GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Mining Engineering

Course / Subject Code: DI03022011

Course / Subject Name: Mine Environment

w. e. f. Academic Year:	2024-25
Semester:	3rd
Category of the Course:	ESC

Prerequisite:	Basic knowledge of mining.
Rationale:	Due to the nature of mining activities, it will become an important source of environmental problems such as land damage, deforestation, degradation of water resources, air pollution etc. To reestablish the ecosystem and productivity of these areas, remediation technologies must be taken by the mining engineers. Furthermore, good management of mining wastes during the exploitation period can help to prevent soil degradation in surrounding areas as well in the tailings ponds themselves. Mining laws also emphasize the provisions regarding environment friendly practices in mines to minimize/ mitigate environmental issues and any circumstances that may create environmental problem. A clear understanding of all environmental factors is always helpful to a mining engineer for making environment management decision. A mining diploma holder must acquire a deep knowledge and understanding of the post-effects of mining activities on each environmental aspect. This course will improve the competency in selecting suitable methods, and technology as a mitigation measure for mine environmental pollution.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Demonstrate the concept of mine environment.	R, U, A
02	Identify various components of mine environment.	R, U, A
03	Justify impacts of environmental pollution due to mining activities.	R, U, A
04	Adopt appropriate preventive measure against mine environmental pollution.	R, U, N
05	Recall various provisions of environmental management.	R, U

**Revised Bloom's Taxonomy (RBT)*

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Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA(M)	PA(I)	ESE (V)	
2	0	2	3	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Introduction of mine environment:** 1.1 Concept of Mine Environment. 1.2 Scope of environmental study. 1.3 Objective and importance of assessing impacts of environmental pollution.	02	10%
2.	**Components of mine environment:** 2.1 Land: Land use pattern, Top soil profile, importance of flora and fauna. 2.2 Water: Surface water & Ground water, Aquatic ecosystem like marine and fresh water ecosystem. 2.3 Air: Factors considered for air pollution like dust (PM 2.5 -10) and gases (NOx and SiO2). 2.4 Societal Environment: Population, ethical culture, societal complexion, sex-ratio, cost of living, migration, civic facilities, income pattern, urbanization, education, medical, infrastructure, transport & communication, health & Recreation, Aspirations, Addiction, Noise level and Domestic waste. 2.5 Others: Waste rock, tailings their sources, Noise, Vibration and Illumination.	08	25%
3.	**Impacts on various Environmental components:** 3.1 Impacts due land pollution: Changes in Topography, land use pattern and land ecosystem. Land degradation cycle due to Mining. 3.2 Impacts due to Water pollution: Surface & groundwater degradation, changes in drainage pattern, Acid Mine Drainage and effluents discharge. 3.3 Impacts due to Air pollution: On human being like visibility, gas	08	25%

	poisoning, lung and throat diseases and living cost. 3.4 Socio-economic impacts: Migration, loss of land, Quality of Life (QOL), livelihood and health hazards. 3.5 Impacts due to Noise Pollution: Auditory effects, Physiological effects and other effects. 3.6 Impacts due to Vibration and Illumination: Ground disturbance, structural disturbance, landslides, road accidents due to poor illumination, eye sight problems.		
4.	**Control and Prevention of Environmental Pollution:** 4.1 Top soil and sub soil management, Reclamation-Physical and Biological. 4.2 Water quality criteria, various parameters of water, water pollution sources and preventive measures, National standards of Drinking water. 4.3 Air pollution sources and preventive measures, National standards of ambient air quality. 4.4 Noise pollution sources and preventive measures, Ambient Air quality standards in respect to noise, Types of Noise control techniques.	08	25%
5.	**Environmental management:** 5.1 Factors considered for Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) statement. 5.2 Brief introduction of Mine Closure planning, Environmental Protection Act, 1986, Forest conservation Act, 1980 and Forest conservation rules, 1981 related to Mining.	04	15%
	Total	**30**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
45%	**40%**	**15%**	--	--	--

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1	Environmental Management in Mining Areas	Naresh Chandra Saxena, Gurdeep Singh, Rekha Ghosh	Pawan kumar scientific Publishers Year: 2002 ISBN: 81-7233-296-3
2	Environmental Impact of Mining and Mineral Processing Management, Monitoring and Auditing strategies	Ravi K. Jain Zengdi CUI, Jeremy K. Domen	Butterworth-Heinemann publications Elsevier Inc. Year: 2016 ISBN: 978-0-12-804040-9
3	Environmental Engineering in Mines	V S Vutukuri and R. D. Lama	Cambridge University Press Year: 1986 ISBN : 978-0-521-24605-7
4	Environmental Impacts of Mining Monitoring, Restoration, and Control	Mritunjoy Sengupta	CRC Press Year: 2021 ISBN : 9781003164012
5	Environmental Pollution and Environmental Management	Padmanabh Dwivedi	Scientific Publishers Journals Dept Year: 2004 ISBN-13 : 978-8172333584

(b) Open-source software and website:

- NPTEL videos on Topic: - Ecology and Environment link: https://archive.nptel.ac.in/courses/127/106/127106004/
- NPTEL videos on Topic: - Environment and Ecology (Web) link: https://archive.nptel.ac.in/courses/122/102/122102006/
- https://www.fao.org/3/I9183EN/i9183en.pdf
- https://www.rpcau.ac.in/wp-content/uploads/2020/03/Water-Pollution.pdf
- https://www.rpcau.ac.in/wp-content/uploads/2020/03/CAUSES-EFFECTS-AND-CONTROL MEASURES-OF-AIR-POLLUTION.pdf
- https://kanchiuniv.ac.in/coursematerials/AirPollutionandControlEngineering.pdf
- https://www.britannica.com/science/land-pollution
- https://en.wikipedia.org/wiki/Environmental_resource_management
- https://en.wikipedia.org/wiki/Sustainability_and_environmental_management
- https://www.academia.edu/39508649/Environmental_Pollution_and_Control_Fourth_Edition_PDF

Suggested Course Practical List:

Sr. No.	Practical list	Unit No.	No. of Hours
1	Determination of different parameters of Soil using Soil Testing kits.	2, 3, 4	6
2	Determination of different parameters of Water using Water Testing kits.		6
3	Measurement of Respirable dust concentration of size PM 2.5 & PM 10.		6
4	Measurement of Noise Level by Integrating Sound Level Meter.		6
5	Measurement of Illuminance by Digital Light meter.	2, 3	6
Total			**30**

Suggested Project List:

a) Prepare a poster showing various components of mine Environment.
b) Prepare a model showing layered structure of top soil, sub-soil, country rock and coal seam.
c) Prepare an illustrative diagram of Land degradation cycle.
d) Prepare a banner related to environmental impacts with reference to local community.
e) Presentation on any case study related to land reclamation techniques used by Mining Industry.
f) Prepare a poster showing National Ambient Air Quality/Noise/Water standards.
g) Make slides showing various health hazards due to Air and Noise pollution.
h) Prepare a banner illustrating various factors considered for EIA and EMP statement.

Suggested Activities for Students:

a) Visit nearby mine area.
b) Visit a mine reclaimed area, mines township and nearby villages for observing environmental impacts due to Mining.
c) Attend expert lectures arranged by department on environmental pollution and its control topics.
d) Participate in seminars conducted by MEAI/department student chapter on related topics.
e) Make a group discussion on environmental issues and its mitigational measures.
f) Watch videos related to reclamation and rehabilitation techniques taken globally.

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