Dr. Babasaheb Ambedkar Technological University, Lonere.

(Established by Government of Maharashtra, vide Dr. Babasaheb Ambedkar Technological University Act. No XXIX of 2014)

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NEP 2020 BASED CURRICULUM

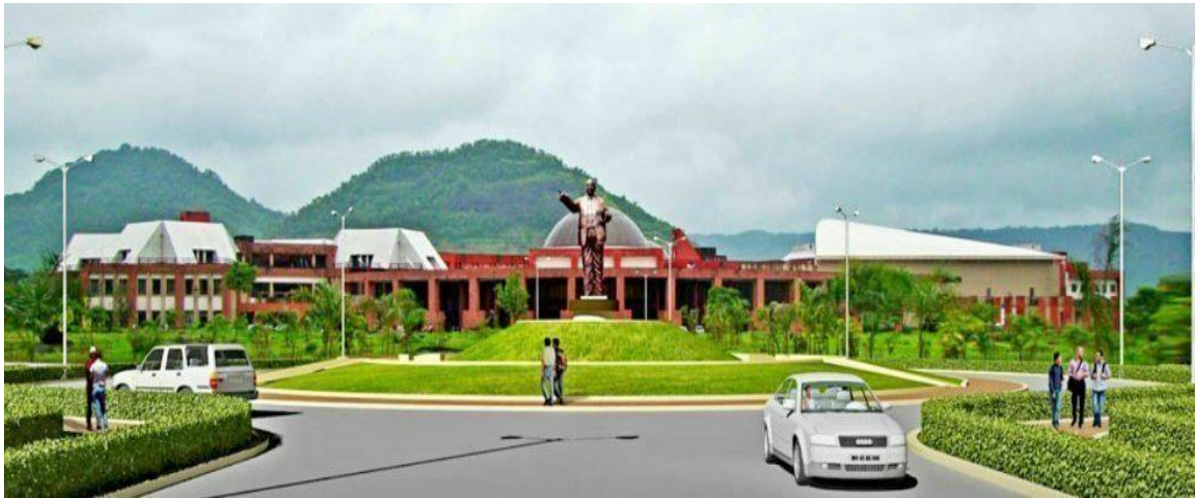
for

AFFILIATED INSTITUTES

B. Tech. (V to VIII Semester) in

MINING ENGINEERING

ACADEMIC YEAR 2026 – 2027 to 2027-2028



Vision

The vision of the Department is to achieve excellence in teaching, learning, research, and transfer of technology in the field of mining, while fostering the overall development of students into competent mining professionals committed to sustainable and safe mining practices.

Mission

To impart quality education in mining and allied fields while nurturing the holistic development of students. The department strives to conduct need-based research and extension activities to serve industry and society.

Graduate Attributes

The Graduate Attributes are the knowledge skills and attitudes, which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** understand the impact of the professional engineering solutions in societal and environmental contexts, demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice.

9. **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objectives

PEO1	Graduates should excel in engineering positions in industry and other organizations that emphasize design and implementation of engineering systems and devices.
PEO2	Graduates should excel in best post-graduate engineering institutes, reaching advanced degrees in engineering and related discipline.
PEO3	Within several years from graduation, alumni should have established a successful career in an engineering-related multi-disciplinary field, leading or participating effectively in interdisciplinary engineering projects, as well as continuously adapting to changing technologies.
PEO4	Graduates are expected to continue personal development through professional study and self-learning.
PEO5	Graduates are expected to be good citizens and cultured human beings, with full appreciation of the importance of professional, ethical and societal responsibilities.

Program Outcomes

At the end of the program the student will be able to:

PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and computing to solve Mining Engineering related problems.
PO2	Demonstrate the ability to Identify, formulate, analyze and solve engineering problems related to Mining Industry.
PO3	Design solutions for Mining engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions related to Mining Industry.
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and tools including prediction and modeling to complex engineering activities related to Mining Engineering with an understanding of the limitations.
PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional mining engineering practice.
PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development of non-renewable mineral resources.
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice to achieve Mining Industry goals and results.
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings, for achieving better mine production and safety.
PO10	Communicate effectively on complex engineering activities with the engineering community and with society, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions, to all mining personnel in the professional hierarchy in the industry.
PO11	Demonstrate knowledge and understanding of the engineering and management principles, and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments and seek to achieve the most optimal results.
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change keeping in view the development of new IT based solutions, for better performance of National/International mining sector.

Credit Framework under Four-Years UG Engineering Programme with Multiple Entry and Multiple Exit options:

- The Four-year Bachelor's Multidisciplinary Engineering Degree Programme allows the students to experience the full range of holistic and multidisciplinary education in addition to a focus on the chosen major and minors as per their choices and the feasibility of exploring learning from different institutions.
- The minimum and maximum credit structure for different levels under the Four-year Bachelor's Multidisciplinary Engineering UG Programme with multiple entry and multiple exit options are as given below:

Credit Framework

Levels	Qualification Title	Credit Requirements		Semester	Year
		Minimum	Maximum		
4.5	One Year UG Certificate in Engg./ Tech.	40	44	2	1
5.0	Two Years UG Diploma in Engg./ Tech.	80	88	4	2
5.5	Three Years Bachelor's Degree in Vocation (B. Voc.) or B. Sc. (Engg./ Tech.)	120	132	6	3
	4-Years Bachelor's degree				

Levels	Qualification Title	Credit Requirements		Semester	Year
		Minimum	Maximum		
6.0	(B.E/B. Tech. or Equivalent) in Engg. / Tech. with Multidisciplinary Minor	160	176	8	4
6.0	4-year Bachelor's degree (B.E/B. Tech. or Equivalent) in Engg. / Tech.- Honors with Research and Multidisciplinary Minor	180	194	8	4

- here are multiple exit options at each level. Student will be given a specific Qualification mentioned in the table depending on the level at which he/she decides to have an exit. Ex. If a student decides to exit after completion of two years (level 5.0) of the program, he will be given a Diploma in Engineering

with specific exit condition mentioned in the syllabus of the specific branch. He/she can rejoin the program with the multiple entry option at the level next where he/she chose to exit previously. (Student can join at level 5.5 if successfully completed level 5.0 previously at the time of exit).

- Minimum credit requirements of each level are mentioned in the credit framework table.
- There are 4 distinct options available at level6.0.
- First one is basic level 6.0 option where minimum 160-maximum 176 credits are mandatory which can be completed as per the Semester –wise Credit distribution structure mentioned in the table given below. Here, the Bachelor's Engineering Degree in chosen Engg./ Tech. Discipline with multidisciplinary minor (min.160-max.176 Credits) i.e. "**B. Tech. in Mining Engineering with Minor in Computer Engineering**" (160-176 credits) enables students to take up five-six or required additional courses of 14 credits in the discipline other than Mining Engineering distributed over semesters III to VIII. Here in the case of "**B. Tech. in Mining Engineering with Minor in Computer Engineering**" (160-176 credits) student is supposed to take up 50% or more courses to complete the 50% or more credits (from assigned 14 credits) from **Computer Engineering minor bucket**. The remaining courses to complete the assigned 14 credits can be covered from other discipline's minor buckets.
- Remaining three level 6.0 options are the advanced options where the student is given an opportunity to get extra qualification by earning some extra credits (18-20 extra credits). These three options are given below:
- Level 6.0:The**Bachelor's Engineering Degree with Honours** in chosen Major Engg./ Tech. Discipline i.e. in Mining Engineering with Honours with Multidisciplinary Minor (180-194 credits) enables students of Mining Engineering to take up five-six additional courses of 18 to 20 credits in the Mining Engineering discipline distributed over semesters III to VIII. The decision regarding the mechanism of distribution of these 18-20 credits over semesters III to VIII, which are over and above the min.160-max. Academic Authorities of University will take 176 Credits prescribed for the duration of four years. **Student must have CGPA equal to or greater than 7.5 at the end of second semester to go for this option**.
- Level 6.0: The **Bachelor's Engineering Degree with Research** in i.e. in Mining Engineering with Research with Multidisciplinary Minor (180-194 credits) enables students of Mining Engineering to take up a research project of 18 to 20 credits in the Mining Engineering discipline distributed over semesters VII to VIII. **Student must have CGPA equal to or greater than 7.5 at the end of sixth semester to go for this option**.

  Level 6.0: The **Bachelor's Engineering Degree in chosen Engg./ Tech. Discipline with Double Minor** (Multidisciplinary and Specialization Minor, 180-194 credits), i.e. "**B. Tech. in Mining Engineering with *other selected discipline in* Engineering (as MDM) with Specialization Minor in Computer Engineering**" (180-194 credits) enables students to take up five-six additional courses of 14 credits in the discipline other than Mining Engineering(for completion of multidisciplinary minor) and 18 to 20 extra credits in the **Computer Engineering discipline** distributed over semesters III to VIII. Here, the ***other selected discipline*** **in Engineering should be different from Specialization Minor i.e. Computer Engineering**. This enables students to take-up five-six or required additional courses of 18 to 20 credits in the **Computer Engineering** discipline distributed over semesters III to VIII, which are over and above the min.160-max.176 Credits. Academic Authorities of University will take the decision regarding the mechanism of distribution of these 18-20 credits over semesters III to VIII, prescribed for the duration of four years. **Student must have CGPA equal to or greater than 7.5 at the end of second semester to go for this option**.

Semester-wise Credit distribution structure for Four Year UG Engineering Program-One Major, One Minor

Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science Course	BSC/ESC	06-08	08-10		--	--	--	--	--	14-18
Engineering Science Course		10-08	06-04		--	--	--	--	--	16-12
Programme Core Course (PCC)	Program Courses	--	02	08-10	08-10	10-12	08-10	04-06	04-06	44-56
Programme Elective Course (PEC)		--	--	--	--	04	08	02	06	20
Multidisciplinary Minor (MD M)	Multidisciplinary Courses		-	02	02	04	02	02	02	14
Open Elective (OE) Other than a particular program		--	--	04	02	02	--	--	--	08
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	02	02	--	02	--	02	--	--	08
Ability Enhancement Course (AEC -01, AEC-02)	Humanities Social Science and Management (HSSM)	02	--	--	02	--	--	--	--	04
Entrepreneurship/Economics/ Management Courses		--		02	02	--	--	--	--	04
Indian Knowledge System (IKS)			02		--	--	--	--	--	02
Value Education Course (VEC)		--	--	02	02	--	--	--	--	04
Research Methodology	Experiential Learning Courses	--	--	--	--	--	--		04	04
Comm. Engg. Project (CEP)/Field Project (FP)		--	--	02	--	--	--	-	-	02
Project		--	--	--	--	--	--		04	04
Internship/ OJT		--	---			--	--	12	-	12
Co-curricular Courses (CC)	Liberal Learning Courses	02	02		--	--	--	--	-	04
Total Credits (Major)		**20-22**	**20-22**	**20-22**	**20-22**	**20-22**	**20-22**	**20-22**	**20-22**	**160-176**

Students need to follow the Semester-wise Credit distribution structure for Four-year UG Engineering Program as prescribed above.

- There are seven vertical categories with specific credits distribute in specific semesters.
- Student can choose a Program Elective Course (PEC) in that specific semester from the given subjects.
- Multidisciplinary course (MDM) and Open Elective (OE) courses can be chosen from the MDM and OE Buckets depending on student's choice. Completion of total credits given in the last column of the table for each vertical is mandatory.
- Students can complete 40% of the courses through online platforms like NPTEL/SWAYAM. The NPTEL SWAYAM course content should be at least 80% similar to the course content in the syllabus.

General Rules and Regulations

1. The normal duration of the course leading to B. Tech degree will be EIGHT semesters.

2. The normal duration of the course leading to M. Tech. Degree will be FOUR semesters.

3. Each academic year shall be divided into 2 semesters, each of 20 weeks duration, including evaluation and grade finalization, etc. The Academic Session in each semester shall provide for at least 90 Teaching Days. The semester that is typically from Mid-July to November is called the ODD SEMESTER, and the one that is from January to Mid-May is called the EVEN SEMESTER. Academic Session may be scheduled for the Summer Session/Semester as well. For the First year, B. Tech. and M. Tech. the schedule will be decided as per the admission schedule declared by Government of Maharashtra.

4. The schedule of academic activities for a Semester, including the dates of registration, mid-semester examination, end-semester examination, inter-semester vacation, etc. shall be referred to as the Academic Calendar of the Semester, which shall be prepared by the Dean (Academic), and announced at least TWO weeks before the Closing Date of the previous Semester.

5. The Academic Calendar must be strictly adhered to, and all other activities including co-curricular and / or extra -curricular activities must be scheduled so as not to interfere with the Curricular Activities as stipulated in the Academic Calendar.

Registration:

1. Lower and Upper Limits for Course Credits Registered in a Semester, by a Full- Time Student of a UG/PG Programme:
   A full-time student of a particular UG/PG Programme shall register for the appropriate number of course credits in each semester / session that is with in the minimum and maximum limits specific to that UG/PG programme as stipulated in the specific Regulations pertaining to that UG/PG programme.
2. Mandatory Pre-Registration for higher semesters: In order to facilitate proper planning of the academic activities of a semester, it is essential for every institute to inform to Dean (Academics) and COE regarding details of total no. of electives offered (Course-wise) along with the number of students opted for the same. This information should be submitted within two weeks from the date of commencement of the semester as per academic calendar.
3. PhD students can register for any of PG/PhD courses and the corresponding rules of evaluation will apply.
4. Under Graduate students may be permitted to register for a few selected Post Graduate courses, in exceptionally rare circumstances, only if the DUGC/DPGC is convinced of the level of the academic achievement and the potential in a student.

Course Pre-Requisites:

1. In order to register for some courses, it may be required either to have exposure in, or to have completed satisfactorily, or to have prior earned credits in, some specified courses.

2. Students who do not register on the day announced for the purpose may be permitted LATE REGISTRATION up to the notified day in academic calendar on payment of late fee.
3. REGISTRATION IN ABSENTIA will be allowed only in exceptional cases with the approval of the Dean (Academic) / Principal.
4. A student will be permitted to register in the next semester only if he fulfills the following conditions:
   i) Satisfied all the Academic Requirements to continue with the programme of Studies without termination
   ii) Cleared all Institute, Hostel and Library dues and fines(if any) of the previous semesters;
   iii) Paid all required advance payments of the Institute and hostel for the current semester;
   iv) Not been debarred from registering on any specific ground by the Institute.

Evaluation System:

1. Absolute grading system based on absolute marks as indicated below will be implemented from academic year 2023-24, from the first year B. Tech.

Percentage of Marks	**Letter Grade**	**Grade Point**
91-100	EX	10.0
86-90	AA	9.0
81-85	AB	8.5
76-80	BB	8.0
71-75	BC	7.5
66-70	CC	7.0
61-65	CD	6.5
56-60	DD	6.0
51-55	DE	5.5
40-50	EE	5.0
<40	FF	0.0

2. Class is awarded based on CGPA of all eight semesters of B. Tech. Program.

CGPA	**Class**
5.00 to 5.49	Pass class
5.50 to 5.99	Second Class
6.00 to 7.49	First Class
7.5 and above	Distinction
[Percentage of Marks=(CGPA-0.5)*10.0]	

3. A total of100 Marks for each theory course are distributed as follows:

Mid Semester Exam(MSE) Marks	20
Continuous Assessment Marks	20
End Semester Examination (ESE) Marks	60

4. A total of 100 Marks for each practical course are distributed as follows:

1.	Continuous Assessment Marks	60
2.	End Semester Examination (ESE) Marks	40

- It is mandatory for every student of B. Tech to score a minimum of 40 marks out of 100, M. Tech to score a minimum of 45 marks out of 100 with a minimum of 20 marks out of 60 marks in End Semester Examination for theory course.
- This will be implemented from the first year of B. Tech starting from Academic Year 2023-24.

5. Description of Grades

EX Grade : An 'EX' grade stands for outstanding achievement.

EE Grade: The 'EE' grade stands for minimum passing grade.

The students may appear for the remedial examination for the subjects he/she failed for the current semester of admission only and his/her performance will be awarded with EE grade only.

FF Grade : The 'FF' grade very poor performance, i.e, failure in a course due to poor performance.

6. Evaluation of Performance

a. Semester Grade Point Average (SGPA)

The performance of a student in a semester is indicated by Semester Grade Point Average (SGPA) which is a weighted average of the grade points obtained in all the courses taken by the student in the semester and scaled to a maximum of 10. (SGPA is to be calculated up to two decimal places). A Semester Grade Point Average (SGPA) will be computed for each semester as follows:

$$SGPA = \frac{[\sum_{i=1}^{n} c_i g_i]}{[\sum_{i=1}^{n} c_i]}$$

where,

'n' is the number of subjects for the semester,

'c_i' is the number of credits allotted to a particular subject,and

'g_i'is the grade-points awarded to the student for the subject based on his performance as per the above table.

SGPA will be rounded off to the second place of decimal and recorded as such.

b. Cumulative Grade Point Average (CGPA):

An up-to-date assessment of the overall performance of a student from the time he entered the Institute is obtained by calculating Cumulative Grade Point Average (CGPA) of a student. The CGPA is weighted average of the grade points obtained in all the courses registered by the student since s/he entered the Institute. CGPA is also calculated at the end of every semester (up to two decimal places). Starting from the first semester at the end of each semester (S); a Cumulative Grade Point Average (CGPA) will be computed as follows:

$$CGPA = \frac{[\sum_{i=1}^{m} c_i g_i]}{[\sum_{i=1}^{m} c_i]}$$

where,

'm' is the total number of subjects from the first semester onwards up to and including the semester S,

'ci' is the number of credits allotted to a particular subject, and

'gi' is the grade-points awarded to the student for the subject based on his/her performance as per the above table.

CGPA will be rounded off to the second place of decimal and recorded as such

7. Attendance Requirements:

a. All students must attend every lecture, tutorial and practical classes.

b. To account for approved leave of absence (e.g. representing the Institute in sports, games or athletics; placement activities; NCC/NSS activities; etc.) and/or any other such contingencies like medical emergencies, etc., the attendance requirement shall be a minimum of 75% of the classes actually conducted. If the student failed to maintain 75% attendance, he/she will be detained for appearing the successive examination. The Dean (Academics)/ Principal is permitted to give 10% concession for the genuine reasons as such the case may be. In any case the student will not be permitted for appearing the examination if the attendance is less than 65%.

c. The course instructor handling a course must finalize the attendance 3 calendar days before the last day of classes in the current semester and communicate clearly to the students by displaying prominently in the department and also in report writing to the head of the department concerned.

d. The attendance records are to be maintained by the course instructor and he shall show it to the student, if and when required.

8. Transfer of Credits:

The courses credited elsewhere, in Indian or foreign University/Institutions/ Colleges/ Swayam Courses by students during their study period at DBATU may count towards the credit requirements for the award of degree. The guidelines for such transfer of credits are as follows:

a. 20% of the total credit will be considered for respective calculations.
b. Credits transferred will be considered for overall credits requirements of the programme.
c. Credits transfer can be considered only for the course at same level i.e. UG, PG etc.
d. A student must provide all details (original or attested authentic copies) such as course contents, number of contact hours, course instructor /project guide and evaluation system for the course for which he is requesting a credits transfer. He shall also provide the approval or acceptance letter from the other side. These details will be evaluated by the concerned Board of Studies before giving approval. The Board of Studies will then decide the number of equivalent credits the student will get for such course(s) in DBATU. The complete details will then be forwarded to Dean for approval.
e. A student has to get minimum passing grades/ marks for such courses for which the credits transfers are to be made.
f. Credits transfers availed by a student shall be properly recorded on academic record(s) of the student.
g. In exceptional cases, the students may opt for higher credits than the prescribed.

Dr. Babasaheb Ambedkar Technological University

Bachelor of Technology (B. Tech.)

Department of Mining Engineering

Course Structure and Syllabus (as per NEP 2020)

Second Year (Affiliated Institutes)

Semester III (w.e.f. AY 2025–26)

Category under NEP	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credits
			L	T	P	ISE	MSE	ESE	Total	
BSC	25AF1000BS301	Engineering Mathematics-III	3	-	-	20	20	60	100	3
PCC1	25AF1701PC302	Mining Geology	2	1	-	20	20	60	100	3
PCC2	25AF1701PC303	Introduction to Fluid Mechanics and Strength of Material	2	1	-	20	20	60	100	3
PCC3	25AF1701PC304	Introduction to Mining Engineering	3	-	-	20	20	60	100	3
OE-I	25AF1701OE305	OPEN ELECTIVE-I	3	-	-	20	20	60	100	3
MDM	25AF1701MD306	Multi-Disciplinary Minor-I	-	-	-	20	20	60	100	-
AES	25AF1000VE307	Modern Indian Language A. Marathi B. Hindi C. Sanskrit	2	-	-	20	20	60	100	2
VSEC	25AFCOIAE308	Constitution of India	2	-	-	-	-	-	AU	GR
VEC	25AF1000VE309	Life of Bharat Ratna Dr. Babasaheb Ambedkar	1	-	-	50	-	-	50	1
PCC Lab	25AF1701PCL310	Mining Geology Lab	-	-	2	25	-	25	50	1
PCC Lab	25AF1701PCL311	Fluid Mechanics and Strength of Material Lab	-	-	2	25	-	25	50	1
Total			**18**	**2**	**4**	**240**	**140**	**470**	**850**	**20**

MDM to be offered to other departments: **Basics of Mining Engineering (3 Credits)**
OE*: The students can opt for the Open Elective from the Open Elective bucket declared for the particular semester.
MDM**: The students will have to choose the MDM course being offered by other disciplines available/offered at the college)

Dr. Babasaheb Ambedkar Technological University

Bachelor of Technology (B. Tech.)

Department of Mining Engineering

Course Structure and Syllabus (as per NEP 2020)

Second Year (Affiliated Institutes)

Semester IV (w.e.f. AY 2025–26)

Category under NEP	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credits
			L	T	P	ISE	MSE	ESE	Total	
PCC1	25AF1701PC401	Basic Mining Machinery	2	1	-	20	20	60	100	3
PCC2	25AF1701PC402	Mine Surveying	3	-	-	20	20	60	100	3
PCC3	25AF1701PC403	Rock Mechanics	3	1	-	20	20	60	100	3
PCC4	25AF1701PC404	Industrial Engineering & Management	3	-	-	20	20	60	100	3
OE-II	25AF1701OE405	OPEN ELECTIVE-II	2	-	-	20	20	60	100	2
MDM	25AF1701MD406	MDM Bucket List	-	-	-	20	20	60	100	-
VSEC	25AF1000VE407	Universal Human Values-II	3	-	-	20	20	60	100	3
VEC	25AF1000VE408	Life of Chhatrapati Shivaji Maharaj	1	-	-	50	-	-	50	1
PCC Lab	25AF1701PCL409	Mine Surveying lab	-	-	2	25	-	25	50	1
PCC Lab	25AF1701PCL410	Rock Mechanics Lab	-	-	2	25	-	25	50	1
VSEC	25AF1701VSE411	Internship-I/Mine Visit-I	-	-	-	-	-	-	-	-
Total			**17**	**2**	**4**	**240**	**140**	**470**	**850**	**20**

MDM to be offered to other departments: **Introduction to Geo-Mechanics (2 Credits)**

OE*: The students can opt for the Open Elective from the Open Elective bucket declared for the particular semester.

MDM**: The students will have to choose the MDM course being offered by other disciplines available/offered at the college)

Exit Option-II: Qualifier for UG Diploma

Broad areas of Training: 1. Open-Cast 2. UG Coal 3. UG Non-Coal

- To be completed during vacation after Second Year in the industry/institute.
- This should contain the well – defined project activity which is equivalent to 10 Credits.
- It should be carried out for the duration of 08 Weeks.
- Examiners should evaluate the project training.

Dr. Babasaheb Ambedkar Technological University

Bachelor of Technology (B. Tech.)

Department of Mining Engineering

Course Structure and Syllabus (as per NEP 2020)

Third Year (Affiliated Institutes)

Semester V (w.e.f. AY 2026–27)

Category under NEP	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credits
			L	T	P	ISE	MSE	ESE	Total	
PCC1	26AF1701PC501	Surface Mine Technology	3	-	-	20	20	60	100	3
PCC2	26AF1701PC502	Mine Environment & Ventilation Engineering	3	-	-	20	20	60	100	3
PCC3	26AF1701PC503	Underground Coal Mine Technology	3	-	-	20	20	60	100	3
PCC4	26AF1701PC504	Advanced Mine Machinery	3	-	-	20	20	60	100	3
OE-III	25AFARPOE505	OPEN ELECTIVE-III	3	-	-	20	20	60	100	3
MDM	25AF1701MD506	MDM Bucket list	-	-	-	20	20	60	100	-
PEC	26AF1000PE507	Program Elective –I A. Advance Mine Surveying B. Advanced Geology	2	-	-	20	20	60	100	2
PCC Lab	26AF1701PCL508	Mine Environment & Ventilation Engineering Lab	-	-	2	25	-	25	50	1
PCC Lab	26AF1701PCL509	Advanced Mine Machinery Lab	-	-	2	25	-	25	50	1
PCC Lab	26AF1701PEL510	A. Advance Mine Surveying/B. Advanced Geology Lab	-	-	2	25	-	25	50	1
VSEC	26AF1701HM511	Internship/ Mine Visit- I Evaluation	-	-	2	50	-	50	100	2
Total			**17**	**-**	**8**	**265**	**140**	**545**	**950**	**22**

MDM to be offered to other departments: **Underground Mining Technology & Ventilation (3 Credits)**
OE*: The students can opt for the Open Elective from the Open Elective bucket declared for the particular semester.

Dr. Babasaheb Ambedkar Technological University

Bachelor of Technology (B. Tech.)

Department of Mining Engineering

Course Structure and Syllabus (as per NEP 2020)

Third Year (Affiliated Institutes)

Semester VI (w.e.f. AY 2026–27)

Category under NEP	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credits
			L	T	P	ISE	MSE	ESE	Total	
PCC1	26AF1701PC601	Underground Metal Mining Technology	3	-	-	20	20	60	100	3
PCC2	26AF1701PC602	Mine Rescue Engineering	3	-	-	20	20	60	100	3
PCC3	26AF1701PC603	Ground Control in Mines	3	-	-	20	20	60	100	3
PCC4	26AF1701PC604	Drilling and Blasting Engineering	3	-	-	20	20	60	100	3
PEC	26AF1701PE605	Program Elective –II A. Mine Planning B. Mine Health and Safety Engineering	3	-	-	20	20	60	100	3
PEC	26AF1701PE606	Program Elective –III A. Mineral Processing Technology B. Environmental Impact Assessment	3	-	-	20	20	60	100	3
MDM	25AF1701MD607	MDM Bucket List	-	-	-	20	20	60	100	-
PCC Lab	26AF1701PCL608	Mine Rescue Engineering Lab	-	-	2	25	-	25	50	1
PCC Lab	26AF1701PCL609	Ground Control in Mines Lab	-	-	2	25	-	25	50	1
VSEC	26AF1701VS610	Academic Research Writing / Mini Project^	-	2	-	50	-	-	50	2
Total			**18**	**2**	**4**	**240**	**140**	**470**	**850**	**22**

MDM to be offered to other departments: **Surface Mining & Environment (3 Credits)**
OE*: The students can opt for the Open Elective from the Open Elective bucket declared for the particular semester.
Open Elective Bucket / Course List is available on DBATU website.
^ : Academic Research Writing / Mini Project – A group of students will submit mini project report on the topic allotted by faculty.

Dr. Babasaheb Ambedkar Technological University

Bachelor of Technology (B. Tech.)

Department of Mining Engineering

Course Structure and Syllabus (as per NEP 2020)

Fourth Year (Affiliated Institutes)

Semester VII (w.e.f. AY 2027–28)

Category under NEP	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credits
			L	T	P	ISE	MSE	ESE	Total	
PCC	27AF1701PC701	Application of IT in Mining	3	-	-	20	20	60	100	3
PCC	27AF1701PC702	Mine Economics	3	-	-	20	20	60	100	3
PCC	27AF1701PC703	Mine System Optimization	3	-	-	20	20	60	100	3
PEC	27AF1701PE704	Program Elective –IV A. Mine Legislation & Safety B. Remote Sensing &Geo-informatics	3	-	-	20	20	60	100	3
PEC	27AF1701PE705	Program Elective – V A. Mine Supports B. Surface mine environment	3	1	-	20	20	60	100	3
MDM	25AF1701MD706	MDM Bucket List	-	-	-	20	20	60	100	-
PCC Lab	27AF1701PCL707	Application of IT in Mining Lab	-	-	2	20	20	60	100	1
Project	27AF1701PC708	Project Phase-I	-	-	4	25	-	25	50	4
Total			**15**	**1**	**6**	**165**	**140**	**445**	**750**	**20**

MDM to be offered to other departments: **Mine Management & Safety (3 Credits)**
OE*: The students can opt for the Open Elective from the Open Elective bucket declared for the particular semester.

Dr. Babasaheb Ambedkar Technological University

Bachelor of Technology (B. Tech.)

Department of Mining Engineering

Course Structure and Syllabus (as per NEP 2020)

Fourth Year (Affiliated Institutes)

Semester VIII (w.e.f. AY 2027–28)

Category under NEP	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credits
			L	T	P	ISE	MSE	ESE	Total	
PEC (Self-Study/NPTEL)	27AF1701PE801	Program Elective -VI A. Clean Coal Technology B. Tunneling Engineering	3	-	-	20	20	60	100	3
PEC (Self-Study/NPTEL)	27AF1701PE802	Program Elective–VII A. Management Information System B. Mine Safety Engineering	3	-	-	20	20	60	100	3
MDM	25AF1701MD803	MDM Bucket List	-	-	-	50		50	100	-
Internship	27AF1701PC804	Project Phase-II	-	-	4	50	-	50	100	6
Total			**6**	**-**	**4**	**140**	**40**	**220**	**400**	**12**

MDM to be offered to other departments: **Internship (3 Credits)**

OE*: The students can opt for the Open Elective from the Open Elective bucket declared for the particular semester.

Multi-Disciplinary Minor

Semester	Subject Code	Subject Name	CA	MSE	ESE	Total Credits
III	25AF1701MD306	Basics of Mining Engineering	20	20	60	3
IV	25AF1701MD406	Introduction to Geo-Mechanics	20	20	60	2
V	25AF1701MD506	Underground Mining Technology & Ventilation	20	20	60	3
VI	25AF1701MD607	Surface Mining & Environment	20	20	60	3
VII	25AF1701MD706	Mine Management & Safety	20	20	60	3
VIII	25AF1701MD803	Internship	20	20	60	3
Total credits required to complete minor degree in Mining Engineering = 14						

Dr. Babasaheb Ambedkar Technological University

Bachelor of Technology (B. Tech.)

Department of Mining Engineering

Course Structure and Syllabus (as per NEP 2020)

Third Year (Affiliated Institutes)

Semester V (w.e.f. AY 2026–27)

Category under NEP	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credits
			L	T	P	ISE	MSE	ESE	Total	
PCC1	26AF1701PC501	Surface Mine Technology	3	-	-	20	20	60	100	3
PCC2	26AF1701PC502	Mine Environment & Ventilation Engineering	3	-	-	20	20	60	100	3
PCC3	26AF1701PC503	Underground Coal Mine Technology	3	-	-	20	20	60	100	3
PCC4	26AF1701PC504	Advanced Mine Machinery	3	-	-	20	20	60	100	3
OE-III	25AFARPOE505	OPEN ELECTIVE-III	3	-	-	20	20	60	100	3
MDM	25AF1701MD506	MDM Bucket list	-	-	-	20	20	60	100	-
PEC	26AF1000PE507	Program Elective –I C. Advance Mine Surveying D. Advanced Geology	2	-	-	20	20	60	100	2
PCC Lab	26AF1701PCL508	Mine Environment & Ventilation Engineering Lab	-	-	2	25	-	25	50	1
PCC Lab	26AF1701PCL509	Advanced Mine Machinery Lab	-	-	2	25	-	25	50	1
PCC Lab	26AF1701PEL510	B. Advance Mine Surveying/B. Advanced Geology Lab	-	-	2	25	-	25	50	1
VSEC	26AF1701HM511	Internship/ Mine Visit- I Evaluation	-	-	2	50	-	50	100	2
Total			**17**	**-**	**8**	**265**	**140**	**545**	**950**	**22**

MDM to be offered to other departments: **Underground Mining Technology & Ventilation (3 Credits)**

OE*: The students can opt for the Open Elective from the Open Elective bucket declared for the particular semester.

V Semester B. Tech. (Mining Engineering)

Course Code: 26AF1701PC501
Title of the Course: Surface Mine Technology

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ$_1$	**Develop** an understanding of surface mining principles, mine planning parameters, and methods of opening surface deposits.
COBJ$_2$	**Provide** knowledge of various surface mining systems, equipment combinations, mine layouts, and their selection based on geological and operational conditions.
COBJ$_3$	**Enable** students to understand and apply suitable extraction methods for different types of mineral deposits, including coal, metallic, and non-metallic deposits.
COBJ$_4$	**Familiarize** students with advanced surface mining technologies such as in-pit crushing and conveying (IPCC), surface miners, and mining under special conditions.
COBJ$_5$	**Develop** the ability to design waste dump layouts, select appropriate dump formation methods, and implement reclamation techniques for sustainable surface mining.

Course Outcomes: At the end of the course, students will be able to:

CO$_1$	Explain the fundamentals of surface mining, mine planning parameters, opening methods, and evaluate the feasibility of surface mining projects.
CO$_2$	Analyze different surface mining systems, equipment layouts, and select appropriate excavation, loading, and transportation systems for efficient mine operations.
CO$_3$	Apply suitable extraction methods for various types of mineral deposits, including bedded, massive, pipe, cap, vein, placer, and dimensional stone deposits.
CO$_4$	Evaluate modern surface mining technologies, including in-pit crushing and conveying (IPCC), surface miners, and mining under underground workings and other special mining conditions.
CO$_5$	Design waste dump systems, select suitable dump formation equipment, and recommend reclamation methods for environmentally sustainable surface mining operations.

Course Contents

Unit-I

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. Opening up of Deposits – different system of opening of deposits, site preparation, box cut, formation of benches and haul roads.

Unit-II

Types of surface mining system– applicability, limitation, advantages, disadvantages, Layouts using different combinations of main excavation, loading and transportation systems

Unit-III

Extraction Methods: Extraction of subsurface deposits – bedded deposits, massive deposit, pipe type, cap type and vein type deposits, mining of bench sands, placer mining, dimensional stone mining

Unit-IV

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

Unit-V

Dump formation: Types of waste dump – internal and external; dump formation methods and equipment, Reclamation methods by using different combination of equipment.

Text / Reference Book/s:

1. Principles and Practices of Modern Coal Mining by R. D. Singh, New Age Int. (P) Ltd., New Delhi
2. Opencast Mining by R. T. Deshmukh, Myra Publishers, Nagpur
3. Introductory Mining Engineering by H. L. Hartman, John Wiley & Sons
4. Opencast Mining - Unit Operations by V. V. Rzhevsky, Mir Publishers, Moscow
5. Surface Mining by G. B. Misra, Dhanbad, Publishers.
6. Surface Mining Equipment by J. W. Martin et al, Martin Consultants Inc., Colorado
7. SME Mining Engineering Handbook by H. L. Hartman (Editor), Soc. For Mining, Metallurgy and Exploration Inc., Co.
8. Bucket Wheel Excavator by W. Durst & W. Vogt, Trans Tech Pub. Germany

V Semester B. Tech. (Mining Engineering)

Course Code: 26AF1701PC502
Title of the Course: Mine Environment and Ventilation Engineering

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ1	**Develop** an understanding of mine atmosphere, mine gases, methane control, and gas monitoring techniques for safe underground mining operations.
COBJ2	**Provide** knowledge of heat, humidity, psychometric, natural ventilation, and their effects on miners' health, safety, and productivity.
COBJ3	**Enable** students to analyze airflow characteristics, ventilation networks, and air distribution systems in underground mines.
COBJ4	**Familiarize** students with mechanical ventilation systems, mine fans, auxiliary ventilation, and the selection and operation of ventilation equipment.
COBJ5	**Develop** the ability to design, evaluate, and optimize mine ventilation systems considering safety, economics, and modern computational techniques.

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the composition of mine atmosphere, properties of mine gases, methane drainage techniques, gas monitoring systems, and methods of mine air analysis.
CO2	Analyze heat and humidity conditions in mines, evaluate natural ventilation, and apply psychometric principles to improve underground working conditions.
CO3	Apply the principles of airflow through mine openings, determine airway resistance, conduct ventilation surveys, and evaluate mine ventilation standards.
CO4	Evaluate the performance and suitability of mine fans, auxiliary ventilation systems, and mechanical ventilation arrangements for underground mines.
CO5	Design and analyze mine ventilation systems, estimate ventilation requirements, perform ventilation network analysis, and evaluate ventilation costs for safe and efficient mining operations.

Course Contents

Unit-I

Composition of Mine Atmosphere: Mine gases – sources, properties, effects and detection; sampling and analysis of mine air, methane content; methane drainage; methane layering; flame safety lamp and its uses; Methanometers; radon gas and its daughter products; continuous monitoring of gases.

Unit-II

Heat and humidity: Source of heat in mines; effects of heat and humidity; psychometric, kata thermometer; heat stress, air-conditioning .Natural ventilation: Seasonal variations, calculation of NVP from air densities and thermodynamic principles.

Unit-III

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

Unit-IV

Mechanical Ventilation: Types of mine fans; theory; characteristics and suitability of fans; selection; fans in series and parallel; forcing and exhaust configurations, reversal of flow; fan drifts, diffusers, evasees, booster fan, Auxiliary ventilation.

Unit-V

Ventilation planning: Planning of ventilation system and economic consideration; ventilation layout for mining of coal and ore deposits; calculation of air quantity of air required for ventilating a mine; calculation of total mine head; network analysis principles and computer applications, ventilation of deep mines-U/G & open pit, Ventilation cost calculation.

Text / Reference Book/s:

1. Mine Environment & Ventilation By G.B. Mishra Oxford University Press
2. Mining Technology Vol II By D.J. Deshmukh Denett, Central Techno Publications, Nagpur
3. Mine Ventilation By S.P. Banerjee Lovely Prakashan , Dhanbad
4. Numerical Problems on Mine Ventilation By L.C. KaKu,Lovely Prakashan Dhanbad
5. Subsurface Mine Hazards & Safety By D.S. Pradhan Planet Publishing House. Hyderabad

V Semester B. Tech. (Mining Engineering)

Course Code: 26AF1701PC503
Title of the Course: Underground Coal Mine Technology

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ$_1$	**Develop** an understanding of underground coal mining methods, mine development, and the principles of bord and pillar and room and pillar mining systems.
COBJ$_2$	**Provide** knowledge of depillaring methods, mechanized extraction techniques, and support systems for safe and efficient coal extraction.
COBJ$_3$	**Enable** students to understand the design, planning, and operation of conventional and mechanized longwall mining systems.
COBJ$_4$	**Familiarize** students with thick seam mining methods and modern extraction techniques suitable for complex geological conditions.
COBJ$_5$	**Develop** the ability to analyze and apply special underground coal mining methods for extracting coal under challenging geological and environmental conditions.

Course Outcomes: At the end of the course, students will be able to:

CO$_1$	Explain the principles of underground coal mine development, design bord and pillar workings, and select suitable development methods for different mining conditions.
CO$_2$	Analyze depillaring methods, mechanized pillar extraction techniques, and support systems to ensure safe and efficient coal recovery.
CO$_3$	Design and evaluate conventional and mechanized longwall mining systems, including panel layouts, face dimensions, and face recovery operations.
CO$_4$	Apply appropriate thick seam mining methods, including slicing, sublevel caving, hydraulic mining, and blasting gallery methods for efficient extraction.
CO$_5$	Evaluate special underground coal mining methods such as contiguous seam mining, shaft pillar extraction, horizon mining, cable bolting, and yield pillar techniques for safe and economical coal extraction.

Course Contents

Unit-I

Introduction; status of coal reserves, status of coal mining in India, Classification of mining method. Development: Bord and Pillar, and Room and Pillar mining, design of bord and 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, development with continuous miner.

Unit-II

Depillaring: Preparatory arrangements for depillaring; sequence and manner of extraction of pillars; mechanized pillar extraction, setting and withdrawal of supports; air blasts; partial extraction, Depillaring with continuous miner

Unit-III

Longwall Mining: Evolutionary development of Longwall mining, its application, layouts, development and extraction by conventional and mechanized methods, design of longwall workings – face length and panel length, salvaging of longwall faces.

Unit-IV

Thick seam mining: multi-section mining, slicing methods, sublevel caving, integrated sublevel caving, blasting gallery method, hydraulic mining

Unit-V

Contiguous seam working; working under surface structures and water bodies, harmonic mining, shaft pillar extraction, horizon mining, special methods- wide stall, extraction with cable bolting, yield pillar technique etc.

Text / Reference Book/s:

1. Modern Coal Mining Technology by Dr S K Das, Lovely Prakashan, Dhanbad
2. Thick Seam Mining – Problems and Issues by Dr T N Singh and B BDhar, Oxford and IBH Publishers
3. Coal Mine Planning and Management, Vol I, II, III, IV by S P Mathur, khanan Prakashan, Bilaspur
4. Underground Winning of Coal by T N Singh
5. Underground Coal Mining Methods by J G Singh
6. Coal Mining Practice by I C F Strathum

V Semester B. Tech. (Mining Engineering)

Course Code: 26AF1701PC504

Title of the Course: Advanced Mine Machinery

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ$_1$	**Develop** an understanding of the construction, operation, and selection of drilling machines used in underground and surface mining.
COBJ$_2$	**Provide** knowledge of coal cutting, continuous mining, and tunneling machines used for efficient excavation in underground mines.
COBJ$_3$	**Enable** students to understand the selection, operation, and productivity of loading and haulage equipment used in mining operations.
COBJ$_4$	**Familiarize** students with opencast mining machinery and continuous surface mining equipment for efficient mineral extraction.
COBJ$_5$	**Develop** the ability to select appropriate mining machinery and communication systems to improve the safety, productivity, and efficiency of mining operations

Course Outcomes: At the end of the course, students will be able to:

CO$_1$	Explain the construction, operation, and selection of drilling machines used in mining.
CO$_2$	Describe the features and applications of coal cutting and continuous mining machines.
CO$_3$	Apply suitable loading and haulage equipment based on mining conditions and production requirements.
CO$_4$	Evaluate the performance and applicability of opencast mining machinery.
CO$_5$	Analyze continuous surface mining equipment and communication systems used in mining operations.

Course Contents

Unit-I

Classification, application & construction features of drilling machines used in Underground coal mines, rock drills, jumbo drills, rock bolting machines. Small and large diameter surface blast hole drills and their construction, Application, selection and operation.

Unit-II

Coal cutting machines, Shearers, Coal plow, Lump breakers, Road headers, TBMs, Raise and shaft borers, Continuous miners, Stage loaders; their main Features and applicability.

Unit-III

Loading machines – Rocker shovel, SDL, LHD, Gathering arm loader, Shuttle car, LPDTs, Scraper; their main features, applicability, selection &estimation of production capacities.

Unit-IV

Opencast Machinery – Shovels, Draglines, Dumpers, Wheel loaders; their main features, applicability, selection and production capacities; Rippers, Scrapers, Road graders, Dozers.

Unit-V

Continuous surface mining equipment – Bucket wheel excavators, Stacker & reclaimer, Continuous surface miners, Spreaders, Dredging equipment; their main features, applicability, selection and estimation of production capacities Signaling and communication; Signaling and communication systems used in Underground and surface mines.

Text / Reference Book/s:

1. Elements of Mining Technology Volume III by D J Deshmukh
2. Coal Mining Technology by Dr S K Das
3. Surface Mining Technology by Dr S K Das
4. Heavy Earth Moving Machinery by Amitosh Dey
5. Introductory Mining By Hartman

V Semester B. Tech. (Mining Engineering)

Course Code: 25AF1701MD506

Title of the Course: Underground Mining Technology &Ventilation (MDM Bucket List)

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ$_1$	**Develop** an understanding of underground coal mine development, panel design, and pillar extraction methods.
COBJ$_2$	**Provide** knowledge of longwall mining systems and their application in modern underground coal mining.
COBJ$_3$	**Enable** students to understand the composition of mine atmosphere, mine gases, and gas control techniques for safe mining operations.
COBJ$_4$	**Develop** knowledge of heat, humidity, psychometric, and natural ventilation principles affecting underground mine environments.
COBJ$_5$	**Familiarize** students with airflow principles, mine ventilation systems, and ventilation control devices for safe and efficient mine ventilation.

Course Outcomes: At the end of the course, students will be able to:

CO$_1$	Explain bord and pillar development and depillaring methods used in underground coal mines.
CO$_2$	Describe the principles and applications of conventional and mechanized longwall mining.
CO$_3$	Analyze mine atmosphere, mine gases, and methane control methods.
CO$_4$	Evaluate heat, humidity, and natural ventilation in underground mines.
CO$_5$	Apply airflow and ventilation principles to ensure safe mine ventilation.

Course Contents

Unit-I

Development: Bord and Pillar, design of bord and pillar workings, the panel system, panels and inter-panel barriers, size of pillars and galleries; methods of driving galleries; Panel size

Depillaring: Preparatory arrangements for depillaring; sequence and manner of extraction of pillars.

Unit-II

Longwall Mining: Evolutionary development of Longwall mining, its application, layouts, development and extraction by conventional and mechanized methods

Unit-III

Introduction: Present status of Indian metal mining industry, Metal mining terminologies, classification and choice of stoping methods. Basic metal mining methods.

Unit-IV

Composition of Mine Atmosphere: Mine gases – sources, properties, effects and detection; sampling and analysis of mine air, methane drainage; methane layering;

Unit-V

Heat and humidity: Source of heat in mines; effects of heat and humidity; psychometric, kata thermometer; Air Flow through Mine Openings flow control devices, standards of mine ventilation.

Text / Reference Book/s:

1. Modern Coal Mining Technology by Dr S K Das, Lovely Prakashan, Dhanbad
2. Underground Winning of Coal by T N Singh
3. Mine Environment & Ventilation By G.B. Mishra Oxford University Press
4. Mining Technology Vol II By D.J. Deshmukh Denett, Central Techno Publications, Nagpur
5. Mine Ventilation By S.P. Banerjee Lovely Prakashan , Dhanbad

V Semester B. Tech. (Mining Engineering)

Course Code: 26AF1000PE507A

Title of the Course: Program E-1 Advance Mine Surveying

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ$_1$	**Develop** an understanding of advanced mine surveying techniques, control surveys, and GPS applications in mining.
COBJ$_2$	**Provide** knowledge of mine correlation methods and underground survey techniques for accurate mine development.
COBJ$_3$	**Enable** students to perform development and stope surveys for the safe and efficient execution of underground mining operations.
COBJ$_4$	**Familiarize** students with the principles and applications of Photogrammetry in mine surveying and mapping.
COBJ$_5$	**Develop** the ability to analyze surveying errors, apply adjustment techniques, and prepare mine plans in accordance with statutory requirements.

Course Outcomes: At the end of the course, students will be able to:

CO$_1$	Explain control survey methods and apply GPS techniques in mine surveying.
CO$_2$	Apply mine correlation methods for accurate underground surveys
CO$_3$	Perform development and stope surveys using appropriate surveying techniques.
CO$_4$	Apply photogrammetric principles for mine mapping and measurements.
CO$_5$	Analyze surveying errors, adjust observations, and prepare statutory mine plans.

Course Contents

Unit-I

Control Surveys: Triangulation; classification; reconnaissance, measurement, procedure for angles and base-line; tri-literation; introduction to GPS and its application in mine surveying

Unit-II

Correlation: Methods of correlation-direct traversing in inclined shaft, correlation in vertical, single and two shafts

Unit-III

Development surveys: Setting a point of known coordinate, control of direction and gradients in drifts, tunnels, raises and winzes; application of lasers Problems of underground traversing Stope surveying: Purpose, methods of survey in moderately and steeply inclined ore bodies, flat and vertical ore bodies/seams.

Unit-IV

Photogrammetry: Principles of Photogrammetry and its elements, orientation of photographs, finding height and distance of ground points from photographs, scale of vertical photographs, photographs versus maps, application of Photogrammetry in mining.

Unit-V

Introduction of errors and its theory, identifications of errors, their prevention and elimination; method of least squares and its applications; probable error of single observation; most probable value, weights, weighted observation and their probable errors, adjustment of observations. General legislative requirements as to mine plans in India, preparation and preservation of plans and sections.

Text / Reference Book/s:

1. Surveying & Field Work Volume III by Dr. B. C. Punmia, Laxmi Pub. Pvt. Ltd., New Delhi.
2. Plane and Geodetic Surveying by Aylmer Johnson, 2014, CRC Press.
3. GPS for Geodesy by Peter J.G. Teunissen and Alfred Kleusberg, 1998, Springer Publications.
4. Metalliferous Mine Surveying by Winniberg
5. Surveying Volume I&II by Dr. T.P. Kanetkar and Kalkar

V Semester B. Tech. (Mining Engineering)

Course Code: 26AF1000PE507B
Title of the Course: Program E-1 Advanced Geology

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ$_1$	**Develop** an understanding of geological principles, earthquakes, volcanism, and their significance in mining engineering.
COBJ$_2$	**Provide** knowledge of environmental geology, land-use planning, and the impact of mining activities on surface and groundwater resources.
COBJ$_3$	**Enable** students to understand the principles and methods of mineral prospecting using geological and geophysical techniques.
COBJ$_4$	**Develop** knowledge of coal geology, including the origin, classification, properties, and distribution of Indian coalfields.
COBJ$_5$	**Familiarize** students with remote sensing and Geographic Information System (GIS) techniques for mineral exploration, mine planning, and environmental management.

Course Outcomes: At the end of the course, students will be able to:

CO$_1$	Explain the fundamentals of mining geology, earthquake phenomena, volcanism, and their relevance to mining operations.
CO$_2$	Analyze environmental geological issues associated with mining and recommend appropriate land-use and environmental management practices.
CO$_3$	Apply geological and geophysical prospecting methods to identify and evaluate mineral deposits.
CO$_4$	Evaluate the geological characteristics, classification, properties, and distribution of coal deposits, with special reference to Indian coalfields.
CO$_5$	Apply remote sensing and GIS technologies for mineral exploration, mine planning, and environmental monitoring in mining operations.

Course Contents

Unit-I

General Geology: Scope of Mining Geology, Causes and Effects of earthquakes, origin of earthquakes, earthquakes waves, seismographs, classifications of earthquakes, earthquake intensity scale, location of epicenter, distribution of earthquakes, prediction of earthquakes, control of earthquakes, volcanism, product of volcano's.

Unit-II

Environmental Geology: Land use and land planning, pollution of surface and groundwater, waste disposal site location for solid and liquid wastes. Impact of mining activities on surface and underground water quality

Unit-III

Prospecting Geophysical Prospecting for metallic deposits, dispersion, pathfinder elements, Anomalies, principles of prospecting, prospecting methods, electrical, seismic, magnetic, gravity methods of prospecting.

Unit-IV

Coal Geology: Classifications of coal, physical properties of coal, chemical composition of coal, coal petrology, distribution of Indian coalfields, varieties and ranks of coal, formation of coal.

Unit-V

Remote Sensing and Geographical Information System (GIS): Introduction to remote sensing technology, analog and digital data, products Remote sensing satellite, application of remote sensing for mining operations, introduction to GIS and its applications.

Text / Reference Book/s:

1. A Text Book of Geology – P. K. Mukherjee
2. Introduction to Geology of Coal and Indian Coalfields – N. L. Sharma & K. S. V. Ram
3. Courses in Mining Geology – R. N. Parthaswamy
4. Impact of Mining on Environment – R. K. Trivedi & N. P. Sinha
5. General and Engineering Geology – Dr. R. K. Bopche & Dr. D. K. Agrawal
6. Principles of Engineering Geology – K. M. Bangar

Course Code: 26AF1701PCL508
Title of the Course: Mine Environment and Ventilation Engineering –Lab

Course Scheme					Evaluation Scheme (Lab)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
0	0	2	2	1	2	0	25	25	50

Course Objectives

COBJ1	**Develop** practical knowledge of mine atmosphere, ventilation parameters, and environmental monitoring techniques used in underground mines
COBJ2	**Provide** hands-on experience in measuring mine air quality, humidity, cooling power, and airflow using standard mine ventilation instruments.
COBJ3	**Enable** students to study the operation and performance of mine ventilation systems, fans, and airflow control devices.
COBJ4	**Develop** skills in conducting ventilation surveys and interpreting ventilation data for safe mine operations.
COBJ5	**Enhance** competency in applying mine ventilation principles to improve underground mine safety and environmental conditions

Course Outcomes: At the end of the course, students will be able to:

CO1	Measure carbon monoxide concentration and relative humidity using standard mine ventilation instruments.
CO2	Determine the cooling power and air velocity of mine air using appropriate instruments.
CO3	Demonstrate the operation of airflow control devices and mine ventilation systems.
CO4	Analyze the performance of mine fans operating in series and parallel configurations.
CO5	Conduct ventilation surveys and interpret results to evaluate mine ventilation efficiency.

List of Practical

Course Code: 25AF1701PC508
Title of the Course: Mine Environment and Ventilation Engineering –Lab

1. To determine CO-percentage by MSA-CO detector
2. To determine relative humidity with whirling hygrometer
3. To determine cooling power of mine air by kata thermometer
4. To determine air velocity by Anemometer
5. To study various airflow control devices in mines
6. To study operation of fans in series
7. To study operation in fans in parallel
8 .To study ventilation survey

V SEMESTER B. Tech. (MINING ENGINEERING)

Course Code: 26AF1701PCL509

Title of the Course: Advanced Mine Machinery – Lab

Course Scheme				Evaluation Scheme (Lab)					
Lecture	**Tutorial**	**Practical**	**Periods/week**	**Credits**	**Duration (hrs)**	**MSE**	**IE**	**ESE**	**Total**
0	0	2	2	1	2	0	25	25	50

Course Objectives

COBJ1	**Develop** practical knowledge of underground and surface mining machinery used in coal and metal mines.
COBJ2	**Provide** hands-on exposure to the construction, working principles, and applications of drilling, loading, excavation, and continuous mining equipment.
COBJ3	**Enable** students to identify and select suitable mining machinery based on mining conditions and production requirements.
COBJ4	**Develop** an understanding of the operation and maintenance aspects of various mining machines used in underground and opencast mines.
COBJ5	**Enhance** students' competency in evaluating mining equipment for safe, efficient, and economical mining operations.

Course Outcomes: At the end of the course, students will be able to:

CO1	Identify and explain the construction and operation of underground drilling machines.
CO2	Demonstrate the features and applications of underground loading equipment such as SDL and LHD.
CO3	Evaluate the construction, operation, and applications of major opencast mining equipment.
CO4	Explain the working principles and applications of underground coal cutting and continuous mining machines.
CO5	Analyze the features and applications of continuous surface mining equipment for efficient mineral extraction.

List of Practical

1. Study of underground drill machines
2 .Study of SDL & LHD
3 .Study of Dragline
4 .Study of shovel & dumper
5.Study of dozers
6. Study of graders
7. Study of road headers
8. Study of shearer
9. Study of coal plow
10. Study of continuous surface miner.

V SEMESTER B. Tech. (MINING ENGINEERING)

Course Code: 26AF1701PEL510A
Title of the Course: Advance Mine Surveying – Lab

Course Scheme					Evaluation Scheme (Lab)				
Lecture	**Tutorial**	**Practical**	**Periods/week**	**Credits**	**Duration (hrs)**	**MSE**	**IE**	**ESE**	**Total**
0	0	2	2	1	2	0	25	25	50

Course Objectives

COBJ1	**Develop** practical skills in advanced mine surveying techniques for underground mine development and control.
COBJ2	**Provide** hands-on experience in the operation and use of modern surveying instruments and photogrammetric equipment.
COBJ3	**Enable** students to perform mine correlation surveys and underground traversing using standard surveying methods.
COBJ4	**Develop** the ability to apply least squares adjustment techniques for improving survey accuracy
COBJ5	**Enhance** competency in conducting precise mine surveys and interpreting survey data for underground mining applications.

Course Outcomes: At the end of the course, students will be able to:

CO1	Perform theodolite traversing for accurate mine surveying.
CO2	Demonstrate the operation and applications of a micro-optic theodolite.
CO3	Conduct correlation surveys using co-planning and Weisbach triangle methods
CO4	Explain the principles and applications of a mirror stereoscope in mine surveying.
CO5	Apply the method of least squares to determine the most probable value of survey observations.

List of Practical

1. Theodolite traversing by horizontal angle measurement
2. Study of micro optic theodolite
3. Co-relation survey by alignment Co-planning method
4. Co-relation survey by weissbach triangle method
5. Study of mirror stereo scope
6. To determine most probable value of included angle of a given triangle by method of least square.

V SEMESTER B. Tech. (MINING ENGINEERING)

Course Code: 26AF1701PEL510B
Title of the Course: Advanced Geology Lab

Course Scheme					Evaluation Scheme (Lab)				
Lecture	**Tutorial**	**Practical**	**Periods/week**	**Credits**	**Duration (hrs)**	**MSE**	**IE**	**ESE**	**Total**
0	0	2	2	1	2	0	25	25	50

Course Objectives

COBJ1	**Develop** practical skills in the identification of economic minerals, fossils, and geological features relevant to mining engineering.
COBJ2	**Provide** hands-on experience in solving geological mapping problems related to boreholes, coal seams, and rock formations.
COBJ3	**Enable** students to analyze groundwater conditions and prepare hydro-geological maps for groundwater exploration and mine planning.
COBJ4	**Develop** the ability to interpret geological and hydro-geological data for the selection of suitable well sites and groundwater management.
COBJ5	**Familiarize** students with the distribution of major coalfields and mineral deposits in India through map interpretation and geological analysis.

Course Outcomes: At the end of the course, students will be able to:

CO1	Identify economic minerals and fossils using megascopic characteristics and explain their geological significance.
CO2	Solve geological problems related to boreholes, rock formations, and coal seam mapping using geological principles.
CO3	Prepare water table maps, determine groundwater flow directions, and evaluate hydro-geological conditions for groundwater resource assessment.
CO4	Interpret hydro-geological data to identify suitable well sites and classify different groundwater conditions.
CO5	Locate major coalfields and important metallic and non-metallic mineral deposits of India using geological maps and apply geological mapping techniques.

List of Practical

1. Megascopic identification of economic minerals
2. Megascopic identification of fossils
3. Three points bore hole problem and thickness of rock formation problem.
4. On the basis ofthe given well data, prepare the water table map of the area. Mark the direction of groundwater flow and groundwater conditions
5. Discuss the hydrogeological condition of the area and mark a suitable site for a well.
6. Demarcate the area in which flowing water wells can be obtained. Identify the type of groundwater well shown in the figure and discuss the groundwater condition at the well site.
7. Location of major coal fields in India and outline map of physiographic divisions.
8. Location of important metallic and non-metallic mineral deposits on the outline map of India
9. Coal seam problem No. 1 on map and Coal seam problem No. 2 on map.
10. Draw groundwater surface contours at a 10 m interval, discuss the hydrogeological conditions of the area, and identify the most suitable site for a well.

Dr. Babasaheb Ambedkar Technological University

Bachelor of Technology (B. Tech.)

Department of Mining Engineering

Course Structure and Syllabus (as per NEP 2020)

Third Year (Affiliated Institutes)

Semester VI (w.e.f. AY 2026–27)

Category under NEP	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credits
			L	T	P	ISE	MSE	ESE	Total	
PCC1	26AF1701PC601	Underground Metal Mining Technology	3	-	-	20	20	60	100	3
PCC2	26AF1701PC602	Mine Rescue Engineering	3	-	-	20	20	60	100	3
PCC3	26AF1701PC603	Ground Control in Mines	3	-	-	20	20	60	100	3
PCC4	26AF1701PC604	Drilling and Blasting Engineering	3	-	-	20	20	60	100	3
PEC	26AF1701PE605	Program Elective –II C. Mine Planning D. Mine Health and Safety Engineering	3	-	-	20	20	60	100	3
PEC	26AF1701PE606	Program Elective –III C. Mineral Processing Technology D. Environmental Impact Assessment	3	-	-	20	20	60	100	3
MDM	25AF1701MD607	MDM Bucket List	-	-	-	20	20	60	100	-
PCC Lab	26AF1701PCL608	Mine Rescue Engineering Lab	-	-	2	25	-	25	50	1
PCC Lab	26AF1701PCL609	Ground Control in Mines Lab	-	-	2	25	-	25	50	1
VSEC	26AF1701VS610	Academic Research Writing / Mini Project^	-	2	-	50	-	-	50	2
Total			**18**	**2**	**4**	**240**	**140**	**470**	**850**	**22**

MDM to be offered too there departments : **Surface Mining & Environment (3 Credits)**

OE*: The students can opt for the Open Elective from the Open Elective bucket declared for the particular semester.

Open Elective Bucket / Course List is available on DBATU website.

^ : Academic Research Writing / Mini Project – A group of students will submit mini project report on the topic allotted by faculty.

VI Semester B. Tech. (Mining Engineering)

Course Code: **26AF1701PC601**
Title of the Course: **Underground Metal Mining Technology**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ$_1$	**Understand** the current practices, challenges, and scope of underground metal mining and the selection of appropriate stoping methods under different geological conditions.
COBJ$_2$	**Develop** knowledge of mine development techniques, including the design and excavation of shafts, raises, winzes, ore handling systems, and underground infrastructure.
COBJ$_3$	**Acquire** the ability to analyze and select suitable stoping methods based on ore body characteristics, mining conditions, safety, and productivity.
COBJ$_4$	**Understand** caving methods, pillar recovery techniques, and methods to minimize ore loss and dilution while improving mining efficiency.
COBJ$_5$	**Familiarize** students with emerging underground mining technologies, deep mining challenges, and innovative mining methods such as solution mining, in-situ leaching, borehole mining, and underground retorting.

Course Outcomes: At the end of the course, students will be able to:

CO$_1$	Explain the principles of underground metal mining, mine development, and the selection of suitable stoping methods based on ore body characteristics.
CO$_2$	Design and evaluate underground mine development layouts, including shafts, raises, winzes, ore handling systems, and underground excavations.
CO$_3$	Analyze and select appropriate open and supported stoping methods by considering geological, technical, economic, and safety requirements.
CO$_4$	Evaluate caving stoping methods, pillar recovery techniques, and measures to control ore dilution, losses, and improve recovery.
CO$_5$	Assess modern underground mining methods, deep mining challenges, rock burst control measures, and design stopes for safe and efficient extraction.

Course Contents

Unit1: Introduction: Present status of Indian metal mining industry, scope and limitations of underground mining; classification and choice of stoping methods. Development: Choice of level interval and block length - shape, size, position. Cross-cuts, drifts, and declines – their shapes, size and position.

Unit 2: 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 ore pass. Raises and winzes - their shape, size and position, excavation process-ground breaking, mucking, ventilation and support, modern methods of raising – Alimak and Jora-lift raising, 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.

Unit 3: 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.

Unit 4: 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

Unit 5: 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

Text / Reference Book/s:

1. Mining Methods & Equipment by Koehler S. Stout, McGraw-Hill
2. Rudiments of Mining Practice by C.E.Gregory, Trans Tech Pub.
3. Introductory Mining Engineering by H. L. Hartman, John Wiley & Sons
4. Metalliferous Mining by Higham, Charles Griffin & Co. Ltd., London
5. Metalliferous Mine Surveying by Frederick Winiberg, John Wright & Sons Ltd., UK
6. SME Mining Engineering Handbook by H.L.Hartman (Editor), Soc. For Mining, Metallurgy and Exploration Inc., Co.
7. Underground Mining Methods Handbook by Hustrulid, Soc.For Mining, Metallurgy and Exploration Inc., Co.

VI Semester B. Tech. (Mining Engineering)

Course Code: 26AF1701PC602
Title of the Course: Mine Rescue Engineering

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ$_1$	**Develop** an understanding of mine fires, explosions, inundation hazards, and their prevention and control techniques to ensure safe mining operations.
COBJ$_2$	**Familiarize** students with the principles of mine rescue, recovery operations, and emergency preparedness in underground mines
COBJ$_3$	**Provide** knowledge of mine illumination systems, lighting standards, and their role in improving safety, health, and operational efficiency.
COBJ$_4$	**Develop** the ability to identify, measure, and control airborne mine dust and other occupational hazards affecting miners' health.
COBJ$_5$	**Enable** students to apply statutory regulations, modern safety practices, and emergency response strategies for accident prevention and disaster management in mines.

Course Outcomes: At the end of the course, students will be able to:

CO$_1$	Explain the causes, mechanisms, detection, prevention, and control methods of mine fires, including spontaneous combustion and accidental fires.
CO$_2$	Analyze the causes, prevention, and investigation of firedamp and coal dust explosions and evaluate explosion control measures.
CO$_3$	Assess inundation hazards and apply suitable preventive measures, safety boring techniques, and water control structures for safe mining operations.
CO$_4$	Demonstrate knowledge of mine rescue equipment, rescue organization, recovery operations, and procedures for reopening sealed-off workings.
CO$_5$	Evaluate mine illumination systems and airborne dust control techniques to ensure safe, healthy, and compliant mining environments.

Course Contents

Unit1: Mine Fires: Causes of mine fires; spontaneous combustion – mechanism, susceptibility indices, factor 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.

Unit 2: Mine Explosions: Firedamp and coal dust explosions-mechanisms, causes and prevention; stone dust and water barriers; investigations after an explosion.

Unit 3: 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 bulkheads, strengthening of dams.

Unit 4: Rescue and Recovery: Rescue equipment and their uses, rescue stations and rescue rooms; organization of rescue and recovery areas, re-opening of sealed off working.

Unit 5: Illumination in mines- it's effect on safety, units in lighting, efficiency and health; construction and working of cap lamp, lamp room design and organization; different types of illumination devices; standards of illumination in underground and opencast mines, special service lamps in mines, illumination survey, Glare and its control, face lighting.
Mine Dust: Airborne respirable dust in underground mines- generation, dispersion, measurement and control; classification, physiological effects, dust measurement, sampling of air-bone dust.

Text / Reference Book/s:

1. Mine Fires, explosions, Rescue, Recovery and Inundations by M A Ramlu
2. Fires in Coal Mines by L C Kaku
3. Prevention and Combating Mine Fires by S C Banerjee
4. A Manual on Mines Rescue, Safety and Gas Detection by J Strang and P Mackenzie-Wood
5. Mine Environment and Ventilation by G B Mishra
6. The Lighting of Underground Mines by D A Trotter Co.

VI Semester B. Tech. (Mining Engineering)

Course Code: 26AF1701PC603
Title of the Course: Ground Control in Mines

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ$_1$	**Develop** an understanding of engineering rock mass classification systems and their applications in mine support design and ground control.
COBJ$_2$	**Provide** knowledge of stress distribution around underground openings, pillar design principles, and modern numerical methods used in rock mechanics.
COBJ$_3$	**Familiarize** students with rock burst phenomena, overburden movement, and strata control techniques for safe underground mining.
COBJ$_4$	**Develop** the ability to analyze, predict, monitor, and control mining-induced subsidence and its impact on surface and underground structures.
COBJ$_5$	**Equip** students with knowledge of ground movement monitoring techniques, photoelasticity, and slope stability analysis for the safe design and operation of underground and opencast mines.

Course Outcomes: At the end of the course, students will be able to:

CO$_1$	Explain engineering rock mass classification systems and apply them for ground control and support design in underground mines.
CO$_2$	Analyze stress distribution around underground openings, design mine pillars, and apply numerical methods for rock mechanics problems.
CO$_3$	Evaluate rock burst mechanisms, overburden movement, and strata behavior to develop appropriate ground control strategies.
CO$_4$	Analyze mining-induced subsidence, predict ground movement, and recommend suitable prevention and control measures.
CO$_5$	Apply ground movement monitoring techniques, photoelasticity, and slope stability analysis for the safe design and management of underground and opencast mining operations.

Course Contents

Unit1:Engineering Rock Mass Classification

Practical significance of classification of rock masses .Bieniawski's RMR Classification Scheme & various modifications suggested including Laubscher's modification, Barton's Q- Classification Scheme, Excavation Support Ratio & Average Stand-up Time, Rock Structure Rating, CMRI Classification Scheme and its use in determination of appropriate support system for an underground mine, Ground Control: Definition, practices, relation to mine layout and subsystems of mining High horizontal stresses.

Unit 2:Stresses around Underground Openings

Types of Openings - single & multiple openings, shapes of openings; Induced stresses around openings using classical closed – form solutions; Design considerations in selection of openings; Elementary introduction to concepts of numerical analysis methods – Finite Element Method (FEM), Boundary Element Method (BEM) and Hybrid Methods.

Pillar Design:
Estimating average pillar stress by Tributary Area Method and its criticism; Factors affecting pillar strength; various important formulae for determination of pillar strength; Factor of Safety of pillars; Steps in design of pillars.

Unit 3: Rockbursts
Caving characteristics of roof rocks; Definition, types & phenomenology of rock bursts; Factors affecting proneness to rock bursts; Prediction of rock bursts; Monitoring of rock bursts – methods & instrumentation; Prevention & control of rock bursts; Bumps and Gas outbursts. Overburden Movement & Abutment Pressure in Longwall Mining, including concepts of Immediate Roof and Main Roof.

Unit 4: Subsidence
Definition – sub-surface & surface subsidence; Important theories of subsidence; Types of surface subsidence; Factors affecting subsidence; Related terminology; Subsidence profiles (lateral & vertical movement, strain curves); Subsidence prediction; Subsidence survey; Prevention & control of subsidence.

Unit 5: Monitoring Ground Movement
Purpose; Devices/Instruments to measure deformation, strain, load, stress, bearing capacity, seismic activity, strata movement etc.
Photo elasticity: Principle & applications
Slope Stability of Opencast Benches: Effect of pit slope on mine economics; Common modes of slope failure; Factors affecting slope stability; Techniques of slope stability analysis; Measures to enhance stability of and to monitor & protect slopes.

Text / Reference Book/s:

1. Rock Mechanics for Underground Mining– B.H.G. Brady and E.T. Brown, Pub Chapman & Hall
2. Coal Mine Ground Control – Syd S. Peng, Dept. of Mining Engg., West Virginia University, USA
3. Introduction to Rock Mechanics – R.E. Goodman, Wiley International
4. Handbook on Mechanical Properties of Rocks – R.D. Lama and V.S. Vutukuri, Trans Tech Publications
5. Engineering in Rocks for slopes, Foundations & Tunnels – T. Ramamurthy, PHI
6. Fundamentals of Rock Mechanics – J.C. Jaeger and N.G.W. Cook, Chapman & Hall

VI Semester B. Tech. (Mining Engineering)

Course Code: 26AF1701PC604
Title of the Course: Drilling & Blasting Engineering

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ1	**Develop** an understanding of drilling principles, drilling systems, drill bits, and the factors influencing drilling performance in mining operations.
COBJ2	**Provide** knowledge of explosives, initiation systems, detonators, and blasting accessories used in underground and opencast mining.
COBJ3	**Enable** students to design and evaluate blasting operations for different mining excavations, ensuring safe and efficient rock fragmentation.
COBJ4	**Familiarize** students with the safe handling, transportation, storage, and statutory requirements related to explosives, including blasting under special mining conditions.
COBJ5	**Develop** the ability to assess blast performance, apply controlled blasting techniques, minimize environmental impacts, and safely manage blasting-related problems.

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the principles of drilling, evaluate drilling systems, and select appropriate drilling methods and drill bits for different mining conditions.
CO2	Describe the properties, classification, testing, and safe use of explosives, detonators, and blasting accessories in mining operations.
CO3	Design and analyze blasting patterns and blast rounds for underground and opencast mining excavations using suitable blasting techniques.
CO4	Apply safe practices for the transportation, storage, and use of explosives, and evaluate blasting operations under special mining conditions while minimizing environmental impacts.
CO5	Evaluate blast performance, implement controlled blasting techniques, analyze blast results, and recommend corrective measures for misfires and other blasting problems.

Course Contents

Unit 1: Drilling: Definition, need, classification, drillability and selection of drilling system, Percussive drilling - mechanics, required vertical thrust and RPM, Indexing, penetration rate etc. Rotary drilling - Mechanics, torque required and estimation of applied thrust, Rotary- percussive drilling - mechanics, torque required, applied axial thrust. Thermal drilling and other types of novel drilling methods with concepts, Factors affecting performance of drilling system, operating parameters etc Bits: types of bits, construction and application, bit wear, Economics of drilling system.

Unit 2: Explosives: Definition, classification, composition, properties and various Tests on explosives Detonator: Need, classification, construction, Delay element, firing sequence, fuse, detonating cord, relay, nonel, shock tube, electronic detonators, Blasting accessories, exploders, circuit tester, etc.

Unit 3: Blasting: Mechanism of blasting- solid blasting, cut blasting and bench blasting, blasting pattern and design of blast round in underground coal mines, opencast, drifts, stopes, raise, winze, shaft, tunnel, etc. Secondary blasting methods

Unit 4: Bulk transportation of explosive, storage and explosives (magazine), blasting in fiery seam, blasting under special conditions, deep hole blasting, environmental effects of blasting and their preventive measures.

Unit 5: Characteristics of good blast, blast performance, evaluation technique, controlled blasting techniques, cast blasting, blast simulation studies, misfire, dealing with misfire, blown out shot, blown through shot.

Text / Reference Book/s:

1. Principles and Practices of Modern Coal Mining by R D Singh, New Age Int. (P) Ltd., New Delhi
2. Surface Blast Design by C.J.Konya&E.J.Walter, Prentice Hall Publications
3. Explosives and Blasting Practices in Mines by Dr S K Das, Lovely Prakashan, Dhanbad
4. Principles of Rock Drilling by U.M.RaoKaranam and B.Misra, Oxford & IBH Co Pub. Ltd., New Delhi
5. Surface Mining by G B Mishra, Dhanbad Publishers
6. SME Mining Engineering Handbook by H.L.Hartman (Editor), Soc. For Mining, Metallurgy and Exploration Inc., Co.
7. Rock Breakage by Blasting by M.I. Petrosyan, Overseas Books Syndicate, Dhanbad

VI Semester B. Tech. (Mining Engineering)

Course Code: PE-II 26AF1701PE605A
Title of the Course: PE-II Mine Planning

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ$_1$	**Develop** an understanding of the principles, phases, and methodologies of mine planning for new and existing mining projects.
COBJ$_2$	**Provide** knowledge of surface and underground mine planning, including reserve estimation, mine layout, production planning, and equipment selection.
COBJ$_3$	**Enable** students to prepare and evaluate geological reports, feasibility reports, and detailed project reports for mining projects.
COBJ$_4$	**Develop** the ability to plan mine infrastructure, transportation systems, and utility requirements for efficient and economical mine operations.
COBJ$_5$	**Equip** students with knowledge of mine drainage, manpower planning, project scheduling, mine closure planning, and sustainable post-mining land use.

Course Outcomes: At the end of the course, students will be able to:

CO$_1$	Explain the principles, phases, and components of mine planning, and prepare basic geological, feasibility, and detailed project reports.
CO$_2$	Analyze and develop surface mine plans by determining mine boundaries, pit configurations, production schedules, and suitable mining systems.
CO$_3$	Develop underground mine plans by estimating reserves, determining mine capacity, planning panel systems, and forecasting production.
CO$_4$	Design mine infrastructure and select appropriate transportation systems, utilities, and material handling arrangements for efficient mine operations.
CO$_5$	Plan mine drainage systems, manpower requirements, project implementation schedules, mine closure activities, and post-mining land use for sustainable mining.

Course Contents

Unit1: Introduction

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; Geological reports, Feasibility Report and Detailed Project Report - Contents, preparation and economic evaluation.

Unit 2: Surface Mine Planning

Mine planning components and planning steps; Bench geometry and mine layouts; Fixing the mine boundary; Ultimate pit configuration; determination of optimum mine size, Optimum designed capacity; introduction to Production planning, production scheduling; Production estimation; Selection of mining system vis-à-vis equipment system.

Unit 3: Underground Mine Planning

Mine planning components and planning steps; Fixing the mine boundary; Determination of size of the mine; Limited and unlimited reserves; Optimum designed capacity; Reserve estimation; Planning

Panel System of Mining; Production estimation; Production potential of different panels; Fixing the target of mine.

Unit 4: Infrastructural Planning

CHP, workshop, power, water requirement and communication in mine, transportation planning Alternatives; Choice of men, material and mineral handling transport systems; Selection of mine transport systems.

Unit 5: Drainage Planning

Assessment of make of water; Drainage layout; Design of sumps; Selection of pumps and pumping capacity, Manpower Planning Project Construction Schedule Planning for mine closure and post mining land use.

Text / Reference Book/s:

1. Coal Mine Planning by S. P. Mathur
2. Coal Mining Methods and Management Vol I,II,III and IV by S. P. Mathur, KhananPrakashan, Bilaspur.
3. Underground Mining Methods Handbook by W A Hustrulid
4. Introductory Mining Technology by H L Hartman
5. Principles and Practices of Modern Coal Mining by R D Singh, New Age Int. (P) Ltd., New Delhi
6. SME Mining Engineering Handbook by H.L.Hartman (Editor), Soc. For Mining, Metallurgy and Exploration Inc., Co.
7. Principles of Mine Planning by A Bhattacharya, Allied Publishers.

VI SEMESTER B. Tech. (MINING ENGINEERING)

Course Code: PE-II 26AF1701PE605B
Title of the Course: PE-II Mine Health and Safety Engineering

Course Scheme					Evaluation Scheme (Theory)				
Lecture	**Tutorial**	**Practical**	**Periods/week**	**Credits**	**Duration of paper, hrs**	**MSE**	**IE**	**ESE**	**Total**
3	-	-	3	3	3	20	20	60	100

Course Objectives

COBJ1	**Understand** the principles of safety management systems, safety engineering, and recent developments in safety practices in the mining industry.
COBJ2	**Develop** the ability to identify hazards and assess risks using reliability concepts, statistical methods, and risk assessment techniques.
COBJ3	**Familiarize** students with advanced risk assessment tools such as Fault Tree Analysis (FTA), Failure Mode and Effect Analysis (FMEA), QSAR, and fuzzy logic models for accident prevention.
COBJ4	**Equip** students with the knowledge and skills to conduct safety audits, evaluate safety performance, and maintain safety records for continuous improvement.
COBJ5	**Enable** students to implement mining safety legislation, ergonomics, safe operational practices, safety committees, and safety programs to ensure compliance and enhance workplace safety.

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain safety management systems, engineering aspects of safety management, and recent developments in safety engineering for mining industries.
CO2	Assess hazards and risks in mining operations using reliability concepts, statistical methods, and control charts.
CO3	Apply advanced risk assessment techniques such as Fault Tree Analysis (FTA), Failure Mode and Effect Analysis (FMEA), QSAR, and fuzzy models to evaluate mining safety.
CO4	Perform safety audits, measure safety performance, and manage safety records to improve organizational safety.
CO5	Apply mining safety legislation, ergonomic principles, safe operational practices, safety committees, and safety programs to promote a safe working environment.

Course Contents

Unit1: Introduction

Safety management systems in Indian mining industry; Engineering aspects of safety management; Recent trends of development of safety engineering approaches.

Unit 2: Risk Assessment

Basic concept of risk, reliability and hazard potential; Elements of risk assessment; Statistical methods; Control charts

Unit 3: Risk Assessment

Appraisal of advanced techniques – fault tree analysis; Failure mode and effect analysis; Quantitative structure – activity relationship analysis; Fuzzy model for risk assessment

Unit 4: Safety Audit and Control

Measurement of safety efficiency; Safety audit methods; Safety records management

Unit 5: Safety Measures

Safety legislation; Safety meetings; Constitution of safety committees including pit safety committee. Safe Practices Ergonomics; Safe operational practices; Safety codes; Implementation and monitoring of safety programmes.

Text / Reference Book/s:

1. Mine Safety - A Modern Approach by Dr B S Dhillon, 2010, Springer Publications.
2. Safety in Mines: A survey of accidents, their causes and prevention by Prof. B K Kejriwal
3. Risk Management Handbook for the Mining Industry, MGD 1010, Minerals industry safety and health risk management guideline, NSW - Department of Primary Industries, 1997.
4. Safety and Health Commission for the Mining and other Extractive Industries, 1998, Guidance for Carrying out Risk Assessment at Surface Mining Operations, Doc. No 5995/2/98-EN.
5. Hazard, Risk and Vulnerability Analysis Tool Kit, January 2004, Ministry of Public Safety, British Columbia.
6. Improving Safety Culture – A Practical Guide by Doominic Cooper, 2001, Applied Behavioral Science, John Wiley and Sons.

VI SEMESTER B. Tech. (MINING ENGINEERING)

Course Code: PE-III 26AF1701PE606A
Title of the Course: PE-III Mineral Processing Technology

Course Scheme					Evaluation Scheme (Theory)				
Lecture	**Tutorial**	**Practical**	**Periods/week**	**Credits**	**Duration of paper, hrs**	**MSE**	**IE**	**ESE**	**Total**
3	-	-	3	3	3	20	20	60	100

Course Objectives

COBJ1	**Understand** the principles of mineral beneficiation and its importance in mineral conservation, value addition, and sustainable utilization of mineral resources.
COBJ2	**Develop** knowledge of comminution, sizing, and sampling techniques used in mineral processing plants for efficient mineral liberation and separation.
COBJ3	**Familiarize** students with pre-concentration and gravity concentration methods for the beneficiation of ores and coal.
COBJ4	**Acquire** knowledge of advanced mineral separation techniques such as froth flotation, magnetic separation, electrostatic separation, pelletization, dewatering, and coal washing.
COBJ5	**Enable** students to analyze and design simplified beneficiation flowsheets for coal and important Indian ores such as iron, manganese, copper, lead, and zinc.

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the fundamentals of mineral beneficiation, comminution, liberation, and the selection of crushing and grinding equipment for mineral processing.
CO2	Apply sizing, classification, and sampling techniques for efficient mineral processing and evaluate their industrial applications.
CO3	Analyze and apply pre-concentration and gravity concentration methods for the beneficiation of ores and coal.
CO4	Evaluate the performance and applications of froth flotation, magnetic separation, and electrostatic separation techniques for mineral beneficiation.
CO5	Develop simplified beneficiation flowsheets and apply pelletization, dewatering, drying, and coal washing techniques for processing Indian mineral deposits.

Course Contents

Unit 1:

Introduction: mineral beneficiation and its role in mineral exploration and conservation with special reference to indian economic minerals.

Communition and liberation: theory and practice of crushing and grinding, conventional units and their performance and choice

Unit 2:

Sizing: laboratory techniques, interpretation and plotting of data, industrial screens and classifiers, dry and wet processes

Sampling: importance of sampling and methods used in mills.

Unit 3:
Pre-concentration: picking, washing and classification, leaching-brief description of techniques ,
Gravity concentration: theory and application of sinks and float, jigging and flowing film concentration-methods and equipments used

Unit 4:
Froth flotation: physico-chemical principles, flotation reagents, floatation machines and circuits, application to common sulfide, oxide and oxidized minerals.
Electrostatic and magnetic separation: principles, operation and field of application

Unit 5:
Pelletization of low iron ores: dewatering and drying: thickening, filtration and drying.
Coal washing: methods of coal washing, wash ability curves
Flow sheets: simplified flow sheets for the beneficiation of coal and typical ores of copper, lead, zinc, iron and manganese with special reference to Indian deposits.

Text / Reference Book/s:

1. Mineral Processing by S K Jain
2. Mineral Processing by Proyar
3. Mineral Processing by Vijayendra
4. Mineral Processing by B A WILLS

VI SEMESTER B. Tech. (MINING ENGINEERING)

Course Code: PE-III 26AF1701PE606B
Title of the Course: PE-III Environmental Impact Assessment

Course Scheme					Evaluation Scheme (Theory)				
Lecture	**Tutorial**	**Practical**	**Periods/week**	**Credits**	**Duration of paper, hrs**	**MSE**	**IE**	**ESE**	**Total**
3	-	-	3	3	3	20	20	60	100

Course Objectives

COBJ1	**Develop** an understanding of ecosystem concepts, ecological processes, and the environmental impacts of mining activities.
COBJ2	**Provide** knowledge of global environmental issues, ozone depletion, deforestation, desertification, and international environmental conventions and protocols.
COBJ3	**Enable** students to identify various types of environmental pollution and apply appropriate pollution prevention and control technologies.
COBJ4	**Familiarize** students with environmental legislation, regulatory frameworks, and Environmental Impact Assessment (EIA) procedures applicable to mining projects.
COBJ5	**Develop** the ability to prepare Environmental Management Plans (EMP) and apply sustainable development principles in mining and industrial projects.

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain ecosystem structure, ecological processes, energy flow, and environmental impacts associated with mining activities.
CO2	Analyze global environmental issues and evaluate the significance of international environmental conventions and protocols in environmental protection.
CO3	Assess different types of environmental pollution and recommend suitable pollution monitoring and control technologies.
CO4	Interpret environmental policies, legislation, and Environmental Impact Assessment (EIA) procedures applicable to mining and industrial projects.
CO5	Develop Environmental Management Plans (EMP) and apply sustainable development principles for environmentally responsible mining operations.

Course Contents

Unit1:

Ecosystems: Basic concepts, scope and importance of ecosystem, classification, structure and function of an ecosystem, Food chains, food webs and ecological pyramids, flow of energy. Factors influencing environmental impacts due to mining

Unit 2:

Global Environment: ozone depletion and Ozone Depleting Substances (ODS), deforestation and desertification.International conventions / Protocols: Earth summit, Kyoto protocol and Montréal protocol

Unit 3:

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution Air Pollution: Primary and secondary pollutants, Ambient air quality standards and control measures. Water pollution: Sources and types of pollution, drinking water quality standards, control measures. Soil Pollution: Sources and types, Impacts of mining on soil. Noise Pollution: sources and health hazards, standards, pollution control technologies: waste water treatment methods: primary, secondary and tertiary.

Unit 4:

Environmental Policy, Legislation & EIA: Environmental Protection Act 1986, Air Act- 1981, Water Act, Forest Act, Wild life Act

Unit 5:

EIA Structure, methods of baseline data acquisition , Environmental Management Plan(EMP), concepts, structure. Sustainable development of Projects, concepts, structure

Text / Reference Book/s:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission
2. Environmental Studies by R. Rajagopalan, Oxford University Press
3. Environmental Science: towards a sustainable future by Richard T. Wright.2008 PHI Learning Private Ltd New Delhi.
4. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela .2008 PHI Learning Pvt. Ltd
5. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition
6. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
7. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

VI SEMESTER B. Tech. (MINING ENGINEERING)

Course Code: 25AF1701MD607
Title of the Course: Surface Mining & Environment (MDM Bucket List)

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	-	-	3	3	3	20	20	60	100

Course Objectives

COBJ1	**Develop** an understanding of surface mine planning, mine layout, and methods of opening mineral deposits.
COBJ2	**Provide** knowledge of different surface mining systems and their selection based on geological, technical, and economic considerations.
COBJ3	**Enable** students to understand extraction methods for various mineral deposits and waste dump management with reclamation techniques.
COBJ4	**Familiarize** students with air and noise pollution generated by mining operations, along with monitoring methods and control measures.
COBJ5	**Develop** an understanding of the socio-economic and environmental impacts of mining, including land use, rehabilitation, and subsidence management.

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the principles of surface mine planning and methods of opening mineral deposits.
CO2	Analyze different surface mining systems and select suitable excavation, loading, and transportation methods.
CO3	Apply appropriate extraction methods, waste dump design, and reclamation practices for sustainable surface mining.
CO4	Evaluate air and noise pollution in mining operations and recommend suitable monitoring and control measures.
CO5	Assess the socio-economic and environmental impacts of mining and recommend measures for rehabilitation, land management, and subsidence control.

Course Contents

Unit 1: Introduction

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.

Opening up of Deposits – different system of opening of deposits, site preparation, box cut, formation of benches and haul roads.

Unit 2: Types of surface mining system – applicability, limitation, advantages, disadvantages, Layouts using different combinations of main excavation, loading and transportation systems

Unit 3: Extraction Methods: Extraction of subsurface deposits – bedded deposits, massive deposit, pipe type, cap type and vein type deposits, mining of bench sands, placer mining, dimensional stone mining.

Dump formation: Types of waste dump – internal and external; dump formation methods and equipment, Reclamation methods by using different combination of equipment.

Unit 4: Air& Sound Pollution

Sources of ambient air pollution; Monitoring methods (periodic and continuous), environment; Statutory provisions; Control measures.

Noise, ground vibration, air blast, fly rocks, damage to surface structures and other related problems due to blasting in mines; Sources of sound pollution and ground vibration; Monitoring of noise produced by machinery & blasting; Control of noise & ground vibration

Unit 5: Societal Environment

Socio-economic impacts of mining activities; Issues of resettlement and rehabilitation of displaced population;

Land Environment Visual impacts; Impacts on land use pattern; Subsidence management

Text / Reference Book/s:

1. Principles and Practices of Modern Coal Mining by R. D. Singh, New Age Int. (P) Ltd., New Delhi
2. Opencast Mining by R. T. Deshmukh, Myra Publishers, Nagpur
3. Introductory Mining Engineering by H. L. Hartman, John Wiley & Sons
4. Opencast Mining - Unit Operations by V. V. Rzhevsky, Mir Publishers, Moscow
5. Air Pollution by M.N. Rao and H.V.N. Rao
6. Environmental Chemistry and Pollution Control by S.S. Dara

VI SEMESTER B.Tech. (MINING ENGINEERING)

Course Code: 26AF1701PCL608
Title of the Course: Mine Rescue Engineering Laboratory

Course Scheme					Evaluation Scheme (Lab)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration (hrs)	MSE	IE	ESE	Total
0	0	2	2	1	2	0	25	25	50

Course Objectives

COBJ1	**Develop** practical knowledge of fire prevention, detection, and control techniques used in mining operations.
COBJ2	**Familiarize** students with mine safety equipment, dust monitoring instruments, and emergency rescue devices used in mines.
COBJ3	**Provide** hands-on experience in the construction of mine stoppings, reopening sealed-off areas, and the use of fire-fighting equipment.
COBJ4	**Enable** students to measure mine environmental parameters and evaluate mine safety conditions using standard instruments.
COBJ5	**Enhance** students' competency in implementing safe work practices and emergency response procedures in accordance with mining safety regulations.

Course Outcomes: At the end of the course, students will be able to:

CO1	Determine the Crossing Point Temperature (CPT) of coal and interpret its significance in assessing the susceptibility of coal to spontaneous heating.
CO2	Demonstrate the construction of isolation stoppings and explain the stage method of reopening sealed-off mine areas safely.
CO3	Identify and operate different types of fire extinguishers and explain their applications in controlling various classes of mine fires.
CO4	Demonstrate the operation and applications of stone dust barriers and the MRE-113A Gravimetric Dust Sampler for explosion prevention and dust monitoring.
CO5	Demonstrate the proper use, inspection, and maintenance of self-contained breathing apparatus (BG-174A Model) and filter self-rescuers for emergency mine rescue operations.

List of Practical

1. To determine Crossing Point Temperature of coal
2. To study the construction of Isolation stopping in the area to be sealed off
3. To study different types of fire extinguishers
4. To study stone dust barrier
5. To study stage method of reopening sealed off area.
6. To study MRE-113 A type Gravimetric Dust Sampler.
7. To study self-contained breathing apparatus (BG-174 A MODEL)
8. To study Filter Self Rescuer

VI SEMESTER B. Tech. (MINING ENGINEERING)

Course Code: 26AF1701PCL609
Title of the Course: Ground Control in Mines Laboratory

Course Scheme					Evaluation Scheme (Lab)				
Lecture	**Tutorial**	**Practical**	**Periods/week**	**Credits**	**Duration of paper, hrs**	**MSE**	**IE**	**ESE**	**Total**
0	0	2	2	1	2	0	25	25	50

Course Objectives

COBJ1	**Develop** practical knowledge of rock mass classification systems and their application in mine support design.
COBJ2	**Enable** students to design suitable support systems and stable mine structures under varying geo-mining conditions.
COBJ3	**Provide** hands-on experience in pillar design, depillaring support planning, and hydraulic stowing system design.
COBJ4	**Develop** the ability to analyze slope stability and design safe bench slopes for opencast mines.
COBJ5	**Enhance** students' skills in conducting subsidence surveys and interpreting subsidence parameters for safe mining operations.

Course Outcomes: At the end of the course, students will be able to:

CO1	Apply engineering rock mass classification systems and design mine support using the CMRI–ISM Rock Mass Classification system.
CO2	Design support systems and prepare systematic support rules for depillaring panels under different geo-mining and mechanization conditions.
CO3	Design stable mine pillars and hydraulic stowing systems to ensure safe underground mining operations.
CO4	Analyze slope stability and design stable bench slopes for safe and economical opencast mining.
CO5	Conduct subsidence surveys, calculate subsidence parameters, and interpret the results for effective ground control and mine safety.

List of Practical

1. A) Study of various engineering rock mass classification systems.
   B) Design of support system using CMRI-ISM Rock Mass Classification system under various geo-mining conditions.
2. A) Design of support system for a depillaring panel.
   B). Framing of systematic support rule for depillaring panel under different types of mechanization.
3. Design of stable pillars under different geo-mining conditions
4. Design of hydraulic stowing system
5. Slope stability analysis and design of stable bench slope for an opencast mine.
6. Subsidence survey including calculation of maximum subsidence and ground strain

VI SEMESTER B. Tech. (MINING ENGINEERING)

Course Code: 26AF1701VS610
Title of the Course: Academic Research Writing/ Mini Project

Course Scheme					Evaluation Scheme (Mini Project)				
Lecture	**Tutorial**	**Practical**	**Periods/week**	**Credits**	**Duration of paper, hrs**	**MSE**	**ISE**	**ESE**	**Total**
0	2	0	2	2	0	0	50	0	50

Course Objectives

COBJ$_1$	**Develop knowledge of data collection**
COBJ$_2$	**Provide** information about technical report writing
COBJ$_3$	**Enable** technical report writing
COBJ$_4$	**Familiarize** technical report writing
COBJ$_5$	**Develop** skill of technical report writing

Course Outcomes: At the end of the course, students will be able to:

CO$_1$	Explain procedure of data collection
CO$_2$	Analyze data
CO$_3$	Summarise collected data
CO$_4$	Formulate technical report
CO$_5$	prepare technical report

Group of regular students enrolled in VI semester shall be formed and each group will be assigned topic by faculty. The faculty will guide student and students will submit project report on the assigned topic at the end of semester. Faculty will assess the performance of students based on report submitted.

*****END*****

Dr. Babasaheb Ambedkar Technological University

Bachelor of Technology (B. Tech.)

Department of Mining Engineering

Course Structure and Syllabus (as per NEP 2020)

Fourth Year (Affiliated Institutes)

Semester VII (w.e.f. AY 2027–28)

Category under NEP	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credits
			L	T	P	ISE	MSE	ESE	Total	
PCC	27AF1701PC701	Application of IT in Mining	3	-	-	20	20	60	100	3
PCC	27AF1701PC702	Mine Economics	3	-	-	20	20	60	100	3
PCC	27AF1701PC703	Mine System Optimization	3	-	-	20	20	60	100	3
PEC	27AF1701PE704	Program Elective –IV C. Mine Legislation & Safety D. Remote Sensing &Geo-informatics	3	-	-	20	20	60	100	3
PEC	27AF1701PE705	Program Elective – V C. Mine Supports D. Surface mine environment	3		-	20	20	60	100	3
MDM	25AF1701MD706	MDM Bucket List	-	-	-	20	20	60	100	-
PCC Lab	27AF1701PCL707	Application of IT in Mining Lab	-	-	2	20	20	60	100	1
Project	27AF1701PC708	Project Phase-I	-	-	4	25	-	25	50	4
Total			**15**		**6**	**165**	**140**	**445**	**750**	**20**

MDM to be offered to other departments: **Mine Management & Safety (3 Credits)**
OE*: The students can opt for the Open Elective from the Open Elective bucket declared for the particular semester.

VII Semester B. Tech. (Mining Engineering)

Course Code: 27AF1701PC701
Title of the Course: Application of IT in Mining

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	ISE	MSE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ1	**Develop** basic knowledge of DBMS, GIS, GPS & MIS
COBJ2	**Provide** knowledge of MS ACCESS & use of tools provided in MS ACCESS
COBJ3	**Enable** newer concepts for problem solving using AI, Neural network, Neurofuzzy and Numerical analysis methods.
COBJ4	**Familiarize** students with advanced programming skills to solve complex mining engineering problems.
COBJ5	**Develop** the ability to apply engineering graphics skills and provide knowledge on digitisers, minimate and other relevant hardware devices.

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the fundamentals of DBMS, GIS, GPS& MIS.
CO2	Analyze and formulate DBMS using MS ACCESS
CO3	Apply modern problem solving techniques to mining engineering problems using AI, Neural network, Neurofuzzy and Numerical analysis methods.
CO4	Formulate and design mining engineering applications using programming language
CO5	Design mining engineering models using graphics and explain fundamentals of digitisers, mini mate and other relevant hardware devices.

Unit	Contents	Hours
I	**Database Management:** Database; DBMS (Database Management System); Desirable characteristics of an ideal DBMS; RDBMS(Relational Database Management System); E-R diagram, DDL, DML, Function of DBA. Introduction to GIS (Geographical Information System) and GPS (Global Positioning System) and their applications; M.I.S. (Management Information System) – concept & applicability to mining industry, Introduction to different RDBMS Software Systems.	9
II	**Introduction to a Database Management Software** Microsoft Access, its essential features and use: Forms, query, filters, report, interlinking of tables using keys and other fields, Creating database for mining industries and its related applications.	9
III	**Newer concepts in problem solving** Elementary Introduction to Artificial Intelligence, Fuzzy Sets, Neural Networks, Neurofuzzy Solutions and Robotics, Numerical analysis methods.	9
IV	**Applications of Computer Programming** Programming for solving problems of mining - mine ventilation networks, pillar design, blast design, haulage& winding calculations, blast fragment analysis.	9
V	**Computer Graphics** Computer Aided Design; Graphics in C; Introduction to AUTOCAD, software	9

	specific to mining engineering applications, digitisers, scanner and other relevant hardware devices, mine plans, minimate.	
	Total	45

Text Book/s:

Reference Book/s:

1. C-The Complete Reference by Herbert Schildt, Tata Mcgraw Hills.
2. Graphics in C by Yashwant Kanetkar, BPB, Pulblications
3. Artificial Intelligence and Expert System by Dan W. Patterson
4. Graphic Programming C by R.T. Stevens
5. Data Base System Concepts, Silberschatz, Korth, Sudarshan, Mcgraw-Hills

VII Semester B. Tech. (Mining Engineering)

Course Code: 27AF1701PC702
Title of the Course: Mine Economics

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	ISE	MSE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ$_1$	**Develop** basic knowledge of mineral industry & NMP
COBJ$_2$	**Provide** knowledge of mine sampling.
COBJ$_3$	**Enable** newer concepts for valuation of mineral deposits
COBJ$_4$	**Familiarize** students with techniques of conservation of mineral resources
COBJ$_5$	**Develop** the ability to analyse the economic aspects of mining.

Course Outcomes: At the end of the course, students will be able to:

CO$_1$	Explain Uniqueness and economic importance of mineral industry and computation of reserves.
CO$_2$	Analyze the importance of mine sampling and its role in analyzing mineral deposits.
CO$_3$	Apply modern problem solving techniques to valuate mineral properties.
CO$_4$	Understand the techniques of conservation of mineral resources.
CO$_5$	Understand the various sources of finance and costs of funds.

Unit	Contents	Hours
I	**Introduction** Uniqueness and economic importance of mineral industry; Concept & classification of mineral resource; Geographical distribution of important mineral deposits and mining fields in India; National mineral policy **Computation of Reserves** Computation of tonnage, average assay width, stoping width, clean width, milling width, average length etc.; Reliability of mine sampling.	9
II	**Mine Sampling** Definition, purpose and scope; Size of sample; Classes of sample; Methods of sampling; Errors in sampling; Salting; Safeguards against salting.	9
III	**Valuation of Mineral Property** Examination and valuation of mines/mineral properties; Time value of money; Present value & its computation; Modern Valuation techniques , Life of a mine; Concepts of redemption of capital, depreciation; Preparation of valuation reports.	9
IV	**Conservation of Mineral Resource** Scope and limitations; Losses of minerals in mining; Dilution and recovery **Costs of Mining** Capital and operating costs; Factors affecting operating costs; Standard cost and forecast; Budget & budgetary control.	9

V	**Economic Feasibility** Need for economic analysis; Sources of finance and the cost of capital; Methods of investment appraisal; Risk Analysis; Royalty, taxes and duties; Small mines and their socio-economic significance; Mineral price and pricing; Price Index.	9
	Total	45

Text Book/s:

Reference Book/s:

1. Mineral economics by Sinha & Sharma
2. Mineral Economics by R.T. Deshmukh
3. Mineral Economics by K. Chatterjee

VII Semester B. Tech. (Mining Engineering)

Course Code: 27AF1701PC703
Title of the Course: Mine System Optimization

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	ISE	MSE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ$_1$	**Develop** basic knowledge of systems approach to mining and managerial decision making techniques
COBJ$_2$	**Provide** knowledge of linear programming concepts.
COBJ$_3$	**Enable** basic concepts of Network analysis and dynamic programming
COBJ$_4$	**Familiarize** students with techniques of Monte-Carlo simulation technique and inventory systems used in mineral industry
COBJ$_5$	**Develop** the ability to formulate and analyse transportation and assignment models.

Course Outcomes: At the end of the course, students will be able to:

CO$_1$	Explain systems approach to mining and managerial decision-making techniques.
CO$_2$	Analyze the importance of application of LPP to mineral industry
CO$_3$	Apply modern problem solving techniques to design network analysis and dynamic programming.
CO$_4$	Understand the techniques of simulation and inventory techniques
CO$_5$	Formulate and design mine transportation and assignment techniques.

Unit	Contents	Hours
I	**Introduction** Concept of system, components and system environment; Classification of systems; Systems analysis **Decision Making** Decision problems; Model formulation; Decision analysis based on expected monetary value and utility value.	9
II	**Linear Programming** Concepts; Graphical solutions; Simplex Method; Primal-dual models; Sensitivity Analysis; case examples from mining engineering.	9
III	**Network Analysis** Determination of the shortest path; Critical Path Method (CPM) and Programme Evaluation Review Technique (PERT); case examples from mining engineering **Dynamic Programming** Dynamic programming and stagecoach problem.	9
IV	**Simulation** Introduction, concept, scope and limitations; Monte Carlo simulation; Simulation of equipment maintenance and Introduction to inventory systems in mines.	9
V	**Transportation and Assignment Problems** Mathematical modelling and solution algorithms; applications to mining engineering; Basic queuing models with constant arrival and service rates.	9
	Total	45

Text Book/s:
Reference Book/s:

1. Operations Research by KantiSwarup, P.K. Gupta, Man Mohan
2. Operations Research by Prem Kumar Gupta, D.S. Hira
3. Operations Research Theory & Applications by J.K. Sharma

VII Semester B. Tech. (Mining Engineering)

Course Code: 27AF1701PE704A - Program Elective - IV
Title of the Course: PE-IV Mine Legislation & Safety

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	ISE	MSE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

$COBJ_1$	Development of Mining legislation
$COBJ_2$	Provide knowledge of Mining Rules and regulations
$COBJ_3$	Provide knowledge of Coal Mines Regulations 2017
$COBJ_4$	Provide knowledge Metalliferrous Mines Regulations
$COBJ_5$	Develop Concept of occupational safety, health and working Conditions .

Course Outcomes: At the end of the course, students will be able to:

CO_1	Explain Development of Mining legislation in India
CO_2	Understand and explain the importance of Mining Rules and Regulation
CO_3	Understand and explain Coal Mines Regulations 2017
CO_4	Understand and explain Metalliferrous Mines Regulations 1961
CO_5	Explain Causes of Mines Accidents and Safety Measures.

Unit	Mine Legislation & Safety	Hours
I	**Introduction** General principles of Mining laws; Development of Mining legislation in India; Sources of legislation; DGMS and its role in monitoring and ensuring safe Mining practices including conducting various examinations for working Mining personnel.	9
II	**Mining Laws** The Mines Act, 1952; The Mines Rules, 1955; Mines and Minerals (Regulation & Development) Act, 1957; Relevant provisions of Indian Electricity Rules, 1956; Vocational Training Rules. 1966.	9
III	**Mining Laws** The Coal Mines Regulations 2017, Mineral conservation and development rues 2017.	9
IV	**Mining Laws** The Metalliferrous Mines Regulations-1961, Mines Rescue Rules 1985.	9
V	**Mine Accidents** The occupational safety, health and working Conditions code,2020; Classification of accidents; Statistics – frequency and severity rates; Causes of accidents; Investigations into accidents and reports. **Safety Measures** Measures for improving safety levels in mines; MAP & ZAP; Emergency Measures; Emergency Organisation.	9
	Total	45

Text Book & Reference Book /s:

1. Indian Mining Legislation – A Critical Appraisal Vol I and II by Rakesh& Prasad, Publishers Mrs Asha Lata, Varanasi
2. Classified Mine Circulars issued by DGMS, Dhanbad.
3. Safety in Mines: A survey of accidents, their causes and prevention by Prof. B K Kejriwal

VII Semester B. Tech. (Mining Engineering)

Course Code: PE-IV 27AF1701PE704B

Title of the Course: PE-IV Remote Sensing & Geo-Informatics

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	ISE	MSE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ1	. Develop a foundational understanding of RS and application of RS in Mineral Explorations
COBJ2	Provide Knowledge on EMR Interaction, Digital Image Process and TIR
COBJ3	Enable students to understand modern survey techniques like Radar and Li-Dar, etc.
COBJ4	Familiarize students with Geo-Informatics principal and DBMS.
COBJ5	Develop practical insight into applying principal of Geo-informatics in various fields.

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the principals of RS, Spectral characters of Rocks and criteria for Geological Mapping.
CO2	Analyze digital satellite Imagery, image classification and enhancement, TIR.
CO3	Apply Photogrammetry and Aerial Photo Interpretation, GNSS/UAV Survey for Spatial Mapping.
CO4	Understand GIS, DBMS, Various data structures and its advantages and disadvantages.
CO5	Formulate integrated Geo-Informatics solution for various industrial fields.

Unit	Contents	Hours
I	Introduction to Remote Sensing (RS) and Classification, RS in Mineral Exploration, Main Types of Mineral Deposits, Spectral Signature of Rocks and minerals, Spectral Characteristics of Rock Alterations. Criteria for Lithological, Structural and Geo-morphological Mapping using Remote Sensing data. Use of high-resolution data in Mineral Exploration studies, some case studies of use of Remote Sensing in Mineral Exploration.	9
II	Electromagnetic radiation(EMR) & Digital Image Processing: Radiation laws and interaction of EMR with atmosphere and terrain features, platforms and sensors. Resolution and calibration aspects of remotely sensed data, fundamentals of digital image processing and classification. Principle, Interaction of TIR wavelength with terrain feature and vegetation and Practical applicationsof TIRs.	9
III	Aerial and Satellite based survey techniques –Principles of Photogrammetry, RADAR, LIDAR – survey using GNSS & UAV.Aerial photo/Image interpretation keys, Interpretation of different geological, geomorphological and structural features on B/W aerial photographs and False Colour Composite (FCC).	9

IV	Introduction to Geo-Informatics: Principles and elements of GIS; GIS Data bases (DBMS), Spatial and Geospatial data concepts, Data models for GIS applications, (Digital, Analogue, Vector and raster data models); Comparative advantages/disadvantages of raster and vector data models, Spatial data acquisition techniques, Vector and raster overlay analysis; raster to vector and vector to raster data conversion methods. Data integration Techniques.	9
V	Application of Geo-Informatics: Mining Engineering, Mineral Exploration, Civil Engineering, Disaster Management stratargies, Geosciences, Soil, Land and Water studies, Meteorology, Environmental studies, Coastal, Oil & Gas Industries etc.	9
	Total	45

Reference and Textbooks :

1. Peter A. Burrough et al., Principles of Geographical Information System (3rd Edition), Oxford University Press Inc., New York, 2015.
2. Ian Heywood, Sarah Cornelivs and Steve Carver, An Introduction to Geographical Information System (3rd Edition), Pearson Education Pvt .Ltd., New Delhi, 2017.
3. Lillesand, Kiefer and Chipman, Remote Sensing and Image Interpretation (6th Edition), Wiley India Pvt. Ltd, New Delhi, 2017.
4. M. Anji Reddy, Textbook of Remote Sensing and GIS, BS Publication
5. Dr. Mandar S., Dr. Sachin Pore, Application of Remote Sensing and GIS, Nirali Publication

VII Semester B. Tech. (Mining Engineering)

Course Code: PE-V 27AF1701PE705A

Title of the Course: PE-V Mine Supports

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	ISE	MSE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ1	**Develop** basic concept of mine strata and type of support requirement
COBJ2	**Provide** various types of support used in mines
COBJ3	**Familiarize with concrete support in shafts with other techniques**
COBJ4	**Develop** basic conceptof stowing and its necessity in underground mining
COBJ5	**Develop** knowledge about rock bolting mechanism in mines

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain necessity and importance if support in mines
CO2	Explain various types support used in underground mines
CO3	Understand shaft lining concept with other techniques like guniting,
CO4	Understand stowing process in mines
CO5	Explain rock and cable bolting mechanism with various types of bolts used in mines.

Unit	Contents	Hours
I	Principle of strata support and strata reinforcement: Need of action of support, terminology, weak strata, strong strata, support reaction curve, classification of mine support, load coming on face support, bord and pillar, Narrow excavation-bord and pillar, longwall, load estimation rock load on face support, bord and pillar.	9
II	Timber support: merits and demerits, various types of prop, crossbar, chock, load bearing capacity of timber supports, steel support, shaft tubbing, steel lining,steelprops,andsteelchocks,steelarches,frictionprops,hydraulic props, powered support.	9
III	Concrete shaft lining-plain of reinforced, supporting of gate roads in advancing longwall face, short creating of guniting, concrete slab or concrete support,pillarsupport-factorsaffectingloadonpillarandestimationofpillar stress, stabilization of weak pillar.	9
IV	Requirements of stowing, characteristics of stowing material, various types of stowing with merits and demerits, details of hydraulic stowing,theory of slurry transport, sand water requirements, design of hydraulic stowing system.	9
V	Pre-reinforcement materials and techniques; rock bolts and dowels – different types and uses ; mechanics of bolting Anchored rock bolts – Slot and wedge type, expansion shell type, grouted point anchor type. Full column anchors, wooden and fibre glass dowels, mechanical full column anchors, split sets/friction rock stabilizers, full column grouted rock bolts, installation and testing of rock bolts. Cable bolting– its installation and applications.	9
	Total	45

Text and Reference Book/s:

1. Ground Mechanics in Hard Rock Mining by M L Jeremic, Oxford Publishers
2. Design of Supports in Mines by Cemal Biron and Ergin Arioglu, John Wileyand Sons
3. SME Mining Engineering Handbook by H. L. Hartman (Editor),Soc .For Mining, Metallurgy and Exploration Inc., Co.

VII Semester B. Tech. (Mining Engineering)

Course Code : PE- V 27AF1701PE705B

Title of the Course : PE- V Surface Mine Environment

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	ISE	MSE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

$COBJ_1$	. Develop knowledge of safe healthy and efficient working environment
$COBJ_2$	Enable about sources and causes of air pollution
$COBJ_3$	Enable about sources and causes of water pollution
$COBJ_4$	Familiarize about noise and ground vibrations due to blasting in mines, tailings in mines
$COBJ_5$	. Develop concept of environmental management, sustainable development .

Course Outcomes: At the end of the course, students will be able to:

CO_1	Explain necessity of safe and healthy working environment and its importance
CO_2	Analyse causes and prevention of air pollution due to mining activities
CO_3	Analyse causes and prevention of water pollution due to mining activity
CO_4	Understand prevention and control of noise and ground vibrations in mines
CO_5	Explain importance of environmental management and various techniques used in environmental management.

Unit	Contents	Hours
I	Need for environmental management, aspects of environmental management, legal provisions of environmental management, concept of sustainable development, need for sustainable development, The theory and practice of creating safe, healthy and efficient working environment at an underground or surface mine.	9
II	Air pollution from surface mining and processing. Sources and classification of air pollutants - standards, monitoring and control, Transport and dispersion of air pollutants, Air quality modeling.	9
III	Water quality - physical, chemical, biological, criteria and standards. Monitoring, treatment and control of contaminated water	9
IV	Noise and ground vibrations: sources, monitoring, prevention and control Tailings: characterization, technical issues, sampling and analysis, site selection and design of tailings impoundment	9
V	Environment planning systems and methodologies based on the principle of sustainable development including environmental impact assessment and management , challenges for sustainable development, green mining	9
	Total	45

Text and Reference Book/s:

1. American Public Health Association, Standard Method For The Examination Of water and West Water, American Water works Association 22nd Edition,2012
2. CPCB, Guidelines for the Measurements of Ambient Air Pollutants, CPCB, 2013
3. Waste water Engineering: Treatment and Reuse. Metcalf and Eddy et al., Mcgraw Hill Education, 4th Edition, 2017
4. Environmental Impact Assessment: Practical Solution to Recurrent Problems., Lawrence D.P, John Wiley, 2003

VII Semester B. Tech. (Mining Engineering)

Course Code: 25AF1701MD706

Title of the Course: Mine Management & Safety (MDM Bucket List)

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	ISE	MSE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ1	. Develop an understanding of basics of management, management thoughts and contribution by management experts
COBJ2	. Provide insights into selection & training and other facets of personnel management
COBJ3	. Enable understanding of Production planning and control
COBJ4	. Familiarize students with DGMS and Mine occupational health & safety
COBJ5	. Develop insights into safety aspects of mining .

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain principles of management and contributions of experts in development of management as science.
CO2	Analyze various facets of personnel management
CO3	Understand production planning & control, work study and concepts of productivity & its measurement.
CO4	Understand role of DGMS in mine occupational health & safety.
CO5	Understand MAP, ZAP and emergency safety organizations.

Unit	Contents	Hours
I	**Introduction** Principles of Mine Management; Management functions, levels of management, structure of organization.	9
II	**Personnel Management** Introduction to personnel management, selection, training and development of human resources, Manpower planning, motivational theories, leadership, communication skills, absenteeism	9
III	Production planning and Control work study, work measurements short and long term planning, Productivity - its concept and measurement, Quality control.	9
IV	DGMS and its role in Monitoring and ensuring safe Mining practices including conducting various examinations for working Mining personnel. **Mine Accidents** Classification of accidents; Statistics – frequency and severity rates; Causes of accidents; Investigations into accidents and reports.	9
V	**Safety Measures** Measures for improving safety levels in mines; MAP & ZAP; Emergency Measures; Emergency Organisation	9
	Total	45

Text Book/s: Reference Book/s:

1. Human Resource Management, S.S. Khanka
2. Industrial Engineering & Production Management, TelsangMert T
3. Text book on Human Psysiology, Sarda Subrahamanyam, H D Singh, K Madhavankutty
4. Business Organisation & Management, Shukla M.C.
5. Basics of Production & Operations Management, S A Chunawalla
6. Essentials of Business Communication Skills for Engineers, UrmilaRai& S.M. Rai
7. Human Resource Management & Industrial Relations, P.N. Subraman

VII Semester B. Tech. (Mining Engineering)

Course Code: 27AF1701PCL707

Title of the Course: Application of IT in Mining Lab

Course Scheme					Evaluation Scheme				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	ISE	MSE	ESE	Total
0	0	2	2	1	0	20	20	60	100

Course Objectives

$COBJ_1$	. Develop an Understanding for MS Access and its uses.
$COBJ_2$	. Develop a Program for Pillar design and its application in Mining.
$COBJ_3$	Develop a program for determination of equivalent resistance and equivalent orifice for an underground mine.
$COBJ_4$	Develop a program to determine torque of friction winder during different stages of winding .
$COBJ_5$	Develop insights to draw and understand various Mine openings .

Course Outcomes: At the end of the course, students will be able to:

CO_1	Explain MS Access and its applications.
CO_2	Analyze Pillar design and its application in Mining.
CO_3	Apply and determine equivalent resistance and equivalent orifice for an underground mine.
CO_4	Understand torque time diagram for winders
CO_5	Formulate and draw various Mine opening

LIST OF PRACTICALS	
01.	Introduction to MS Access. Exploring its features
02.	Creating a database and a table therein
03.	Display and entering data in table
04.	Creating a form using the form wizard
05.	Creating a filter
06.	Creating a query using the simple query wizard
07.	Creating a report
08.	To programing in ‘C’ language for pillar design.
09.	To draw various underground mine openings.
10.	To determine equivalent resistance and equivalent orifice for an underground mine.
11.	To determine torque of friction winder during different stages of winding

VII Semester B. Tech. (Mining Engineering)

Course Code: 27AF1701PC708

Title of the Course: Project Phase -I

Course Scheme					Evaluation Scheme				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	ISE	MSE	ESE	Total
0	0	02	4	04		25	-	25	50

Course Objectives

COBJ$_1$	. Develop basic knowledge of understanding of Industrial Problems.
COBJ$_2$	. Provide problems identifications statements.
COBJ$_3$	. Enable formulations of projects objectives.
COBJ$_4$	. Develop Methodology to achieve projects objectives
COBJ$_5$	. Develop and collects literature by experts. .

Course Outcomes: At the end of the course, students will be able to:

CO$_1$	Explain Industrial Problems and justifications for projects
CO$_2$	Explain understanding of problems identifications statements.
CO$_3$	Analyze and prepare problems identifications statements.
CO$_4$	Understand and Develop Methodology to achieve projects objectives
CO$_5$	. Formulate and synthesize literature review by experts.

Dr. Babasaheb Ambedkar Technological University

Bachelor of Technology (B. Tech.)

Department of Mining Engineering

Course Structure and Syllabus (as per NEP 2020)

Fourth Year (Affiliated Institutes)

Semester VIII (w.e.f. AY 2027–28)

Category under NEP	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credits
			L	T	P	ISE	MSE	ESE	Total	
PEC (Self-Study/NPTEL)	27AF1701PE801	Program Elective -VI A. Clean Coal Technology B. Tunneling Engineering	3	-	-	20	20	60	100	3
PEC (Self-Study/NPTEL)	27AF1701PE802	Program Elective–VII A. Management Information System B. Mine Safety Engineering	3	-	-	20	20	60	100	3
MDM	25AF1701MD803	MDM Bucket List	-	-	-	50		50	100	-
Internship	27AF1701PC804	Project Phase-II	-	-	4	50	-	50	100	6
Total			**6**	**-**	**4**	**140**	**40**	**220**	**400**	**12**

MDM to be offered too there departments: **Internship (3 Credits)**

OE*: The students can opt for the Open Elective from the Open Elective bucket declared for the particular semester.

VIII Semester B. Tech. (Mining Engineering)

Course Code: 27AF1701PE801A

Title of the Course: Clean Coal Technology

Course Scheme					Evaluation Scheme				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	ISE	MSE	ESE	Total
3	0		3	3	3	20	20	60	100

Course Objectives

COBJ1	. To elaborate the life cycle of coal, coal characterization, classification systems, rank, grade, and fundamental concepts such as the C-H graph
COBJ2	. To illustrate coal beneficiation techniques, including dry and wet processes, chemical and biological cleaning methods, coal washing objectives, techniques, and washability analysis.
COBJ3	. To familiarize clean coal technologies, their objectives, technology options, and various approaches including pre-combustion, combustion, post-combustion, and coal conversion technologies.
COBJ4	. To familiarize advanced coal utilization technologies such as Coal Bed Methane (CBM), Coal Mine Methane (CMM), Coal-to-Liquid (CTL) technology, CO_2 capture and sequestration methods.
COBJ5	. To familiarize coal gasification processes, including in-situ and surface gasification techniques, and their applications in energy production. .

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the life cycle of coal, characterize coal properties, classify coal based on rank and grade, and interpret coal composition using C-H diagrams.
CO2	Describe and analyze coal beneficiation processes, coal washing techniques, and wash ability characteristics for improving coal quality.
CO3	Identify and evaluate different clean coal technologies, combustion options such as FBC and IGCC, co-generation systems, and CO_2 sequestration methods.
CO4	Explain the recovery, utilization, and environmental significance of CBM, CMM, CTL technologies, and methane management practices.
CO5	Understand and compare coal gasification methods, including surface and underground (in-situ) gasification techniques for efficient coal conversion.

Unit	Course Contents	Hours
I	Life cycle of coal, coal characterization, classification system of coal, rank and grade of coal, C-H graph	9
II	Coal beneficiation – Feed Grade dry and wet coal beneficiation techniques, chemical and biological methods of coal cleaning. Coal washing: Objectives and Techniques; Wash ability curve.	9
III	Clean coal technology: Definition and Objectives, Technology Options; Pre - combustion, Combustion, Post Combustion and Conversion CCTs. Coal combustion options: FBC, IGCC, co-generation options, CO2 Sequestration options: Capture and storage of CO2 (CCS),	9
IV	Coal Bed Methane (CBM) - Recovery and utilization, Coal to Liquid Technology (CTL), Coal Mine Methane (CMM).	9
V	Coal Gasification (In-situ and surface Gasification Techniques) – Introduction.	9
	Total	45

Text Book/s: Reference Book/s:

1. Coal Preparation by J Osborne

2. Mineral Dressing by M A Gaudin / S K Jain

3. Advanced Coal Mining by Vorobjev and Deshmukh

4. CCT Initiative – Roadmap for future development, CCT DST-BHEL Workshop, Oct'2006

5. Carbon capture and storage technologies, International Energy Agency, 2008

6. Energy technology perspectives: Conservation, carbon dioxide reduction, and production from alternate sources, N R Neelamegghame*t al* (eds), JWS Wiley Publications, 2009. 7. CO_2 sequestration technologies for clean energy, S Z Qasim and MaltiGoel (eds), Daya Publishing House, New Delhi, 2010. Integrated energy policy, annual report 2008, Department of Coal, Govt of India

VIII Semester B. Tech. (Mining Engineering)

Course Code: PE-VI 27AF1701PE801B

Title of the Course: PE-VI Tunneling Engineering

Course Scheme					Evaluation Scheme				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	ISE	MSE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ1: Familiarize with types, planning, and methods of underground excavations.
COBJ2: Elaborate tunneling techniques in soft ground and rock using road headers.
COBJ3: Illustrate TBMs, micro tunneling, and underground cavern construction.
COBJ4: Elaborate special tunneling methods and tunneling hazards.
COBJ5: Elaborate tunnel support systems and essential tunnel services.

Course Outcomes: At the end of the course, students will be able to:

CO1: Explain types, planning, and excavation methods of underground structures.
CO2: Describe tunneling techniques using road headers in soft ground and rock.
CO3: Analyze the applications and performance of TBMs and cavern excavation.
CO4: Apply special tunneling methods while identifying tunneling hazards.
CO5: Design suitable tunnel supports and plan ventilation, drainage, and lighting systems.

Unit	Course Contents	Hours
I	Types & Planning: Types of underground excavations: tunnel, shaft, cavern, etc. Parameters influencing location of a tunnel and its design, planning and site - investigation for tunneling, methods of tunneling; selection of method of excavation.	9
II	Soft Ground &Roadheaders: Tunneling in soft ground, Tunneling in rock by road heading machines: cutting principles, method of excavation, performance limitations and problems	9
III	TBMs &Caverns: Tunneling in rock by tunnel boring machines: method of excavation, performance, limitations and problems, TBM application, TBM for soft formations, micro tunneling. Excavation of large tunnels, special storage and underground space, caverns for hydro-electric projects.	9
IV	Special Methods & Hazards: No-Dig technology, NATM & NTM methods, short life excavations, tunneling under water bodies. Cut and cover tunnels, metro tunnels Hazards in tunneling	9
V	Supports & Services: Supports in tunnels Tunnel services: ventilation, drainage and lighting and maintenance.	9
	Total	45

Text Book/s: Reference Book/s:

1. J. O. Bickel, T. R. Kuesel and E. H. King, Tunnel Engineering Handbook, 2nd ed., Chapman & Hall, 1996

2. Z. T. Bieniawski, Design Methodology in Rock Engineering, A.A. Balkema, 1992.

3. B. N. Whittaker and R. C. Frith, Tunneling: Design, Stability and Construction, Institution of Mining and Metallurgy, 1990. .

4. Evert Hoek and E. T. Brown, Underground Excavation in Rock, Institution of Mining and Metallurgy, 1980.

5. Bhawani Singh and D. K. Yadav, Design and Construction of Tunnels: Analysis of Controlled Convergence Pressure Tunnel Boring Machines, CRC Press, 2010

VIII Semester B. Tech. (Mining Engineering)

Course Code: PE-VII 27AF1701PE802A

Title of the Course: Management Information System

Course Scheme					Evaluation Scheme				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	ISE	MSE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ1	. To introduce the concepts of information as a resource, information management, management information systems, and planning of information resources
COBJ2	. To Elaborate computer-based information management systems, information methodologies, and their role in effective decision-making and organizational management
COBJ3	. To provide knowledge of computer fundamentals, database management systems, data mining, data warehouses, data banks, and various data storage and handling techniques.
COBJ4	. To **Familiarize** information storage and retrieval systems, data processing, data communication, data capturing methods, and information management tools.
COBJ5	. To familiarize students with Mine Management Information Systems (MMIS), decision support systems, expert systems, office automation, and computer network applications in mine management.

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the importance of information resources, information management concepts, and the role of management information systems in organizations.
CO2	Analyze different computer-based information systems and apply information methodologies for efficient information management.
CO3	Describe database systems, data mining techniques, data warehouses, data banks, and methods of data storage and management.
CO4	Explain information capturing, processing, retrieval, communication systems, and data handling techniques for effective information utilization.
CO5	Apply Mine Management Information Systems concepts for managing production, geological, environmental, financial, inventory, and other mining-related information using decision support tools and computer networks

Unit	Course Contents	Hours
I	**Unit 1 Introduction Information as a Resource** Introduction to information management; Concept of management information system; Planning of information resources	9
II	**Unit 2 Information systems** Computer based information management systems; Information methodologies and	9
III	**Unit 3 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	9
IV	**Unit 4 Information storage & retrieval** Capturing of information - On-line, off-line, pre-processing, formatting etc; Forms and layout; Data processing systems; Data communication; Data loggers etc.	9
V	**Unit 5 Mine management information system** Production information; Human resource information; Geological information; Geo-technical information; Environmental information; Survey information; Stores and inventory information;	9

	Marketing, financial information etc. **Decision support systems for mine managers** Reporting, models; Expert systems; office automation; Network layout of computer nodes and data communication	
	Total	45

Text Book/s: Reference Book/s: Text cum Reference Book/s:

1. Management Information Systems – Effy Oz, Vikash Publishing House

2. Management Information Systems – James A. O'Brien, Galgotia Publications Pvt. Ltd.

3. Management Information Systems – D.P. Goel, MacMillan

4. Information Systems for Modern Management – Murdick, Ross &Claggett, PHI Pvt. Ltd.

Management-Oriented Management Information Systems – Jerome Kanter, PHI Pvt. Ltd

VIII Semester B. Tech. (Mining Engineering)

Course Code: PE-VII 27AF1701PE802B

Title of the Course: PE-VII MINE SAFETY ENGINEERING

Course Scheme					Evaluation Scheme				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	ISE	MSE	ESE	Total
3	0	0	3	3	3	20	20	60	100

Course Objectives

COBJ	**COBJ1: Familiarize** mine accidents, investigation, and prevention. **COBJ2:** Develop occupational health, mine safety, and statutory provisions. **COBJ3: Familiarize** Fault Tree Analysis for safety evaluation. **COBJ4:** Illustrate risk assessment and hazard control techniques. **COBJ5:** Develop importance disaster management and mine disaster mitigation.

Course Outcomes: At the end of the course, students will be able to:

CO	**CO1:** Explain mine accidents and preventive measures. **CO2:** Apply health and safety principles and regulations in mining. **CO3:** Analyze using Fault Tree Analysis for accident and safety analysis. **CO4:** Apply risk assessment and hazard evaluation. **CO5:** Explain disaster management and mitigation strategies for mines.

Unit	Course Contents	Hours
I	UNIT-1 MINE ACCIDENTS 1.1 Accident in mines;- different types, accident investigations; 1.2 Accident analysis; accident prevention and corrective action, accident proneness, 1.3 Creating and maintaining safety awareness, ZAP and MAP, 1.4 Job safety analysis, safety meeting and committee.	9
II	UNIT-2 HEALTH AND MINE SAFETY 2.1 Definition of health and safety, management's role 2.2 Function; evolution of management involvement, management's training, responsibility, cost of health and safety, role of labour organizations 2.3 Union impact and involvement, role of government 2.4 Statutory controls and directions, spot and regular inspections, enforcement of standards, penalties for violations, collection and distribution of statistical data.	9
III	UNIT-3 FAULT TREE ANALYSIS 3.1 Introduction- methodology, symbols and Boolean techniques, qualitative analysis, 3.2 Computerized methods, statistical analysis, safety information, systems design	9
IV	UNIT-4 RISK ASSESSEMENT 4.1 Principles, risk and hazard control, risk and hazard evaluation and data collection for identified health risks, exposure assessment and risk characterization, 4.2 Probabilistic risk analysis,	9
V	UNIT-5 DISASTER MANAGEMENT 5.1 Risk management, safety culture, human factors, reliability evaluation, and safety audit. 5.2 Identification of causes of mine disasters, preventive action, 5.3 Disaster management and mitigation, typical cases of mine disasters in India	9
	Total	45

Text & Reference Book:

1. De Reamer, R., Modern Safety Practices, John Wiley and Sons

2. Wahab Khair. A., New Technology in Health and Safety, SMME, 1992

3. Zyl, D.A., Koval, M, Li Ta, M. (Ed. Risk Assessment / Management Issues in the Environmental Planning in Mines, SMME, 1992

VIII Semester B. Tech. (Mining Engineering)

Course Code: 27AF1701PC804

Title of the Course: Project Phase -II

Course Scheme					Evaluation Scheme				
Lecture	Tutorial	Practical	Periods / week	Credits	Duration of paper, hrs	ISE	MSE	ESE	Total
0	0	04	0	06	03	50	-	50	100

Course Objectives

COBJ1	. **Familiarize** a fundamental understanding of industrial problems and challenges.
COBJ2	. **Formulate** problem statements.
COBJ3	. **Formulate** well-defined project objectives.
COBJ4	. **Develop** an appropriate methodology to achieve the project objectives.
COBJ5	. **Develop** an insight to analyze collected data for developing solutions to industrial problems .

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain industrial problems and justify the need for the project.
CO2	Understanding of problem identification and problem statements.
CO3	Analyze and prepare clear and effective problem statements.
CO4	**Familiarize** an appropriate methodology to achieve the project objectives.
CO5	. Analyze collected data for developing solutions to industrial problems