
to make students understand problems of mine dust and illumination including the assessment and mitigating measures

Contents:

Mine Fires : Causes of mine fires; spontaneous combustion - mechanism, susceptibility indices, factors affecting spontaneous combustion; detection and prevention of spontaneous heating; accidental fires – causes and prevention; dealing with mine fires - direct and indirect methods, fire stoppings; fires in quarries, coal stacks and waste dumps.

Mine Explosions : Firedamp and coal dust explosions – mechanisms, causes and prevention; stone-dust and water barriers; investigations after an explosion.

Inundation : Causes and prevention, precautions and techniques of approaching old workings; safety boring apparatus, pattern of holes; design and construction of water dams, shaft dams, emergency bulk heads, strengthening of dams

Rescue and Recovery : Rescue equipment and their uses, rescue stations and rescue rooms; organization of rescue and recovery areas, re-opening of sealed-off workings
Illumination in mines- it's effect on safety, efficiency and health ; common types of safety lamps & their uses and limitations, maintenance and examination of lamps, their charging, cleaning, lighting, re-lighting ; lamp room design and organization; lighting from mains – different types of illumination devices; illumination of pit bottoms. main roads, faces, pump houses and haulage rooms; standards of illumination in underground and opencast mines
Airborne respirable dust in underground mines - generation, dispersion, measurement and contro; classification, physiological effects, dust measurement, sampling of air-bone dust

Course Outcomes:

1. To familiarize with the concept of hazards in mines and rescue operations
2. To understand the basic mechanism of hazards
3. To develop the ability of analyzing complex engineering problems associated with hazards
4. To be competent in designing components and processes dealing with hazards.

Sub code-MNL364 (3-0-0)

Sub-GROUND CONTROL IN MINES

Course Objectives :

To make students conversant with different types of rockmasses with regard to design of excavations and methods of designing
To acquaint students with various types of supports and reinforcements as well as permanent supports of excavations
To make them conversant with ground control and subsidence problems and preventive measures

Contents:

Design and Stability of Structures in Rock : Intact rock and rock mass classification systems; criteria for design and support of underground excavations; energy released by making an underground excavation; design of single and multiple openings in massive, stratified and jointed rock mass; Estimation of support requirement.
Mine pillars and their classification, pillar stresses, pillar design, stability analysis of pillars.

Timber and Steel support: Prop/post, various types of chocks, cross bars, lagging, forepoling; load bearing capacity of timber supports; setting up of timber supports, bulkheads, treatment and preservation of timber. Steel set - rigid and yielding types; shaft tubbing, wire mesh, steel lining, screw jacks and ratchet jacks; improvised steel props, friction props, hydraulic props; link bars and chocks, powered supports

Active Supports: Rock bolts and dowels - different types and uses; mechanics of bolting. Anchored rockbolts Slot and wedge type, expansion shell type, grouted point anchor type. full column anchors, wooden and fiberglass dowels, mechanical full column anchors, split sets/friction rock stabilizers, installation and testing of rock bolts. Cable bolting — its installation and applications.
Insitu constructed support - Poured monolithic and reinforced concrete lining; guniting and shotcreting. Materials of backfill and their procurement; sand gathering plant; theoretical aspects of slurry transportation; preparation, transport and placement of hydraulic backfill with and without cement; rock and concrete fills; surface arrangement for storage and mixing; pneumatic and mechanical methods of backfilling.

Subsidence : Causes and impacts of subsidence; mechanics of surface subsidence, discontinuous and continuous subsidence; monitoring, prediction, control and management of subsidence.

Caving of Rockmass : Caving characteristics of rocks; cavability index. Rockburst : Phenomenology of rockbursts; prediction and control of rockbursts; bumps and gas outbursts.

Surface Mine Slope Stability : Types of mine slope; influence of pit slope on mine economics; common modes of slope failure; factors influencing slope stability; slope stability assessment techniques; stability of analysis of slopes; measures to enhance slope stability; protection and monitoring of slopes.

Reference Books :

Hoek, E and Brown, E.T. (1980): Underground Excavation in Rock, The Institution of Mining and Metallurgy, London

B.H.G.Brady, E.T.Brown : Rock Mechanics for Underground Mining, George Allen & Unwin, London

M. Jeremic : Strata Mechanics in Coal Mines (1985), Taylor & Francis

Course Outcomes:
The students will be able to

1. Classify the rock based on their engineering properties
2. Understand applicability of different types of supports.
3. Understand various phases of stowing and back filling.
4. Predict and control the subsidence, rock burst and bumps
5. Analyze the stability of slopes

Sub code-MNL267 (3-0-0)

Sub-UNDERGROUND COAL MINING

Course Objectives :

Gives understanding of coal mining methods with respect to development and extraction
- Provides methodology for selection of coal mining methods, methods of driving underground openings
To appraise the special mining techniques and problems

Contents

Introduction ; status of coal reserves, grade and rank of coals available in India, status of coal mining in India, mining conditions in Indian coalfields; choice of mining methods

Development: Bord and Pillar, and Room and Pillar Mining; design of bord & pillar workings, the panel system, panels and inter-panel barriers, size of pillars and galleries; methods of driving galleries; layouts for different combinations of loading and transport systems including continuous systems

Depillaring: preparatory arrangements for depillaring; sequence and manner of extraction of pillars; mechanized pillar extraction, setting and withdrawal of supports; airblasts; partial extraction

Longwall Mining : Evolutionary development of longwall mining, its application, layouts, development and extraction by conventional and mechanised methods; design of longwall workings - face length and panel length; salvaging of longwall faces. Thick seam mining: multi-section mining, slicing methods, sublevel caving, integrated sublevel caving, blasting gallery method, thick seam extraction by cable bolting, hydraulic mining

Contiguous seam working: working under surface structures and water bodies, harmonic mining; shaft pillar extraction; horizon mining
Gasification of coal

Course Outcomes:
The students will be able to understand the

4. Basic technology of coal mining
5. Various operations involved in depillaring
6. Various operations involved in Longwall Mining and Contiguous seam working

Sub code-MNL268 (3-0-0)

Sub-SURFACE MINING

Objectives :

Develop students into design and construction of surface mines under various geo-environmental conditions.To expose students to the modes of conversion of underground mines into surface mines and reclamation practices.

Contents

Role of surface mining in mineral production in India, elements of surface mine planning- height, width, and slope of benches, overall and ultimate pit slopes, stripping ratio, cut off grade, different mining costs and preliminary evaluation of surface mining prospects

Types of surface mining systems: — applicability, limitations, advantages, disadvantages
Opening up of Deposits – different systems of opening of deposits, site preparation, box cut, formation of benches, and haul roads Layouts using different combinations of main excavation, loading and transportation systems Blasting: Blasting practices and design in surface mines

Extraction Methods : Extraction of subsurface deposits - bedded deposits, massive deposits, pipe type, cap type and vein type deposits; mining of beach sands, placer mining, dimensional stone mining Layouts with In-pit crushing and conveying, surface miners Surface mining of coal seams developed by underground methods, surface mining over underground workings, mining in fiery strata, deep mining problems Dump Formation : Types of waste dump - internal and external; dump formation methods and equipment Reclamation methods by using different combination of equipment

Course Outcomes:

1. The students will be able to understand the

2. Importance of surface mining in today's mineral requirement and world mineral production of various minerals from surface mines.

3. Understanding viability of surface mining and its design aspects.

4. Various systems of surface mining and their applications. Opening of deposits under various conditions and haul road design

5. Mining of deposits under various conditions using various equipment combination with layouts including in-pit-crushing technology. Problem solving of mine design covering – development, production, equipment capacity & strength calculation and layouts.

6. Blast design under various geo-mining conditions with live problem solving.
7. Conversion of underground developed to surface mines – its related problems and design of mines.
8. Construction of external and internal dumps with problems.
9. Reclamation and with real life problems.

Sub code-MNL461 (3-0-0)

Sub-SURFACE MINE ENVIRONMENT

Course Objectives:

To make student conversant with prevailing environmental legislation in India
to provide knowledge in details about various sources of pollution in surface mines and mitigating measures against each source
to make student conversant with social impacts and aspects of getting approvals and permissions for running mining industry

Contents

Environmental issues in mineral industry — national and global; ambient environment mining complexes; environmental impacts of mineral exploitation - underground and opencast mining and associated activities.

Societal Environment : Societal environment and its management including resettlement and rehabilitation; socio-economic impacts; sustainable development; concept of carrying capacity based planning. Ecological environment and its management including biological reclamation. Land

Environment : Visual impacts; landscape analysis; land use; landscape planning; physical reclamation and subsidence management.

Air Pollution : Air pollution - sources, monitoring and control

Water Regime: Availability; water quality; water pollution treatment and water management.

Waste Management : solid wastes - generation, treatment and disposal

Noise and Vibrations : Causes, precautions, measurement, prevention and reduction. Blasting :

Environmental aspects of blasting.:

Environmental Administration in India: Administration and Management, preparation of Environmental Management Plan. Environmental audit, salient features of Environment Protection Act

Reference Books

Environmental Impact of Mining : Stocks
Mining and Environment : Dr. B.B.Dhar
Mine Environment : Dhar and Thakur

Course Outcomes:

The students will be able to understand the

5. Environmental issues in mineral industry
6. Issues related to air and water pollution
7. Environmental issues related to blasting
8. Management of environment

Sub code-MNL464(3-1-0)

Sub-MINING ECONOMICS

Course Objectives :

To make students conversant with the minerals as an economic commodity, their contributions in the national economy
To acquaint them with various types of business organizations and mobilization of funds for the exploitation of the various mineral resources
To acquaint them with the concepts of mineral resources and reserves, the methods of evaluation of mineral resources in various stages of development

Contents

Introduction : Economic importance of the mineral industry; mining economy, risky nature of the mining industry; State and the mining industry; national mineral policy
Mineral resource - concept, classification and estimation. Mineral inventory -concept, characteristic features, composition and economic significance; estimation of life index. Economics of mineral exploration and production Mineral price and pricing, price index. Mineral consumption and substitution; market survey and demand analysis. Conservation of mineral resource - scope and limitations.
Forms of business organization- Private and public enterprises, acquisition and merger. Mine finance : Capital and its importance, sources of finance, shares, debentures and the cost of capital, various forms and formation; Royalty, taxes and duties; imports and exports.

Mine Sampling : Definition, purpose and scope; sampling methods and computations; reliability of mine sampling. Loss of mineral in mining : Classification and incorporation of losses; coefficient of completeness of mineral extraction; dilution and recovery.
Geostatistical application for grade and reserve estimation

Cost of mining : Capital and operating costs; factors affecting operating cost; methods of estimating future costs; standard cost and forecast; budget and budgetary control.
Mine examination and valuation : Examination and valuation of mines/mineral properties; Hoskold and modern concepts, present value computation;.

Economic feasibility studies : Need for economic analysis; techno-economic analysis data estimates; methods of investment appraisal; risk analysis; societal versus private interest economic evaluation.

Reference Books

1. Mineral Economics : KK Chatterjee
2. Mineral Economics : R.T.Deshmukh
3. Valuation and Examination of mineral Property : Parks
4. Indian Mineral Year Book – Indian Bureau of Mines

Course Outcomes:

1. Students will have knowledge about various inventory of minerals and aspects of mineral economics
2. Students will develop some skill in financial managements of mineral industry

Sub code-MNL465 (3-1-0)

Sub-MINE SYSTEMS ENGINEERING

Course Objectives :

Student will be imparted with the basic knowledge of system engineering and its application to mining engineering
Various operations research and system engineering tools and their application to mining engineering, knowledge has been given to the students through the live examples

Contents

Introduction to Systems Engineering : Concept of system, components and system environment; classification of systems; systems analysis; creative aspects of planning and design; factors influencing creativity; techniques for generating alternative ideas/solutions

Mathematical Programming Methods : Linear programming - definition/elements, assumptions and limitations of LPP; graphical solution; geometry and algebra of simplex method; interpretation of simplex table; application of linear programming for solution of mining problems related to production, blending, scheduling.

Transportation and Assignment Problems : Mathematical modelling and solution algorithm; application to mining problems.

Project Management with PERT & CPM : Network Models Assumptions of PERT and CPM; art of drawing network; redundancy and identification of redundant jobs; algorithm for calculation of critical path and identification of critical jobs; criticality index; statistics related to PERT; probability of completing a project by a due date; lowest cost schedule; case examples
application to mining problems

Decision Analysis : Decision problems; model formulation; decision analysis based on expected monetary value and utility value. Optimisation techniques and queueing theory.

Simulation : Introduction and concept; scope and limitation; system type versus simulation technique; generating input data; Monte-Carlo simulation; deterministic and stochastic simulation of various systems in mines.

Reference Books

ORT Applications : Kulkarni

Course Outcomes:

1. Students will acquire knowledge about different modelling techniques for mining and allied applications

2. Students will acquire some simulation knowledge useful for decisions making and management
3. Students will acquire knowledge about Project Management with PERT & CPM

Sub code-MNL466 (3-0-0)

Sub- ROCK EXCAVATION ENGINEERING

Course Objectives :
Advance processes of excavation techniques are covered

Contents

Introduction: Scope and importance of rock excavation engineering in mining and construction industries; physico-mechanical and geotechnical properties of rocks vis-a-vis excavation method; selection of excavation method.

Drilling : Mechanics of rock drilling; design and operating parameters of surface and underground drilling; evaluation of drill performance; drillability of rocks; mechanism of bit wear; bit selection; problems of drilling; economics of drilling.

Blasting: Mechanics of rock fragmentation by explosives; advancement in explosives and blasting technique; their selection criteria for rock excavation; blast design for surface excavations and optimization;

Advanced blasting techniques; blast performance evaluation; cast blasting; techno-economic and safety aspects of surface and underground blasting; advances in blast design for underground excavations; control blasting; computer aided blast designs; review of tunnel blasting techniques, recent advances and novel techniques of blasting

Rock Cutting: Theories of rock tool interaction for surface excavation machinery; design of cutter head - rippers, dozers, scrapers, BWE. Continuous surface miners, auger drills;

Theories of rock tool interaction for underground excavation machinery; design of cutter head - ploughs, shearers, roadheaders, continuous miners and tunnel boring machines: selection criteria for cutting tools; advanced rock cutting techniques - high pressure water jet assisted cutting. Recent Developments in rock excavation machinery.

Reference Books:

1. Blasting Practices : G.K.Pradhan
2. Explosives and Blasting Practices in Mines : Dr. Sameer Kumar Das
3. Drilling : G. Chugh
4. SME – Mining Engineers Handbook
5. Surface Mining – SME

. Introduction to Mining : Hartman

Course Outcomes:

The students will be able to understand the

4. Concepts of drilling and Blasting
5. Advanced blasting techniques
6. Theories of rock tool interaction and Rock Cutting

Sub code-MNL467 (3-0-0)

Sub- GEOSTATISTICS

Course Objectives :

Students are made conversant with basic statistical and geostatistical methods
Application of these tools are made with reference to mineral grade calculations

Contents

Classical statistics, random distributions, normal and lognormal theory. Concept of geo-statistics and its application to mining
Spatial statistics, Covariogram, definitions, estimation, fitting
Variogram, semi-variogram, defination, estimation, experimental variogram, fitting; application, uses of variogram.
Various model of variograms: random model, spherical model, expontial model, gaussian model, Linear model, logarithmic or de Wijsian model, parabolic model
Nugget effect, its implication on model, anisotropies
Numerical calculation of variogram, and graphs for one, two and three dimensions
Krigging method for grade and reserve estimation.
Krigging estimator, krigging error, point krigging, block krigging, optimal valuation
Use for geostatistical software for various application
Case studies of grade estimation

Reference Books

1. Geostatistics – Methods and Applications : Rendu J.M.
2. Open Pit Planning – SME

Course Outcomes:

The students will be able to understand the

1. Statistical distributions – random, normal and lognormal and its importance in mining environment.

2. Variogram, co-variogram calculation. Different models of variogram like random spherical, spherical, exponential, Gaussian, Linear, logarithmic and Parabolic - their application, Nugget effect and its implication on model.

3. Grade and reserve estimation for mineral deposits.
4. Case studies on various geostatistical models, grade estimation

Sub code-MNL468 (3-0-0)

Sub- ADVANCED MINE SURVEYING

Course Objectives :

Students are made aware about the modern survey equipment and methods for precision survey

Contents

National Grid: Map Projections; Cassini, Lambert's Polyconic, UTM, transformation of coordinates.

Geodesy: Good, spheroid and ellipsoid, geocentric, geodetic and astronomical coordinates, orthometric and dynamic heights.

GPS, principle, operation, application to mine survey and face monitoring.
EDM, Total survey station, principle and application to mine survey,
Laser profilers, opencast mine survey
Survey for construction of excavations, chambers, installation of headgear, haulages, hoisting engine, sub-station, pump stations etc.
Gyro-theodolite, principle, application to mine survey
Subsidence survey
Remote sensing, Photogrammetry, satellite imaging, GIS application to mining
Computer aided drawings of plans and sections
Reference Books

Mine Surveying by Mason
Metalliferous Mine Surveying by Winigerg
Surveying Vols I, II & III – by Punmiya
Surveying & Levelling Vols I & II by Kanetkar and Kulkarni

Course Outcomes:

1. Learn advanced tools for mine surveying
2. Students will be trained in handling the various advanced survey instruments
3. Learn various calculations required for planning
4. Will work with team spirit

Sub code-MNL463 (3-0-0)
Sub-MINE MANAGEMENT

Course Objective :

The students are made conversant with management, organization, structures, personnel management and managerial behaviors etc.

Contents

Introduction of management : Evolution of management, theory and practice, principles of scientific management; objectives of management - administration and management , Levels of management organization, types of organisation; structures of mining organization from mine to corporate sectors, legislative aspects of mining organization..
Personnel Management : Objectives and principles, Various functions of management like employment, development, relation and retention. Recruitment, Interview techniques, Selection, training and EDP, job evaluation and performance appraisal, Human resources and . Manpower Planning in mines.
Communication : Role of communication in mining organizations, types and its importance, two way personal communications; communication networks.
Behavioural Sciences for Management : Human needs, various theories of motivations; causes of conflicts in organization, sources of conflicts, dealing with conflicts, role of PRO
Leadership: Essential qualities of leader, Leadership models, types of leaders, functions of leaders, group dynamism, individual and group behavior, leader and mass communication.

Industrial Psychology: Definitions, objectives and applications; study or individual differences, traits and personality theories; job satisfaction and morale, determining factors, and steps for improvement; study of work groups, characteristics and types; psychological tests and their uses.
Industrial Relations : Industrial disputes, definitions and causes; industrial discipline, grievance, causes, and grievance settling machinery in industry,; trade union movement, trade unions collective bargaining; adjudication, workers' participation in management.
Production Management: Determination of norms and standards of operations by work study; analysis of mine capacities and capabilities; production planning, scheduling and control, short and long term planning; productivity, its concept and measurement.
Materials Management : Importance and role of material management, management organization,; purchase and stores management; Inventory Management : Introduction; components, scope and limitations; nature of inventory; ABC analysis of inventory control, classical E. O. Q. model; E. O. Q. model inventory optimization
Introduction to various managements: Financial Management . sources of capitals, accounting principles and budget and budgetary control. Introduction to Project management, principles and functions. Introduction to office management, introduction to quality management , quality circles, six sigma management

Reference Books :
1. Principles of Management by Kulkarni and Chopde
2. Industrial Engineering and Production Management by M. Mahajan, Dhanpat Rai Group publ.

3. Personnel management and industrial relations, by Varma and Agarwal, Educational publisher, New Delhi
4. Principles of Management by Gupta, Dhanpat Rai group

Course Outcomes:

1. To know managerial aspects of mines and its organization and structures,
2. To understand the fundamentals of principles of management
3. Application of management principles in mining industries
4. To study the behaviour science , industrial psychology and motivations etc human aspects

Sub code-MNL462 (3-0-0)

Sub-MINE LEGISLATION AND SAFETY

Course Objectives :

To acquaint the students with the prevailing legislative set ups governing the allocation of the exploration and mining rights
To acquaint them with the safety, health, and technical aspects of mining activities
To acquaint them with the methods of accident investigation, disaster management etc and modern day tools of accident prevention

Contents
Introduction: General principles of mining laws, development of mining laws in India. Sources of legislations, mining laws of India. General provisions of Mines and Minerals(Regulation and Development Act 1957, Mineral Concession Rules 1960, Mineral Conservation and development Rules 1988
Salient features of Mines Act 1952 , Mines Rules 1955, Additional provisions Indian Electricity Rules 1956 applicable to mines, Workman Compensation Act, Mine Chreche Rules, Pit Head Bath Rules, Vocational Training Rules 1966, Mines Rescue Rules 1985
General provisions of Coal Mines Regulations 1957 and some important by-laws and standing orders for coal mines
General provisions of Metalliferous Mines Regulations 1961 and some important by-laws and standing orders for coal mines
Safety and Health in Mines: Occupational hazards of mining and diseases; accidents and their classification; statistics of fatal and serious accidents; frequency rates and severity rates of accidents; cause-wise analysis; basic causes of accident occurrence; investigations into accidents and accident reports; in-depth study of accidents due to various causes;. Cost of Accidents.
Emergency measures and emergency organization, Disaster Management Plans for major disasters of explosions, inundation etc. Measures for improving safety in mines, risk assessment

Reference Books
1. Indian Mining Legislation – A Critical Appraisal : Rakesh & Prasad
2. NIOSH Publications
3. DGMS Circulars : L.C.Kaku
4. Safety in Mines : A survey of accidents, their causes and prevention by Prof. Kejriwal

Course Outcomes:

The students will be able to understand the

1. General principles of Mining Laws and their history
2. Salient features of Mines Act and mines rules

3. General provisions of CMR 1961 and MMR 1961
4. Legal aspects of safety and health of Mine workers.

Sub code-MNL470 (3-0-0)

Sub-MINE PLANNING

Course Objectives:
to make students conversant with aspects of mine planning
to develop skill of planning of mining operations
to develop expertise in mine design

Contents

Principles of planning, Features of mine planning, planning for new projects and reconstruction planning, short range and long range planning, phases of mine planning, project implementation and monitoring, types of reserves & their inter-relationship, geological reports, weather, topography, drainage and climate report
Fixing the mine boundary- surface and underground, size of mine, limited and unlimited reserves, optimum designed capacity, reserve allocation. Dividing mine into various panels, stope, panel dimensions
Mine entries: types, their application, location, selection shape and size opening. Planning for pit top and pit bottom layouts, choice of layout
Infrastructure planning: CHP/mineral handling plant, workshop, power, water requirement, communication
Method of mining: factors to be considered, surface v/s underground, selection of various methods of extraction, production estimation, production potential of different panels, fixing the target mine
Transportation planning: alternatives, choice of men, material and mineral transport systems, essential requirement, and selection
Ventilation planning: objectives, steps, essential features of ventilation system, different types of ventilation systems, network solutions, economics of ventilation
Drainage planning: assessment of make of water, drainage layout, design of sumps, selection of pumps and pumping capacity
Manpower planning,
Planning for mine closure and post mining land use planning

Reference Books

1. Coal Mine Planning : S.P.Mathur
2. Coal Mining Methods : S.P.Mathur
3. Underground Mining Methods Handbook : Hustrulid
4. Introductory Mining Technology : Hartman

Course Outcomes:

1. To understand various components of mine planning
2. To learn general planning principles
3. Design of various components of mine system
4. Plan and design an overall mine

Sub code-MNL471 (3-0-0)

Sub- UNDERGROUND SPACE TECHNOLOGY

Course Objectives :

students are made conversant with the importance of underground space and the methods of its creation
utilization of the underground space for mining and civil purpose

Contents

Need and importance of underground space creation, types of underground excavations- tunnels, caverns, shafts. Applications of underground excavations: storage, transport, military etc.

Equipment: Roadheading machines, their selection, operation for underground excavation
Shaft Boring machine and Tunnel Boring Machine: construction and operation

Drill for underground excavations: drill jumbos
Site investigation, various shapes and sizes, selection of method of excavation
Excavation by drilling and blasting: Tunnels, caverns, shafts, Method of excavation and design of blasting round, cycle of operation

Excavation by mechanical means : excavation in soft ground and hard rock by TBM and cutting methods, their layouts
Hazards in underground excavations
Parameters for design of underground excavations, Design and selection of support and reinforcement for underground excavation, Consideration for swelling and squeezing rock conditions, rock burst prone zones, seismic zone and soft ground
Environmental problems in rock excavations, causes and preventions, ventilation and illumination in excavations.

Reference Books

1 SME underground mining methods Handbook
2 Storage in excavated rock and caverns
3 Design parameters for underground construction
4 Geo- technical instrumentations in Civil Engg.
5 Tunneling and Underground space technology, Elsevier

Course Outcomes:

The students will be able to

1. Understand the need and importance of underground space technology

2. Understand the applicability of various types of underground excavating machines and drilling patterns

3. Understand the hazards of underground excavations and environmental problems
4. Select and design the underground support for different mining conditions

Sub code-MNL472 (3-0-0)

Sub- MINE SAFETY ENGINEERING

Course Objectives :
students are imparted with the knowledge regarding importance of safety and safety management in mines
various tools of risk, audit, safety practices, safety codes applicable to the mining operations are covered

Contents

Safety management systems in Indian mining industry; engineering aspects of safety management. Basic concept of risk, reliability and hazard potential; elements of risk assessment; statistical methods; control charts; appraisal of advanced techniques - fault tree analysis, failure mode and effect analysis, quantitative structure - activity relationship analysis; fuzzy model for risk assessment.
Measurement of safety efficiency; safety audit methods; safety records management.
Safety legislations, Safety meetings, constitution of safety committees, functions, pit safety committee Ergonomics, Safely practices in various operations, blasting , drilling, equipment and machine handling, site specific safety, ground control, ventilation and gases; safety codes, implementation and monitoring of safety programmes. Recent Trends of development of safety engineering approaches. Safety training

Reference Books

1. Mine Safety : Prof. Kejriwal
2. Occupational Safety and Health in Industries and Mines : C.P.Singh
3. Indian Mining Legtislation – A Critical Appraisal : Rakesh & Prasad
** Safety in Mines : A survey of accidents, their causes & prevention (1901 to 2000)

Course Outcomes:

1. Students will gain the idea about preparation of safety management plan and risk calculation
2. Students can will learn the various steps of safety audit
3. Students will develop a initial skill to monitor the safety related to mining

Sub code-MNL473 (3-0-0)

Sub- MINE MANAGEMENT INFORMATION SYSTEM

Course Objective :
Making students conversant with the Management Information System and developing expertise in creating Mine Management Information System

Contents :

Information as a Resource: Introduction to information management, concept of management information system, planning of information resources
Computer based information management systems, information methodologies and tools, system approach to various operations in mines, analysis of systems
Computer fundamentals for information system, database and database management systems, data mining, data ware house, data banks, data storage and handling. Relational and other data bases
Capturing of information, on-line, off line, pre-processing, formatting etc, Forms and layout. Data processing systems; data communication, data loggers etc.
Mine management information system: Production information, human resource information, geological information, geo-technical information, environmental information, survey information, stores and inventory information, Marketing, financial etc.
Decision support systems for mine mangers, reporting, models, expert systems, office automation, network layout of computer nodes and data communication

Reference Books

1. Mine Safety : Prof. Kejriwal
2. Occupational Safety and Health in Industries and Mines : C.P.Singh
3. Indian Mining Legislation – A Critical Appraisal : Rakesh & Prasad

Course Outcomes:

1. Students will get initial knowledge about database and its preparation
2. Students can will develop skill handling database software
3. Students will get the idea about database and MIS application to mining

Sub code MNL479(3-0-0)

Sub: ADVANCED SURFACE MINING & DESIGN

Course Objectives :
Making students conversant with the advances in surface mining technology
Developing expertise in planning of surface mine system and its design

Contents :

Openpit Optimisation considering Ultimate pit slope, cutoff grades and stripping ratio
Optimum Production Scheduling
Planning and Design of Surface coal mines, Planning and design of Open pit Mines, Planning of Hill Mining
Design of Surface mines Using Inpit Crushing, Surface Miners, Rock Breakers, Design of Highwall Mining
Advances in Loading, Hauling and transportation equipment (Shovel, Draglines, Dumpers, Cross-pit Conveyors, Skip Transportation etc), Application and design of Truck Dispatch System, Application of GPS in surface mining
Design of Waste Dumps and Tailing Ponds, Design of Haul roads, Design of Drainage System.
Monsoon preparation in surface mines
Design of large scale bench blasting: coal and non coal: cast blasting, coyote blasting, chamber blasting, Estimation of Mining Cost for surface mines

Reference Books:

Fundamentals of Open Pit Mine Planning & Design: Hustrulid, W. and Kuchta, M.
Surface Mining : Kennedy, B.A., 2nd Edition, SME, New York, 1990
Surface Mining Technology, : Das, S.K., Lovely Prakashan, Dhanbad, 1994
SME Mining Engg. Hand book Vol.I and II: Cummings, A.B. and Given, I.V., New York

Course Outcomes:

The students will be able to understand the

1. Cut-off grade, ultimate pit slope angle and break-even-stripping ratio. In the light of this information ultimate pit design they will learn.

2. Planning and design of opencast coal mines, opencast metal mines and hill mining – involves layout, equipment calculation.

3. Different loading and transport equipments – their technical combination based on output capacity.
4. Design of waste dumps, haul roads, drainage system.
5. Design of various blasting practices need based.

Sub code MNL477(3-0-0)

Sub: NOVEL MINING METHODS

Course Objectives :
Making students conversant with the various novel mining techniques
Developing the understanding the details of these techniques

Content:

Review of various experimental mining procedures, including a critical evaluation of their potential applications. Mining methods covered include deep sea nodule mining, in situ gasification of coal, in situ retorting of oil shale, solution mining of soluble minerals, in situ leaching of metals, geothermal power generation, oil mining, nuclear fragmentation, slope caving, electro-thermal rock penetration and fragmentation.

Borehole mining: Borehole mining of coal, uranium, sulphur. Drilling, maintenance services, Jet Cavitations, fracturing, Solution Mining of important minerals, leaching
Coal bed methane: Coal Fundamentals and Geology, Key Coal Properties, Coal Permeability, Measurement of Coal bed Gas Content, Elements of a CBM, Isotherms, and Recovery Factor, Development Considerations, Well Design and Drilling, Gas Recovery & Well Performance
Coal gasification: Introduction to gasification: Chemical reactions, Process technologies: Coal Liquefaction, Underground gasification – principles and potential, Conversion of coal to syngas, Impact of coal properties on gasification, Production of coal for gasification: mining and beneficiation perspective, Conversion of syngas to a variety of chemical products, Conversion of coal to syngas via the Sasol process, Environmental aspects around a gasification plant, relevance of coal gasification and its future potential as an environmentally sound technology in the co-production of energy and chemicals with CO2 minimisation.

Hydraulic mining: Introduction, Process of hydraulic mining, hydro monitors, water jets, surface and underground layouts, merits and impacts

Dimensional Stone mining: Introduction and stone mining in India, cutting and control blasting technology, damage measurement during mining, marble and granite mining, cobbles and building stone mining

Ocean floor mining : Deep ocean exploration, sea bed mining, ocean floor nodules mining, technology, dredgers and other machines for mining and transport

Mining in the space : lunar mining, asteroid mining, automatic and robotic machines, future of space mining, Impacts

Reference Books :
1. Underground Mining Methods by SME publication Hustrilid
2. Introductory Mining Engineering : Hartman 2nd Edition
3. Society of Mining Engineering Handbooks –Vol. I and II

Course Outcomes:

The students will be able to understand the

1. Technology for methane drainage and coal gassification
2. Technology for hydraulic mining and deep sea mining.
3. Latest Mining methods such as Nuclear fragmentation, Mining in space dimensional mining etc.

Sub code MNL478 (3-0-0)

Sub : MINE AUTOMATION

Course Objectives:

Making students conversant with methods of automation in mines
Understanding various control systems and automation of various systems in surface and underground mines

Content:

Scope and role of automation in mining operation and human related factors.
System engineering approach and use of operational data from mining equipment and its use the mining process.
Data communication and modern computerised control systems
Data formats and IREDES, mine process data, AGV technology
Basic foundations for automation of mining equipment.
Navigation, surface navigation and GNSS (satellite navigation), mine planning tools, etc
Automation of drilling and drill rig, drilling process.
Automation of underground loading and transportation systems.
Automation in tunnelling projects.
Automation in monitoring of environments in longwall and continuous mining system
Automation of transportation system in surface mining.
Use of robotics in mining for production and disaster management purpose

Reference Books:
Society of Mining Engineering Handbooks –Vol. I and II
Introductory Mining Engineering: Hartman
Underground Mining Methods Handbook: Hustrulid (SME NY, 1994)

Course Outcomes:

The students will be able to understand the

4. Scope and role of automation in mining operation
5. Data communication and modern computerised control systems
6. Use of latest techniques used for mine automation.

Sub code CEL 384(3-0-0)

Sub: ADVANCED MINING GEOLOGY

Course Objectives :

To Understand the Internal structure of earth
Teach fundamental geomorphic and dynamic processes on the Earth
To know about the rocks and minerals and their properties.
To study various geological structures and impacts on mining
To Know prospecting and subsurface exploration methods
To generate the sub surface profiles from geological maps and plotting structures.

Content :

Principles of Prospecting and Exploration: Geophysical methods; Electrical, Seismic, Magnetic and Radar methods of exploration. Geo-Chemical methods; dispersion, mobility, anomaly, pathfinder elements, sampling methods. Exploratory drilling, different methods and applicability. Borehole logging, orebody modelling.

Engineering Geology: Engineering properties of rocks in context to geology. Rock discontinuities and their bearing on rock performance and rock mass failures. Geology of natural slopes. Geological characteristics influencing subsidence and rock bursts.

Stratigraphy: Physiographic and Tectonic Divisions of India. General review of Stratigraphy of India detailed study including economic potential of Archean, Cuddapah, Vindhyan, Gondwana, Deccan Traps and Tertiary systems of India.

Geo-Hydrology: Hydrologic Cycle and equation, Vertical zones of sub-surface water, water table, aquifers, aquicludes, aquifuges and aquitards. Confined and unconfined aquifers. Influents and effluents, seepage, springs. Hydrologic properties of rocks; porosity, permeability. Occurrence and movement of Groundwater, Darcy's Law, water table maps and their usages, Hydrographs.
Economic Mineral deposits. Processes of Ore genesis; magmatic concentration, Hydrothermal, contact metasomatism, residual concentration etc. Syngenetic and epigenetic deposits. Controls of ore localization. Metallogenic Epochs and provinces.
Remote Sensing and Geographical Information System: Introduction to remote sensing technology, Analog and digital data products, remote sensing satellites, application of remote sensing for mining operations. Introduction to GIS and its applications.

Reference Books:

Principles of Engineering Geology : KVGK Gokhale, BS Publications
Fundamentals of Engineering Geology : F.G.Bell, BS Publications
D.K. Todd : Groundwater Hydrology
Principles of Stratigraphy : Ravindra Kumar
Courses in Mining : RNP Arogyaswamy
Environmental Geology : K.S. Valdiya
Rock Mechanics : B.P. Verma
Remote Sensing : F.A Sabins

Course Outcomes:
The students will be able to understand

6. The Internal structure of earth, fundamental geomorphic and dynamic processes on the Earth
7. The rocks and minerals and their properties.
8. The various geological structures and impacts on mining
9. To Know prospecting and subsurface exploration methods
10. And generate the sub surface profiles from geological maps and plotting structures

Sub Code MNL480 (3-0-0)

Sub code: ADVANCED UG METAL MINING & DESIGN

Course Objectives :
Students are made conversant with special and advanced mining methods and their design and planning

Content:
Development- size of stope,level interval
Classification and Selection of stoping methods
Design and locating the orepass and levels

Design of stopes: Stope design and production planning, scheduling
Ring drilling, fan drilling design
Mechanisation and Selection of equipment
Methods of extraction of pillars
Deep mining problems
Mine fills, pastefill, cemented fills

Case studies : Indian and mines from other countries
Mine costing

1. Techniques in Underground Mining - Selection : Richard E. Gertsch et al, SME 1998
2. Underground Mining Methods: Engineering Fundamentals and International Case Studies : A. Hustrulid, 2001
3. Introductory Mining Engineering : Hartman
4. Underground Mining Methods Handbook : Hustrulid (SMEYork, 1994

Course Outcomes:

1. Students will get ideas about the advancement of metal mining methods with regards to mechanization and automation
2. Students will be trained to select the method of mining based on geo-mining data
3. Student will develop initial skill to stope design

Sub Code: MNL469(3-0-0)
Sub : MASS PRODUCTION TECHNOLOGY FOR UNDERGROUND COAL

Course Objectives :

Students are made aware about bulk production technology and its application in coal in the world and India in particular

Status of coal mining in India and abroad, Need for mass production technology for Indian coal
Continuous Mining Technique: Applicability, Layout for development and depillaring, Design, Equipment required and their Selection, System analysis , Cycle of operation, Case studies
Longwall Mining: Applicability, various layouts, System analysis and system design, Equipment and their selection, Types of cut, ground control, cycle of operation, Case studies

Reference Books:

SME Mining Engineers' Handbook : W A Hustrulid, SME, USA
Underground Mining Method Handbook : W A Hustrulid, SME, USA
Longwall Mining : S.S.Peng, John Wliey
Ground Control in Mines : S.S.Peng, John Wiley

Course Outcomes:

1. Student will have in-depth knowledge of advanced techniques of underground coal mining
2. They will be able to design such systems
3. Develop technical skill for operation of such systems
4. Will be ready to take up advanced research in coal mining on long term basis

Sub Code MNL476 (3-0-0)

Sub: ROCK SLOPE ENGINEERING

Course Objectives:
to make student conversant with slope stability problems
to develop skill in slope stability analysis by various methods
to deal with slope stability problems in mines and in general

Contents

Basic Concepts: Engineering issues of Slope stability, Basic terminology, Slope failure causes and process, basic mechanism of slope failure

Rock mass properties: various properties, data collection, stereographic projections

Ground water: Role of ground water flow, influence of ground water on slope stability, evaluation of ground water conditions in slopes

Plane failure : general conditions and failure analysis

Wedge failure: general conditions and failure analysis

Circular failure: general conditions and failure analysis

Toppling failure: general conditions and failure analysis
Rock slope stabilization techniques, Geotechnical Instrumentation and Monitoring
Aspect of Waste dump stability analysis

Reference Books :

Rock Slope Stability, Charles A Kliche (SME publication)
Rock Slope Engineering, Hoek & Brown SME
Slope Stability in Surface mining, WA Hustrulid, SME

Course Outcomes:

1. Learning basic slope stability in mining operations as well as civil excavation
2. Developing expertise in slope stability analysis
3. Expertise in management of slopes
4. Expertise in Dump Management

Sub code MNL 475
Sub: Blasting Technology for Mining and Construction 3-0-2

History and use of explosives: blasting and its applicability to mining and construction industry. Role of blasting in production of minerals and in construction industry. Blasting inputs and outputs, Controllable and non controllable parameters . Blast Economics, blasting costs and role of fragmentation with blasting costs, cost optimization , Environmental impact of blasting

Characteristics and constituents of explosives, Mechanics of blasting,
Basics of Explosives and their classifications as low explosives, high explosives and blasting agents Indian classification of explosives. Properties of explosives for their selection, Testing of explosives for safety. Standards of storage and handling of explosives, Provisions in Explosives Act and legal aspects of explosives

Various Pattern of holes for drives and drift, roadways, underground storage and tunnels, pattern of holes for surface excavation, Blasting accessories and tools. Initiation system and firing sequences. Blasting operation in surface and underground coal mines, metal mines, drifts, shaft, tunnels and caverns. Safety precautions during blasting, blasting fumes.

Rock explosive interaction, Various rock fragmentation theories. Role of rock parameters, explosive parameters and blast design parameters on blasting. Evaluation of blasting results, techno economic evaluation of fragmentation, fragmentation Analysis of production blasts, fragmentability and productivity. fragmentation and costs, effect of structural discontinuities on blasting results, Use of various software like wipfrag, wipjoint, Blastware, Blast Information Management Systems etc.

Optimization of blast designs for tunnels, caverns, nuclear waste disposal and other domestic purpose. Blast design for surface workings and opencast mines. Blast design for non coal and coal mines. Ground vibrations, fly rock and noise due to blasting. Minimization of environmental damages due to blasting.

Controlled blasting techniques for surface blasting and underground blasting, Use of innovative techniques in blasting like, air deck, cushion blasting, underwater blasting, blasting near sensitive structures, cast blasting etc. use of blasting techniques for demolition of structures.

Reference books:

Engineering rock blasting operations : S. Bhandari, A. A. Balkema Pulb.
Rotary drilling and blasting in large surface mines : B.V. Gokhale, CRC press, A. Balkema Pulb.
Explosive blasting technology : G.K. Pradhan, Mintech Publ. Bhubaneswar
Rock blasting effects and operation : P.PalRoy, Oxforrd and IBH Publ.
Explosives and blasting practices in mines : S.K. Das
Surface mine blast evaluation : Thote and Pradhan, Mintech publ. Bhubaneswar

Course Outcomes:

1. to understand the basic characteristics of explosives
2. to know the mechanism of rock breakage utilization of explosives energy.
3. Conduction of blasting operation in mine and its safer aspects.
4. design of optimum blast and control measures