GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (A), Rajahmundry
DEPARTMENT OF MINING ENGINEERING
GRBT-20 Course Structure

I B.Tech., I SEMESTER

S.No	Category	Course Code	Course Title	Hrs/Week			Credits	Internal	External	Total
				L	T	P				
1	BSC-1	201HB101	Mathematics-I	3	0	0	3	30	70	100
2	BSC-2	201HB103b	Engineering Chemistry	3	0	0	3	30	70	100
3	HSMC-1	201HB102	Communicative English-1	3	0	0	3	30	70	100
4	ESC-1	201ME105	Engineering Graphics	1	0	4	3	30	70	100
5	ESC-2	201EE104	Basic Electrical & Electronics Engineering	3	0	0	3	30	70	100
6	ESC-3	201ME113d	Basic Engineering Workshop	0	0	3	1.5	50	50	100
7	BSCL-1	201HB111b	Engineering Chemistry Laboratory	0	0	3	1.5	50	50	100
8	ESCL-1	201EE112	Basic Electrical & Electronics Engineering Laboratory	0	0	3	1.5	50	50	100
	BSC=7.5	**ESC=9**	**HSMC=3 Total**	**13**	**0**	**13**	**19.5**	**300**	**500**	**800**

I B.Tech., II SEMESTER

S.No	Category	Course Code	Course Title	Hrs/Week			Credits	Internal	External	Total
				L	T	P				
1	BSC-3	201HB201	Mathematics-II	3	0	0	3	30	70	100
2	BSC-4	201HB202b	Engineering Physics	3	0	0	3	30	70	100
3	ESC-4	201CS204a	Fundamentals of Computer Programming	3	0	0	3	30	70	100
4	ESC-5	201ME203a	Engineering Mechanics	3	0	0	3	30	70	100
5	ESC-6	201ME205	Material Science and Metallurgy	3	0	0	3	30	70	100
6	BSCL-2	201HB211b	Engineering Physics Laboratory	0	0	3	1.5	50	50	100
7	ESCL-2	201CS213a	Fundamentals of Computer Programming Laboratory	0	0	3	1.5	50	50	100
8	HSMC-2	201HB212	Communicative English Laboratory	0	0	3	1.5	50	50	100
9	MC-1	201HB296	Environmental Science	2	0	0	0	30*	-	-
	BSC=7.5	**ESC=10.5**	**HSMC=1.5 MC=0 Total**	**17**	**0**	**9**	**19.5**	**300**	**500**	**800**

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (A), Rajahmundry
DEPARTMENT OF AUTOMOBILE ENGINEERING
GRBT-20 Course Structure

II B.Tech., I SEMESTER

S.No	Category	Course Code	Course Title	Hrs/Week			Credits	Internal	External	Total
				L	T	P				
1	BSC-5	201HB301A	Probability & Statistics	3	0	0	3	30	70	100
2	PCC-1	201MM302	Mine Development	3	0	0	3	30	70	100
3	PCC-2	201MM303	Mine Surveying	2	1	0	3	30	70	100
4	PCC-3	201MM304	Mining Geology	3	0	0	3	30	70	100
5	PCC-4	201MM305	Mining Machinery	2	1	0	3	30	70	100
6	PCC-L1	201MM311	Mine Surveying Laboratory	0	0	3	1.5	50	50	100
7	PCC-L2	201MM312	Mining Geology Laboratory	0	0	3	1.5	50	50	100
8	PCC-L3	201MM313	Mining Machinery Laboratory	0	0	3	1.5	50	50	100
9	SOC-1	201CS381	Programming with Python	0	1	2	2	-	15+35	50
10	MC-2	201CE491	Constitution of India	2	0	0	0	30*	70*	100*
11	Proj	201MM321	Community Service Project	0	0	0	4	100	-	100
			Total	**15**	**3**	**11**	**25.5**	**400**	**550**	**950**

II B.Tech., II SEMESTER

S.No	Category	Course Code	Course Title	Hrs/Week			Credits	Internal	External	Total
				L	T	P				
1	ESC-7	201MM401	Mineral Processing	3	0	0	3	30	70	100
2	PCC-5	201MM402	Advanced Mine Surveying	2	1	0	3	30	70	100
3	PCC-6	201MM403	Surface Mining	3	0	0	3	30	70	100
4	PCC-7	201MM404	Underground Coal Mining	3	0	0	3	30	70	100
5	HSMC-3	201MM405	Mine Systems Engineering	2	1	0	3	30	70	100
6	ESCL-3	201MM411	Mineral Processing Laboratory	0	0	3	1.5	50	50	100
7	PCC-L4	201MM412	Advanced Mine Surveying Laboratory	0	0	3	1.5	50	50	100
8	PCC-L5	201MM413	Engineering Geology Laboratory	0	0	3	1.5	50	50	100
9	SOC-2	201MM481	CAD for Mining	1	0	2	2	-	15+35	50
			Total	**14**	**2**	**11**	**21.5**	**300**	**550**	**850**
			Honor course /Minor course (Optional)				**4**			

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (A), Rajahmundry
DEPARTMENT OF AUTOMOBILE ENGINEERING
GRBT-20 Course Structure

III B.Tech., I SEMESTER

S.No	Category	Course Code	Course Title	Hrs/Week			Credits	Internal	External	Total
				L	T	P				
1	PCC-8	201MM501	Mine Planning and Design	3	0	0	3	30	70	100
2	PCC-9	201MM502	Mine Ventilation	3	0	0	3	30	70	100
3	PCC-10	201MM503	Underground Metal Mining	3	0	0	3	30	70	100
4	PEC-1	201MM564A 201MM564B 201MM564C 201MM564D	1. Geostatistics 2. Mine Transportation 3. Mine Management 4. Rock Excavation	3	0	0	3	30	70	100
5	OEC-1		Open Electrive-1 (See enclosed table)	3	0	0	3	30	70	100
6	PCC-L6	201MM511	Mine Planning and Design Lab	0	0	3	1.5	50	50	100
7	PCC-L7	201MM512	Mine Ventilation Lab	0	0	3	1.5	50	50	100
8	SOC-3	201HB581	English for Carrier	1	0	2	2	-	15+35	50
9	MC-3	201MB591	IPR and Patents	2	0	0	0	30*	70*	100*
10	Proj	201MM521	Mini Project/ Study Project	0	0	0	1.5	100	-	100
			Total	**18**	**0**	**8**	**21.5**	**350**	**500**	**850**

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (A), Rajahmundry
DEPARTMENT OF AUTOMOBILE ENGINEERING
GRBT-20 Course Structure

III B.Tech., II SEMESTER

S. No	Category	Course Code	Course Title	Hrs/Week			Credits	Internal	External	Total
				L	T	P				
1	PCC-11	201MM601	Computer Applications in Mining	3	0	0	3	30	70	100
2	PCC-12	201MM602	Mine Legislation and General Safety	3	0	0	3	30	70	100
3	PCC-13	201MM603	Rock Mechanics	2	1	0	3	30	70	100
4	PEC-2	201MM664A 201MM664B 201MM664C 201MM664D	1. Environmental Impact Assessment in Mines 2. Innovative Mining Systems 3. Mine Construction Engineering 4. Mine Hazards and Rescue	3	0	0	3	30	70	100
5	OEC-2		Open Electrive-2 (See enclosed table)	3	0	0	3	30	70	100
6	PCC	201MM611	Computer Applications in Mining Laboratory	0	0	3	1.5	50	50	100
7	PCC-L8	201MM612	Mine Rescue Laboratory	0	0	3	1.5	50	50	100
8	PCC-L9	201MM613	Rock Mechanics Laboratory	0	0	3	1.5	50	50	100
9	SOC-4	201MM681	GIS Applications in Mining	1	0	2	2	-	15+35	50
10	MC-4	201HB691	Quantitative Aptitude and Reasoning	2	0	0	0	30*	70*	100*
			Total	**18**	**0**	**11**	**21.5**	**300**	**550**	**850**
Summer Internship after third year (to be evaluated during 7th sem)										

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (A), Rajahmundry
DEPARTMENT OF AUTOMOBILE ENGINEERING
GRBT-20 Course Structure

IV B.Tech., I SEMESTER

S.No	Category	Course Code	Course Title	Hrs/Week			Credits	Internal	External	Total
				L	T	P				
1	PEC-3	201MM761A 201MM761B 201MM761C 201MM761D	1. Disaster Management 2. Environmental Pollution & Control in Mines 3. Mining Finance and Economics 4. Waste Management	3	0	0	3	30	70	100
2	PEC-4	201MM762A 201MM762B 201MM762C 201MM762D	1. Environmental Management and Planning in Mines 2. Drilling and Rock Fragmentation 3. Rock slope Engineering 4. Tunneling Engineering	3	0	0	3	30	70	100
3	PEC-5	201MM763A 201MM763B 201MM763C 201MM763D	1. Mine Strata Control 2. Mine Safety Engineering 3. Mine Subsidence Engineering 4. Mine Valuation	3	0	0	3	30	70	100
4	OEC-3		Open Electrive-3 (See enclosed table)	3	0	0	3	30	70	100
5	OEC-4		Open Electrive-4 (See enclosed table)	3	0	0	3	30	70	100
6	H&SSE	201HB796	UHV 2 Understanding Harmony	3	0	0	3	30	70	100
7	SOC-5	201MM781	Product Development	0	1	2	2	-	15+35	50
8	Proj	201MM731	Internship	0	0	0	3	100	-	100
			Total	**19**	**0**	**2**	**23**	**280**	**470**	**750**

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (A), Rajahmundry
DEPARTMENT OF AUTOMOBILE ENGINEERING
GRBT-20 Course Structure

IV B.Tech., II SEMESTER

S. No	Category	Course Code	Course Title	Hrs/Week			Credits	Internal	External	Total
				L	T	P				
1	Proj	201MM841	Project work	0	0	0	8	60	140	200
			Total	**0**	**0**	**0**	**8**	**60**	**140**	**200**

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (A), Rajahmundry
DEPARTMENT OF AUTOMOBILE ENGINEERING
GRBT-20 Course Structure

Open Elective Courses/Job Oriented Electives:

	Open Elective-1 (III-1)	**Open Elective-2 (III-2)**	**Open Elective-3 (IV-1)**	**Open Elective-4 (IV-2)**
CIVIL Engineering	Environmental Pollution & Control (201CE565a)	Solid Waste Management (201CE665a)	Building Technology (201CE764a)	Safety Engineering (201CE765a)
EEE	Fundamentals of Utilization of Electrical Energy (201EE565a)	Concepts of Power System Engineering (201EE665a)	Fundamentals of smart grid technologies (201EE764a)	Basics of Electrical Measurements and Instrumentation (201EE765a)
MECH	Robotics (201ME565a)	Introduction to MEMS (201ME665a)	Nano Technology and its Applications (201ME764a)	Introduction to Operations Research (201ME765a)
ECE	Microprocessors and its Interfacing (201EC565a)	IoT and its Applications (201EC665a)	Introduction to Embedded Systems (201EC764a)	Fundamentals of Digital Image Processing (201EC765a)
CSE, CSC, CSM	Foundations of Operating Systems (201CS565a)	Fundamentals of Databases (201CS665a)	Information Security (201CS764a)	Human Computer Interaction (201CS765a)
Automobile Engineering	Basic Automobile Engineering (201AM565a)	Hybrid and Electric Vehicles (201AM665a)	Modern Vehicle Technology (201AM764a)	Alternative Energy Resources for Automotives (201AM765a)
MINING Engineering	Elements of Mining Technology (201MM565a)	Open Pit Slope Analysis and Design (201MM665a)	Mining and its importance (201MM764a)	Remote Sensing & GIS in Mining (201MM765a)
Petroleum	Fundamentals of Petroleum Engineering (201PT565a)	Basic Concepts in Petroleum Drilling Engineering (201PT665a)	Introduction to Petroleum Production Engineering (201PT764a)	Basic Concepts in Petroleum Reservoir Engineering (201PT765a)
MBA	Principles of Management (201MB565a)	Operations Management (201MB665a)	Entrepreneurship for Engineers (201MB764a)	Digital Marketing (201MB765a)

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B. Tech. I Sem. (3rd semester)			
Course Code	**MINE DEVELOPMENT**				
Teaching	Total contact hours- 45	L	T	P	C
Pre-requisite(s): Engineering Chemistry		3	0	0	3

Course Objectives

The objectives of this course are to

1. Illustrate the concept of mining operations and the field of mining engineering.
2. Explain the sequence of opening the deposits.
3. Impart the knowledge on process of shaft sinking.
4. Explain various drilling techniques.
5. Impart the knowledge on explosives and its handling.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1	Infer the role of mining in economic development, various unit operations in mining.
CO2	Gain exposure in various modes of mine access in underground and opencast mining.
CO3	Summarize the methods and various factors affecting shaft sinking operation in mining.
CO4	Compare various drilling mechanisms.
CO5	Identify various types of explosives.

Syllabus

UNIT-I

Introduction of Mining Engineering

Introduction to Indian mining industry; role of mining in national economy and infrastructure building; National scenario, Basic mining terminologies, Different stages of mining, Classification of mining methods, Selection criteria for underground and open cast mining methods, Advantages and disadvantages of open cast and underground mining.

UNIT-II

Seam openings

Opening-up of deposits; Selection, types and location of entries for mines

(Dr. B. S. Sastry) **University Nominee**	(Dr. Singam Jayanthu) **Subject Expert**	(Mr. S. Venkata Chary) **Industrial Expert**	(Dr. M.V.S. Babu) **Special Invitee Member**

(Dr. A. Charan Kumar) **BOS-Member**	(Mr. G. D. N. Raju) **BOS-Member**	(Ms. P. Manasa) **BOS-Member**	(Mr. A. K. Sanjay) **BOS-Member**	(Mr. A. Sandeep Kumar) **BOS-Chairman**

Basics of Mine Systems

Introduction to- ventilation; support system; lighting and transportation systems

UNIT-III

Shaft sinking operations

Surface arrangements, apparatus and equipment for sinking shafts, Unit operations of shaft sinking: drilling, blasting, mucking, de-fuming, temporary and permanent lining, construction of insets and shaft stations; Methods of sinking shaft in water-logged, pressurized strata in loose and running soils; Mechanized sinking, multi-deck platforms.

UNIT-IV

Drilling

Drilling methods - Percussive, Rotary, Rotary-Percussive; applicability, advantages and disadvantages of drilling methods; drillability studies, factors effecting drillability, mechanics of drilling, Selection of drills, Care of drills, various types of drill bits.

Drill Patterns

Various underground and open cast drill patterns

UNIT-V

Explosives and blasting

Types of - explosives used in mines, Properties of explosives, Detonators and accessories: Safety fuses, detonating cord and accessories, detonators, exploders, electronic detonators, NONEL blasting; magazines and explosive handling.

Text book(s)

1. Elements of Mining Technology, Vol. I, D. J. Deshmukh, Vidyasewa prakashan, Nagpur.
2. Explosives and Blasting techniques, G. K. Pradhan, Mine Tech Publication.

Reference(s)

1. Principles and practices of modern coal mining, Singh R. D., New Age International Publishers.

Web Link(s)

1. https://miningandblasting.files.wordpress.com/2009/09/engineering-rock-blasting-operations_bhandari.pdf
2. https://www.britannica.com/technology/coal-mining/Underground-mining

(Dr. B. S. Sastry)	(Dr. Singam Jayanthu)	(Mr. S. Venkata Chary)	(Dr. M.V.S. Babu)
University Nominee	**Subject Expert**	**Industrial Expert**	**Special Invitee Member**

(Dr. A. Charan Kumar)	(Mr. G. D. N. Raju)	(Ms. P. Manasa)	(Mr. A. K. Sanjay)	(Mr. A. Sandeep Kumar)
BOS-Member	**BOS-Member**	**BOS-Member**	**BOS-Member**	**BOS-Chairman**

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B. Tech. I Sem. (3rd semester)			
Course Code	**MINE SURVEYING**				
Teaching	Total contact hours-45	L	T	P	C
Pre-requisite(s): Mathematics-I		2	1	0	3

Course Objectives

The objectives of this course are to

1. Convey the knowledge on relative positions of objects below or above the earth surface.
2. Explain the usage of theodolite, computation of areas and angles by using instruments.
3. Illustrate usage of surveying instruments in leveling and contouring.
4. Impart the knowledge on utilizing plane table survey conceding all the factors.
5. Explain modern surveying techniques and their applications.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1	Measure relative positions of objects below or above the earth surface.
CO2	Identify the parts of surveying instruments and calculate horizontal, vertical angles.
CO3	Evaluate the elevation of field objects and contour intervals.
CO4	Perform using plane table surveying.
CO5	Utilize modern surveying techniques in field.

Syllabus

UNIT -I

Introduction to surveying

Definition of Surveying, principles of surveying, classifications of survey, errors in surveying

Chain Surveying

Linear measurements, principles, instruments, methods, obstacles, offsets, error in chaining

Compass surveying

Types of bearing, calculation of angles and bearings, prismatic and surveyor compass, trough compass, tabular compass, local attraction and declination, errors, problems.

(Dr. B. S. Sastry) **University Nominee**	(Dr. Singam Jayanthu) **Subject Expert**	(Mr. S. Venkata Chary) **Industrial Expert**	(Dr. M.V.S. Babu) **Special Invitee Member**

(Dr. A. Charan Kumar) **BOS-Member**	(Mr. G. D. N. Raju) **BOS-Member**	(Ms. P. Manasa) **BOS-Member**	(Mr. A. K. Sanjay) **BOS-Member**	(Mr. A. Sandeep Kumar) **BOS-Chairman**

UNIT -II

Theodolite Survey

Definition and terms, parts, temporary adjustments, permanent adjustments, horizontal and vertical angles, miscellaneous operations, errors; Methods of theodolite traversing-checks, plotting, closing error.

UNIT -III

Levelling and contouring

Principles and definition, types of levels, adjustments, reduction of levels, curvature and refraction, sensitivity of bubble, problems; Contour- Contour interval and characteristics, methods, interpretation of contours and uses of contours.

UNIT -IV

Plane table survey

Accessories, working operation, precise plane table equipment, methods of plane tabling, radiation, intersection (graphic triangulation), traversing, resection, three point problem, two point problem, adjustments, errors, advantages and disadvantages.

UNIT -V

Modern surveying techniques

Types of modern surveys, total station & its application, Global Positioning System (GPS) & its application in mining, introduction to Geographical Information System (GIS), remote sensing and its application in mining industry.

Text book(s)

1. Surveying Vol. I, B. C. Punmia, Laxmi Publication.
2. Surveying Vol. II, B. C. Punmia, Laxmi Publication.

Reference(s)

1. Surveying Vol. I, S. K. Duggal, Tata McGraw Hill Publications
2. Mine Surveying Vol. I, II & III, S. Ghatak, Coal Field Publishers

Web Link(s)

1. https://civiltoday.com/surveying/87-surveying-lecture-notes-pdf

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University Nominee	**Subject Expert**	**Industrial Expert**	**Special Invitee Member**

(Dr. A. Charan Kumar)	(Mr. G. D. N. Raju)	(Ms. P. Manasa)	(Mr. A. K. Sanjay)	(Mr. A. Sandeep Kumar)
BOS-Member	**BOS-Member**	**BOS-Member**	**BOS-Member**	**BOS-Chairman**

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B. Tech. I Sem. (3th semester)			
Course Code	**MINING GEOLOGY**				
Teaching	Total contact hours- 45	L	T	P	C
Pre-requisite(s): Engineering Physics, Engineering Chemistry		3	0	0	3

Course Objectives

The objectives of this course are to

1. Familiarize with the engineering concepts of geological and hydrological elements.
2. Explain the processes of ore minerals formation, origin, occurrence and usage.
3. Introduce the basic attributes of geology.
4. Impart the knowledge on economic viability of mineral.
5. Impart knowledge on various prospecting method for mineral deposit.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1	Outline the engineering concepts of geological and hydrological elements.
CO2	Classify processes of ore minerals formation, origin, occurrence and usage.
CO3	Infer the basic attributes of geology.
CO4	Relate economic viability of mineral.
CO5	Summarize various prospecting methods for mineral deposit.

Syllabus

UNIT –I

Introduction of Geology

Definition of geology, branches of geology, Geological time scale. importance of geology in mining, interior of the earth, weathering, erosion, denudation, geological processes, ground water origin and occurrence, hydrological cycle, sources of water in mines, classification of rocks based on porosity and permeability, water table and types of ground water, geological controls on ground water movement in mines.

(Dr. B. S. Sastry)	(Dr. Singam Jayanthu)	(Mr. S. Venkata Chary)	(Dr. M.V.S. Babu)
University Nominee	**Subject Expert**	**Industrial Expert**	**Special Invitee Member**

(Dr. A. Charan Kumar)	(Mr. G. D. N. Raju)	(Ms. P. Manasa)	(Mr. A. K. Sanjay)	(Mr. A. Sandeep Kumar)
BOS-Member	**BOS-Member**	**BOS-Member**	**BOS-Member**	**BOS-Chairman**

UNIT –II

Structural Geology

Petrology study of Rock classifications Stratified rocks and their structures - attitude of beds; strike and dip; thickness of beds; folds; genesis, classification, identification in field, impact on-landscape, mineral deposits and mining; unconformities: types, importance and identification; faults: definition, mechanism of faulting, classification, impact of faulting on topography, significance of faults in mining; joints: definition and characteristics, classification, differences between joints and faults.

UNIT – III

Attributes of Geology

Syngenetic and epigenetic deposits; processes of ore formation: magmatic concentration, sublimation, contact metasomatism, hydrothermal processes, sedimentation, evaporation, residual and mechanical concentration; oxidation and supergene enrichment, metamorphism.

UNIT – IV

Economic Mineral deposits

Introduction to estimation of ore reserves-definition, classification and importance, industrial uses of different minerals of iron, manganese, chromites, gold, lead, zinc, beach sand, copper, bauxite, uranium, Quartz, Pyroxenes, Micas, Aluminum silicates & coal.

UNIT –V

Mineral Prospection

Introduction to different methods of prospecting for mineral deposits- geological, geophysical, gravity, magnetic, seismic, electrical, geochemical, aerial photography and remote sensing, GIS.

Text book(s)

1. Engineering Geology, Parbin Singh, Kataria, S. K., & Sons.
2. A text book of Geology, G. B. Mahapathra, CBS publishers and distributors Pvt. Ltd.

Reference(s)

1. Principles of Engineering Geology, K. M. Bangar, Standard publishers.

Web Link(s)

1. http://geologylearn.blogspot.com

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B. Tech. I Sem. (3rd Semester)			
Course Code	**MINING MACHINERY**				
Teaching	Total contact hours - 50	L	T	P	C
Pre-requisite(s): Engineering Physics, Engineering Mechanics		2	1	0	3

Course Objectives

The objectives of this course are to

1. Introduce the principles, operations and application of wire ropes.
2. Discuss the principles, operations and application of mine pumps.
3. Elaborate the electrical and telecommunication systems used in mines.
4. Impart the knowledge on surface mining machinery systems and their applications.
5. Educate on the underground mining machinery systems and their applications.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1	Compare the operations and application of conveyors.
CO2	Plan and design the pumping system of a mine.
CO3	Plan the electrical and telecommunication systems in mines.
CO4	Identify the operations and application of surface mining equipment.
CO5	Assess the operations and application of machinery in underground mines.

Syllabus

UNIT-I

Wire Ropes

Construction of wire ropes; various types of rope used in mining; factor of safety (FOS) of rope; care and maintenance of rope in use and also in storage; splicing of haulage rope; calculation of size of winding rope; examination of rope; life of rope and norms for discarding a rope; Rope capel and recapping.

UNIT-II

Mine Pumps

Sources of mine water; Classification of mine pumps; Basic definition of head, suction, lift, suction head, discharge head; Friction of water in pipes; Location and size of Mine Sumps;

(Dr. B. S. Sastry) **University Nominee**	(Dr. Singam Jayanthu) **Subject Expert**	(Mr. S. Venkata Chary) **Industrial Expert**	(Dr. M.V.S. Babu) **Special Invitee Member**

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Constructional features; Working principles; Single stage and multistage pumps; Application & uses of centrifugal and reciprocating pumps; Series and parallel arrangement of pumps, arrangement of different valves and other components in centrifugal & reciprocating pumps; Pump design calculations - numerical problems, special types of pumps used in mines.

UNIT-III

Electrical and Telecommunication System in mines

Mining cables -classification, constructional features and use of each type - armored, pliable armored and trailing cable; Installation of cable in shaft & in roadways; General working principles of gate end box, drill panels; Safety & protective devices - function of pilot core protection & earth leakage protection; Flame proof & intrinsically safe apparatus- application, features & safety aspects.

Underground signaling arrangement

Haulage signals, shaft signals and use of telephone systems in underground; latest developments in mine communications

UNIT-IV

Surface Mining Machinery

Basic constructional features, working principles, applicability, capacity (maximum & most common) and limitations of - blast hole drills, shovel (hydraulic and rope), dozer, front end loader, dumper, scraper, grader, bucket wheel excavator, dragline, continuous surface miner, stacker & spreader.

UNIT-V

Underground Mining Machinery

Basic constructional features, specifications, working principle & applicability of – drills (handheld coal drills, jackhammer & jumbo drill), mucking equipment (LHD, SDL, Shuttle Car), continuous excavators (continuous miner, DERD shearer) & powered supports in longwall method of mining.

Text book(s)

1. Mine pumps haulage and winding, S. Ghatak, Coalfield Publishers Skylark.
2. Theory of Machines, R. S. Khurmi, J. K. Gupta, Eurasia Publishing House.

Reference(s)

1. Elements of Mining Technology, Vol. 3, D. J. Deshmukh, Denett & Company.

(Dr. B. S. Sastry)	(Dr. Singam Jayanthu)	(Mr. S. Venkata Chary)	(Dr. M.V.S. Babu)
University Nominee	**Subject Expert**	**Industrial Expert**	**Special Invitee Member**

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B. Tech. I Sem. (3rd semester)			
Course Code	**MINE SURVEYING LABORATORY**				
Teaching	Total contact hours- 33	L	T	P	C
Pre-requisite(s): Mathematics-I, Mine Surveying		0	0	3	1.5

Course Objectives

The objectives of this course are to

1. Convey the knowledge on relative positions of objects below or above the earth surface.
2. Explain the usage of theodolite, computation of areas and angles by using instruments.
3. Illustrate usage of surveying instruments in leveling and contouring.
4. Impart the knowledge on utilizing plane table survey conceding all the factors.
5. Explain modern surveying techniques and their applications.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1	Measure relative positions of objects below or above the earth surface.
CO2	Identify the parts of surveying instruments and calculate horizontal, vertical angles.
CO3	Evaluate the elevation of field objects and contour intervals.
CO4	Perform using plane table surveying.
CO5	Utilize modern surveying techniques in field.

List of experiments

1. Triangulation survey.
2. Study of theodolite in detail- practice for measurement of horizontal and vertical angles.
3. Measurement of horizontal angles by method of repetition and re-iteration.
4. Trigonometric leveling - heights and distance problem.
5. Heights and distance using principles of tachometric surveying.
6. Curve setting – different methods.
7. Determine of area using surveying instruments.
8. Determine the Reduced Level of the Ground by Height of Instrument Method.
9. Traversing & Contouring using surveying instruments.
10. Determination of remote height using total station.
11. Determine the Location of objects by Plain Table Survey.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B. Tech. I Sem. (3th semester)			
Course Code	**MINING GEOLOGY LABORATORY**				
Teaching	Total contact hours - 33	L	T	P	C
Pre-requisite(s): Mining Geology		0	0	3	1.5

Course Objectives

The objectives of this course are to

1. Familiarize with the basic concepts of Geo-Morphology and geological structures.
2. Expound the attitude of bed using various compasses.
3. Study the physical properties of minerals.
4. Demonstrate megascopic study of rocks.
5. Observe the geological formations.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1	Observe and analyse the Geo-Morphology and geological structure of a particular area.
CO2	Measure attitude of bed using various compass.
CO3	Examine the mineral physical properties.
CO4	Identify the Megascopic properties of rocks.
CO5	Categorize the geological formations.

List of experiments

1. Study of important geo-morphological models.
2. Finding of attitude of beds by using clinometers/ Brunton compass.
3. Identification of different types of folds and faults from block models.
4. Study of Physical properties of rock forming minerals.
5. Study of Physical properties of ore forming minerals.
6. Megascopic studies of igneous rocks.
7. Megascopic studies of sedimentary rocks.
8. Megascopic studies of metamorphic rocks.
9. Study of Geological cross sections and geological maps.
10. Geological cross sections and study of geological maps.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B. Tech. I Sem. (3rd Semester)			
Course Code	**MINING MACHINERY LABORATORY**				
Teaching	Total contact hours - 36	L	T	P	C
Pre-requisite(s): Mining Machinery		0	0	3	1.5

Course Objectives

The objectives of this course are to

1. Impart the knowledge of different types of wire ropes & rope capping.
2. Explain different transport systems and safety devices.
3. Study about gate end box and various cables used in mines.
4. Impart the knowledge different types of support systems.
5. Study about different types of drill bits.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1	Identify various wire ropes used in mines.
CO2	Plan transport systems and safety devices.
CO3	Demonstrate gate end box and various cables used in mines.
CO4	Plan and design different types of support systems.
CO5	Distinguish different types of drill bits.

List of Experiments

1. Identify and sketch the different types of wire ropes.
2. Sketch different types of rope capping.
3. Sketch the direct rope haulage system and endless rope haulage system.
4. Study and sketch various safety devices used in haulage system.
5. Study of constructional features of gate end box.
6. Study the constructional features of flame proof and intrinsically safe apparatus.
7. Study and sketch different types of electrical cables used in mines.
8. Study, sketch and working of safety detaching hooks.
9. Study of head gear structure and its working.
10. Study about working mechanism of Jack hammer.
11. Sketch the different types of drill bits used in mining.
12. Study and sketch the chock shield supports used in long wall mining.

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Regulation GRBT- 20	Godavari Institute of Engineering & Technology (Autonomous)	II B. Tech. II Sem. (4th Semester)			
Course Code	**MINERAL PROCESSING**				
Teaching	Total contact hours - 50	L	T	P	C
Pre-requisite(s): Engineering Chemistry, Mining Geology		3	0	0	3

Course Objectives

The objectives of this course are to

1. Impart the knowledge on various sampling methods.
2. Discuss about the settlement of solids.
3. Expound the beneficiation operations and its applications.
4. Impart the knowledge on unit operations.
5. Illustrate about the efficiency of operations in mineral processing industries.

Course Outcomes

On Completion of the course, the students will be able to	
CO1	Classify various sampling methods.
CO2	Comprehend and explain the settling of solids.
CO3	Appraise the beneficiation process and its applications.
CO4	Distinguish the various unit operations.
CO5	Comprehend and analyze the efficiency of operations in mineral processing industries.

Syllabus

UNIT – I

Introduction to Mineral Engineering

Sampling and sampling methods; Particle size determination – Test sieves, laboratory sizing methods, graphical representation, sub sieve Sizing; Industrial screening, screen surfaces, types of industrial screens; Dry and wet screening, factors effecting rate of screening; screen efficiency; Liberation; Communition – Laws of communition; Reduction ratio; Classification of crushers, description and characteristics; Grinding – Ball, rod, tube mills; Methods of feeding and discharge; Theory of ball mill, critical speed; Open and closed circuit grinding; Circulating load; Wet and dry grinding.

UNIT-II

Settling of Solids

Density – Pulp density, percentage of solids, dilution ratio, settling of solids in fluids, stoke's and newton's laws, terminal velocity, free and hindered settling, equal settling particles Settling ratio; Principles of Classification – Sizing and sorting classifiers; Hydro cyclone Construction and operation, d50 – Design and operating variables; Classification as a means of concentration.

UNIT – III

Beneficiation Operations

Gravity concentration, concentration criterion, float and sink, HMS, heavy media cyclone; Jigging, principles and methods, types of Jigs, applications, flowing film concentration; Basic principles of tabling, shaking tables, operation and applications; Flotation, natural and acquired floatability, frothers, collectors, modifying agents and their action in flotation; Froth flotation and its mechanism, factors effecting the flotation, flotation applications.

UNIT – IV

Unit Operations

Magnetic separation, types of separators, dry and wet, low and high intensity magnetic separators, HGMS, applications; Electrical separation; Electrostatic and high-tension separators; Separation of solids from fluids, flocculation; Thickening, industrial thickeners; Filtration and its mechanism, types of filters, dust control.

UNIT – V

Metallurgical Efficiency

Beneficiation of metallic ores: Iron ores, Manganese ores, Copper ores, Lead & Zinc deposits; Bauxite deposits ;Chromite deposits; Beneficiation of precious metals and beach sands: Gold deposits – diamond deposits – beneficiation of uranium deposits, Beach sand - Ilmenite, Rutile, etc.; Role of ore microscope in mineral processing, processing flow sheets for common minerals; Ratio of concentration; Ratio of enrichment; Recovery, rejection losses; Efficiency of a concentrating operation, metallurgical efficiency.

Text book(s)

1. Mineral Beneficiation – A Concise Basic Course, Dr. D. V. Subba Rao, Taylor & Francis.
2. Mineral Processing Technology, B. A. Wills and D.W. Hopkins, Elsevier Science.

Reference(s)

1. Coal Processing and Utilization, Dr. D. V. Subba Rao, T. Gouricharan, CRC Press.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B. Tech. II Sem. (4th Semester)			
Course Code	**ADVANCED MINE SURVEYING**				
Teaching	Total contact hours- 50	L	T	P	C
Pre-requisite(s): Mine Surveying		2	1	0	3

Course Objectives

The objectives of this course are to

1. Explain various tachometric methods and their deterministic parameters.
2. Impart knowledge on curves, curve settings and their methods.
3. Explain about various methods of measuring areas and volumes.
4. Discuss the design of mine plan by using various methods and their errors.
5. Correlate surface points with the underground points.

Course Outcomes

On Completion of the course, the students will be able to	
CO1	Understand the basics of Tachometric survey.
CO2	Set out curves by using various surveying methods and instruments.
CO3	Measure the areas and volumes by using various surveying methods.
CO4	Design the mine plans by using various methods.
CO5	Correlate surface, underground survey and stop survey.

Syllabus

UNIT -I

Tachometric Survey

Definition and different systems of tachometric methods, determinations of tachometric constants (K&C) - the stadia system – principle of stadia method; Fixed hair method - distance and elevation formulae; Movable hair method staff normal, staff vertical; Substance method — principle of substance (or movable hair) method, the tangential method.

UNIT –II

Curves

Definitions and notations, designation of curves, elements of simple curves, setting out simple curves - by ordinates from the long chord, by successive bisections of arcs and chords, by off-sets

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from the tangents, by deflections distances, Rankin's method of tangential angles, two theodolite method, tachometric method. Transition curves (Brief).

UNIT -III

Areas and Volumes

Areas - general methods of determining areas, areas computed by sub division into triangles, areas from offsets to a baseline, area by double meridian distances, area by coordinates, area by plan meter; Volumes - measurements from cross- sections, the prismoidal formula, the trapezoidal formula (average and area method), volumes from spot levels, volumes from contours.

UNIT -IV

Mine Plans &Theory of Errors

Various methods of plotting survey, survey office, storage of survey instruments, scales and its classifications, kinds of errors, definitions, laws of accidental errors, probability curve, probable errors of an average, probable error of sum, most probable value, mean square error, average error, general principle of least squares, law of weights, determination of probable errors, distribution of error of the field measurement, determination of most probable values.

UNIT -V

Correlation & Stope Survey

Definition, purpose & classification of correlation survey, correlation of surface and U/G surveys, direct traversing through adits or inclined shafts/ drifts, direct transference of azimuth down the shaft, correlation by plumb wires in two shafts, correlation by plumb wires in single shaft, co-planation or exact alignment method, Weisbatch triangle or approximate alignment method, Weiss quadrilateral method; Stope surveying: purpose of stope surveying, classification of stop surveying methods, tape triangulation method, Ray method.

Text book(s)

1. Surveying Vol. I & II, B. C. Punmia, Laxmi Publication.

Reference(s)

1. Surveying Vol. I, S. K. Duggal, Tata McGraw Hill Publications, New Delhi.
2. Mine Surveying Vol. I, II & III, S. Ghatak, Coal Field Publishers.

Web Link(s)

1. http://www.dmp.wa.gov.au/Documents/Safety/MSH_COP_MineSurvey.pdf

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B. Tech. II Sem. (4th Semester)			
Course Code	**SURFACE MINING**				
Teaching	Total contact hours – 45	L	T	P	C
Pre-requisite(s): Mining Geology, Mine Development		3	0	0	3

Course Objectives

The objectives of this course are to

1. Explain the unit operations of surface mining methods.
2. Illustrate the opening up of deposits in surface mining.
3. Discuss the working of excavating and loading equipment.
4. Impart the knowledge on working mechanism of various HEMM.
5. Elaborate the surface mining blasting operations.

Course Outcomes

On Completion of the course, the students will be able to	
CO1	Differentiate various systems of surface mining and their applications.
CO2	Design the opening up of the deposits and Bench formations.
CO3	Compare various excavating and loading equipment.
CO4	Formulate the production capacities of various HEMM.
CO5	Apply fundamental principles to the design and selection of safe and efficient blasting.

Syllabus

UNIT -I

Basic concept of Surface Mining

Preliminary evaluation of surface mining prospects; stripping ratio – concepts, types and significance; mine life; various surface mining methods, their advantages and disadvantages.

UNIT -II

Opening-up of deposits with Box Cut

Factors affecting selection of site of box-cut; Production benches–formation parameters and factors affecting their selection; Preparation for Excavation: Working principle of ripper and Scraper—their cycle of operation, application and limitations.

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UNIT -III

Excavation and Transportation

Cyclic methods - Shovel-dumper -Types, Applicability and limitations of Shovel and dumpers; Cycle time and productivity calculation for shovel and dumper; Dragline operation: Applicability and limitations, different modes of operation; Side cast diagram and calculation of reach; Cycle time and productivity calculation. Dozers: Applicability, limitations; Types and classification; Types of blade and corresponding merits and demerits; Method and cycle of operation.

UNIT -IV

Heavy Earth Moving Machineries

Grader, Loader, Crusher, Different in-pit crushing and conveying methods and their respective applicability & limitations; Continuous methods - Bucket wheel excavator, continuous surface miner - operation of these machines, their advantages, limitations and capacity calculations.

UNIT - V

Blast Operations

Blast patterns, parameters effecting selection of blast pattern, production calculation; powder factor; various controlled blasting techniques; Noise and vibration: sources, monitoring methods and control measures.

Textbook(s)

1. Surface Mining Technology, T. N Singh, Lovely Prakashan.
2. Surface Mining Technology, S.K. Das, Lovely Prakashan.
3. Surface Mining, G. B. Mishra, Dhanbad Publishers.

Reference(s)

1. Principles of Open Pit Mine Planning & Design, Hustrulid, W. and Kuchta, M.

Web Link(s)

1. https://nptel.ac.in/courses/123/105/123105007/

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B. Tech. II Sem. (4th semester)			
Course Code	**UNDERGROUND COAL MINING**				
Teaching	Total contact hours- 50	L	T	P	C
Pre-requisite(s): Mine Development		3	0	0	3

Course Objectives

The objectives of this course are to

1. Discuss the basics of coal mining and mine entries.
2. Impart the knowledge on bord and pillar method of coal mining.
3. Illustrate the concepts involved in longwall methods of working coal seams.
4. Explain the mining operations involved in thick Seam and special mining methods.
5. Explain special methods of coal mining conceding the problems.

Course Outcomes

On Completion of the course, the students will be able to	
CO1	Infer the factors influencing choice of mining methods and possible entries.
CO2	Perform the development and depillaring operations in bord and pillar mining.
CO3	Summarize the development and extraction using long wall mining method.
CO4	Evaluate different challenges associated with thick seam mining.
CO5	Plan the extraction of coal using modern mining methods.

Syllabus

UNIT –I

Introduction

Present situation and future growth of coal mining industry in India and abroad; Factors affecting selection of different possibilities of entry: Adit, shaft, incline etc. Different terminologies used in coal mining, mine development process, different coal mining methods, factors influencing choice of coal mining methods.

UNIT –II

Bord and Pillar Mining

Applicability, limitations, advantages and disadvantages of bord and pillar mining method,

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development and depillaring sequence of operations in bord and pillar mining, local fall, main fall and air blast; Problems associated with bord & Pillar method and safe practices; Case studies with layouts and its related calculations- manpower, machinery, production & output per man-shift.

UNIT –III

Longwall Mining

Applicability, limitations, merits and demerits, different long wall mining methods- advancing , retreating; factors influencing selection of longwall method, method of development and extraction of panels; Case studies with layouts and its related calculations- man power, machinery, production & output per man-shift.

UNIT –IV

Thick Seam Mining

Problems associated with thick seam mining; caving and stowing methods, limitations and their applicability; Different orders of slicing; various slicing methods-inclined slicing, horizontal slicing, diagonal slicing, transverse slicing, with layouts; Blasting gallery method; Support system used in thick seam mining.

UNIT –V

Special methods of coal mining

Applicability, limitations, merits and demerits of horizon mining, hydraulic mining, high wall mining, method of extraction of contiguous seam; working underneath surface features, extraction of multi seams and problems associated; Surface and underground arrangements for stowing.

Text book(s)

1. Principles and Practices of Modern Coal Mining, R. D. Singh, New Age International.
2. Modern Coal Mining Technology, S. K. Das, Lovely Prakashan Publishers.

Reference(s)

1. Elements of Mining Technology, Vol. I, D. J. Deshmukh, Denett & Co.
2. Underground winning of coal, T.N Singh, Oxford & IBH Publishing Company Private, Ltd

Web Link(s)

1. http://www.undergroundcoal.com.au/fundamentals/default.aspx
2. https://scienceandtech.cmpdi.co.in/PDF%20Files/Mining%20Methods.pdf

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B. Tech. II Sem. (4th Semester)			
Course Code	**MINE SYSTEMS ENGINEERING**				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisite(s): Mathematics-I		2	1	0	3

Course Objectives

The objectives of this course are to

1. Introduce the concept of operational research models and allocation.
2. Discuss transportation, assignment, sequencing and replacement concepts.
3. Elaborate the concept of games, waiting lines.
4. Impart the knowledge on inventory and break-even analysis.
5. Introduce the concepts of dynamic programming and simulation.

Course Outcomes

On Completion of the course, the students will be able to	
CO1	Solve the real-life problems on Linear programming and allocation
CO2	Comprehend the transportation, assignment, sequencing and replacement concepts.
CO3	Comprehend the concept of games, waiting lines.
CO4	Comprehend and analyze inventory and break-even analysis.
CO5	Solve dynamic programming problems and understand the concept of simulation.

Syllabus

UNIT –I

Introduction

Development, Definition, Characteristics and phases, Types of operation research models, Applications.

Linear Programming Problem

Linear programming problem formulation - Graphical solution -Simplex method -Artificial variables techniques -Two–phase method - Big-M method - Special cases: degeneracy, multiple optimal solution, infeasibility and unbounded solution, duality principle.

UNIT – II

Transportation Problems

Formulation - Initial and optimal solutions for balanced and unbalanced transportation problems – Degeneracy in transportation problems

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Assignment Problems

Formulation - Optimal solution - Variants of assignment problem- Traveling salesman problem

Sequencing

Introduction, flow – Shop sequencing, n jobs through two machines, n jobs through three machines - Job shop sequencing, two jobs through 'm' machines.

UNIT – III

Replacement

Introduction – Replacement of items that deteriorate with time, when money value is not counted and counted, replacement of items that fail completely, group replacement.

Theory of Games

Introduction – Mini. max (max. mini) – Criterion and optimal strategy, solution of games with saddle points, rectangular games without saddle points, 2 x 2 games, dominance principle, m x 2 & 2 x n games, graphical method.

UNIT-IV

Waiting Lines

Introduction – Single channel, Poisson arrivals, exponential service times, with infinite population and finite population models, multichannel, Poisson arrivals, Exponential service times with infinite population single channel Poisson arrivals.

Inventory Models

Introduction, Deterministic inventory models – Static economic order quantity models, Dynamic economic order quantity models - Probabilistic Inventory Models – Continuous review models, single period models and multi period models, P-System, Q-System.

UNIT – V

Dynamic Programming

Introduction – Bellman's principle of optimality, applications of dynamic programming, capital budgeting problem, shortest path problem, linear programming problem.

Simulation

Definition, types of simulation models, phases of simulation, applications of simulation, inventory and queuing problems, advantages and disadvantages, simulation languages, problems on inventory and queuing models.

Text book(s)

1. Operations Research, S. D. Sharma, Kedarnath, Ramnath & Co.,
2. Operations Research, An Introduction, H. A. Taha., PHI.

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Reference(s)

1. Operations Research Theory &Applications, J. K. Sharma, Macmillan.
2. Operations Research, A.M. Natarajan, P. Balasubramani, A. Tamilarasi, Pearson Education.
3. Operations Research, R. Pannerselvam, PHI Publications.
4. Operations Research, S Kalavathy, Vikas Publishers.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B. Tech. II Sem. (4th Semester)			
Course Code	**MINERAL PROCESSING LABORATORY**				
Teaching	Total contact hours – 36	L	T	P	C
Prerequisite(s): Mineral Processing		0	0	3	1.5

Course Objectives

The objectives of this course are to

1. Impart knowledge on selection of mineral samples.
2. Communicate the separation of mineral particles by different methods.
3. Elaborate determination of size distribution of mineral particles.
4. Impart the knowledge on the verification of Comminution laws.
5. Illustrate the critical speed of the ball mill.

Course Outcomes

On Completion of the course, the students will be able to	
CO1	Comprehend the selection of mineral samples by different methods.
CO2	Identify and comprehend the process of separation of mineral particles.
CO3	Determine the size distribution of mineral particles using various techniques.
CO4	Comprehend and verify the comminution laws.
CO5	Determine the critical speed of the ball mill.

List of Experiments

1. Selection of sample through coning & quartering.
2. Crushing of iron ore using primary jaw crusher
3. Verification of comminution laws for jaw crusher.
4. Study the effect of grinding with grinding time in ball mill.
5. To find critical speed of ball mill.
6. To determine size distribution using sieve analysis.
7. To determine size distribution using vibratory sieve shaker.
8. Separation of iron ore using electromagnetic separation.
9. Separation of particles using tabling equipment.
10. To study separation performance of cyclone Separator.
11. Determination of size distribution of iron ore using sieve analysis.
12. Verification of comminution laws for roll crusher.

(Dr. B. S. Sastry)	(Dr. Singam Jayanthu)	(Mr. S. Venkata Chary)	(Dr. M.V.S. Babu)
University Nominee	**Subject Expert**	**Industrial Expert**	**Special Invitee Member**

(Dr. A. Charan Kumar)	(Mr. G. D. N. Raju)	(Ms. P. Manasa)	(Mr. A. K. Sanjay)	(Mr. A. Sandeep Kumar)
BOS-Member	**BOS-Member**	**BOS-Member**	**BOS-Member**	**BOS-Chairman**

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B. Tech. II Sem. (4th semester)			
Course Code	**ADVANCED MINE SURVEYING LABORATORY**				
Teaching	Total contact hours- 36	L	T	P	C
Pre-requisite(s): Mine Surveying, Advanced Mine Surveying		0	0	3	1.5

Course Objectives

The objectives of this course are to

1. Explain various tachometric methods and their deterministic parameters.
2. Impart knowledge on curves, curve settings and their methods.
3. Explain about various methods of measuring areas and volumes.
4. Discuss the design of mine plan by using various methods and their errors.
5. Correlate surface points with the underground points.

Course Outcomes

On Completion of the course, the students will be able to	
CO1	Understand the basics of Tachometric survey.
CO2	Set out curves by using various surveying methods and instruments.
CO3	Measure the areas and volumes by using various surveying methods.
CO4	Design the mine plans by using various methods.
CO5	Correlate surface, underground survey and stop survey.

List of experiments

1. Determination of multiplying constant & additive constant of the Theodilite.
2. Setting out curves by long chord method.
3. Correlation survey by Weiss Quadrilateral method.
4. Determine the Contour of an Area by Grid Method
5. Setting out curves by rankines method.
6. Plane table Survey; finding the area of a given boundary by Radiation method.
7. Correlation survey by Weisbatch Triangle method.
8. Plane table Survey; finding the area of a given boundary by Intersection method.
9. Determination of horizontal distance between two in-accessible points using compass survey.
10. Setting out curve by perpendicular offsets.
11. Plane table Survey; finding the area of a given boundary by traverse method.
12. Setting out curves by tangent method.

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(Dr. A. Charan Kumar) **BOS-Member**	(Mr. G. D. N. Raju) **BOS-Member**	(Ms. P. Manasa) **BOS-Member**	(Mr. A. K. Sanjay) **BOS-Member**	(Mr. A. Sandeep Kumar) **BOS-Chairman**

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B. Tech. II Sem. (4th semester)			
Course Code	**ENGINEERING GEOLOGY LABORATORY**				
Teaching	Total contact hours – 36	L	T	P	C
Pre-requisite(s): Mining Geology		0	0	3	1.5

Course Objectives

The objectives of this course are to

1. Familiarize with the Interpretation of maps.
2. Explain geological time scale and mineral formations.
3. Examine mineral in detail by microscopic study.
4. Expose the crystallography concepts of minerals.
5. Solve the geological numerical problems.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1	Interpret the topographic map, geological map, Structural Geological maps of India.
CO2	Infer geological time scale
CO3	Evaluate mineral in detail by microscopic study.
CO4	Summarize the crystallography concepts of minerals in an area.
CO5	Calculate the geological numerical problems required in the mining field.

List of experiments

1. Interpret topographic map, geological map, Structural Geological maps of India.
2. Study of Geological Time Scale.
3. Study of Coal formation process.
4. Study of rock formation process.
5. Microscopic study of minerals.
6. Microscopic study of rocks.
7. Study and Identification of geomorphological models.
8. Study of crystals through crystal models.
9. Simple geometrical problems on strike and dip
10. Problems on water bearing properties

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University Nominee	**Subject Expert**	**Industrial Expert**	**Special Invitee Member**

(Dr. A. Charan Kumar)	(Mr. G. D. N. Raju)	(Ms. P. Manasa)	(Mr. A. K. Sanjay)	(Mr. A. Sandeep Kumar)
BOS-Member	**BOS-Member**	**BOS-Member**	**BOS-Member**	**BOS-Chairman**

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B. Tech. II Sem. (4th semester)			
Course Code	**CAD FOR MINING**				
Teaching	Total contact hours – 36	L	T	P	C
Pre-requisite(s): Engineering Graphics		1	0	2	2

Syllabus

1. **Computer aided drafting:** Introduction to computer aided drafting, Benefits of computer aided drafting, Standards in drawing, drawing sheets.
2. **Introduction to AutoCAD software:** Units, draw tools, modify tools, snap tools.
3. **Dimensioning and text:** Adding dimensions and text, managing dimensioning styles, text styles, adding leaders, creating tables and bill of materials.
4. **Parametric constraints and plotting**: Adding parametric constraints and plotting.
5. **Layers:** Benefits, Layer properties.
6. **Block and Groups:** Inserting blocks and creating groups
7. **Layouts:** Layouts creation, Viewports and advanced tools.
8. **Isometric drawings**: Snap settings, Drawing isometric views and Isometric dimensioning.
9. **CAD in Mining:** Pit top Layout, Pit bottom Layout, Surface mine outline.

Reference(s)

1. Introduction to AutoCAD 2020: A Modern Perspective, Paul Richard, Pearson Higher Education & Professional Group.
2. AutoCAD 2011 Tutor for Engineering Graphics by Alan Kalameja, DELMAR Cengage Learning.

Website link(s)

1. http://www.mycadsite.com/index.htm

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(Dr. A. Charan Kumar) **BOS-Member**	(Mr. G. D. N. Raju) **BOS-Member**	(Ms. P. Manasa) **BOS-Member**	(Mr. A. K. Sanjay) **BOS-Member**	(Mr. A. Sandeep Kumar) **BOS-Chairman**

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. I Sem (5^{th} Semester)			
Course Code 201MM501	**Mine Planning and Design**				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Surface Mining		3	0	0	3

Course Objectives

1. To discuss the process of mine planning and stages of planning new mines.
2. To impart the knowledge of preparation of plan reports.
3. To elaborate the ventilation and infrastructure planning.
4. To familiarize with the concept of open-pit design.
5. To discuss about mine reclamation and corporate social responsibility in mining.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Comprehend and plan different stages in new mines.
CO2:	Analyse and prepare different plan reports.
CO3:	Interpret the design, planning of ventilation and infrastructure in mines.
CO4:	Analyse the concept of open-pit design.
CO5:	Comprehend the process of mine reclamation, rehabilitation, and corporate social responsibility.

Syllabus

UNIT-I

Introduction to Mine Planning

Introduction, Process of planning; Cautions and essentials in planning; Mine planning components; Selection of method of mining; Stages of planning of new mines; Mining revenues and costs.

UNIT-II

Preparation of Plan Reports and Considerations in Planning

Different types of plans - long range, short range, intermediate and conceptual; Feasibility Report; Detail Project Report; Technical considerations, socio-economic considerations, restructuring planning, issues, challenges and future considerations in planning.

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Dr. Atma Ram Sahu **BOS-Member**	(Mr. G. D. N. Raju) **BOS-Member**	(Ms. P. S. Mounika) **BOS-Member**	(Mr. A. K. Sanjay) **BOS-Member**	(Dr. A. Charan Kumar) **BOS-Chairman**

UNIT-III

Infrastructure Planning

Planning sequence; Division of mine lease area into mining units; Development of open cast and underground mines- Surface layouts, pit top layout, pit bottom layout; Planning of mineral handling plant; Introduction to ventilation planning; Factors affecting HEMM and manpower selection.

UNIT-IV

Open Pit Design

Concepts of mineral inventory: Block Economic Modeling; Concept of ultimate pit design: Floating Cone Method, 2-D Lerchs- Grossmann Algorithm, 3-D Lerchs- Grossmann Algorithm.

UNIT-V

Mine Reclamation & Corporate Social Responsibility

Restoration, Reclamation & Rehabilitation; Socio-Economic Impact of Mining; Suggest ways and means for improving the Living Standard of locals; Introduction to Corporate Social Responsibility (CSR); Project Affected People (PAP); Initiatives & ways to improve corporate image in the mining sector.

Textbook(s)

1. J. Bhattacharya, Principles of Mine Planning, Allied Publishers Private Limited, 2016.
2. R D Singh, Principles and Practices of Modern Coal Mining, New Age Publishing, 2005.

Reference(s)

1. S. P. Mathur, Mine Planning for Coal, M. G. Consultants, 1993.
2. W. Hustrulid and M. Kuchta, Open Pit Mine Planning and Design, CRC Press, 2013.
3. H. L. Hartman, SME Mining Engineering Handbook, Vol. I & II, Society for Mining, Metallurgy, and Exploration, 1992.
4. Rzhevsky, Open Cast Mining Unit Operations, Mir publishers, 1985.

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Dr. Atma Ram Sahu **BOS-Member**	(Mr. G. D. N. Raju) **BOS-Member**	(Ms. P. S. Mounika) **BOS-Member**	(Mr. A. K. Sanjay) **BOS-Member**	(Dr. A. Charan Kumar) **BOS-Chairman**

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. I Sem. (5th Semester)			
Course Code 201MM502	**Mine Ventilation**				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Underground Coal Mining		3	0	0	3

Course Objectives

1. To elaborate about the underground mine atmosphere.
2. To familiarize about various mine heat sources and cooling systems.
3. To discuss about the types of natural and mechanical ventilation systems.
4. To inculcate about mine ventilation survey.
5. To impart the knowledge on mine ventilation network analysis.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Comprehend the mine atmosphere, monitoring, and its control.
CO2:	Evaluate the various mine heat sources and cooling system in mines.
CO3:	Compare different types of natural and mechanical ventilation systems.
CO4:	Interpret and perform the mine ventilation survey.
CO5:	Design a ventilation network

Syllabus

UNIT-I

Mine Gases

Atmospheric air composition; Mine air composition and comparison; Mine gases-origin, occurrence, physiological effects, detection, monitoring and control, limitations and various damps; Methane layering; Degasification of coal seams.

UNIT-II

Psychrometry

Mine heat load sources, heat stress and heat stress indices, design of mine cooling system.

UNIT-III

Natural and Mechanical Ventilation

Production of natural Ventilation; Motive Column; Computation of NVP from air density; Centrifugal and axial flow fans- Construction, pressure developed, characteristic curves, series and parallel operation; Fan laws; Selection of mine fans; Evasee; Auxiliary ventilation; Booster fans.

(Dr. S. Jayanthu) **University Nominee**	(Dr. B. S. Sastry) **Subject Expert**	(Mr. S. Venkata Chary) **Industrial Expert**	(Dr. M.V.S. Babu) **Special Invitee Member**	(Dr. Satya Prakash) **BOS-Member**
Dr. Atma Ram Sahu **BOS-Member**	(Mr. G. D. N. Raju) **BOS-Member**	(Ms. P. S. Mounika) **BOS-Member**	(Mr. A. K. Sanjay) **BOS-Member**	(Dr. A. Charan Kumar) **BOS-Chairman**

UNIT-IV
Ventilation Survey
Importance of ventilation survey; Air quantity survey; Vane Anemometer; Standard of ventilation and permissible air velocities; Location of air measuring stations; Pressure quantity survey by U-tube manometer and inclined manometer.

UNIT-V
Ventilation Network Analysis
Airways Connected in Series and Parallel; Splitting of Airways; Merits and Demerits of Series Airways; Basic Concepts in Ventilation Network Analysis; Methods of Solving Ventilation Networks; Hardy Cross Method of Successive Approximation.

Textbook(s)

1. D. J. Deshmukh, Elements of Mining Technology, Vol II, Denett & Co., 2016.
2. G. B. Mishra, Mine Environment and Ventilation, Oxford University Press, 1986.

Reference(s)

1. Howard L. Hartman, Mine ventilation and air conditioning, Wiley, 2012.
2. Vutukuri & Lama, Environmental Engineering in Mines, Cambridge University Press, Cambridge, 1986.
3. S. Ghatak, Mine Ventilation, Vol. – II, Coalfield Publishers, 1993.

Weblink(s)

1. https://nptel.ac.in/courses/123106002

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Dr. Atma Ram Sahu **BOS-Member**	(Mr. G. D. N. Raju) **BOS-Member**	(Ms. P. S. Mounika) **BOS-Member**	(Mr. A. K. Sanjay) **BOS-Member**	(Dr. A. Charan Kumar) **BOS-Chairman**

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. I Sem. (5th Semester)			
Course Code 201MM503	**Underground Metal Mining**				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Development of Mineral Deposits		3	0	0	3

Course Objectives

1. To impart the knowledge on the terminology used in underground metal mining.
2. To elaborate about the development of a metal mine.
3. To discuss various raising methods used in underground metal mining
4. To expound different stoping methods and their applications.
5. To demonstrate the special stoping methods and their applications.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Comprehend the terminology used in underground metal mining, their scope and limitations.
CO2:	Analyze the mine development works in underground metal mine.
CO3:	Summarize the raising methods used in underground metal mining.
CO4:	Assess different stoping methods, their applicability with limitations.
CO5:	Discuss different special stoping methods, their applicability with limitations.

Syllabus

UNIT-I

Introduction to Metal Mining

Metal mining terminologies; Applicability; Scope and limitations of underground metal mining; Indian metal mining industry; Opening of underground deposits.

UNIT-II

Metal Mine Development

Selection of a suitable mode of entry of deposit, different types of entry, factors effecting choice of mode of entry; Selection of level intervals, factors effecting it; Winzes; Haulage drifts; Cross-cuts drifts; Ore bin; Ore chute; Ore pass; Shaft station and their positions relative to ore body; Use of modern drilling and loading equipment in drifting.

(Dr. S. Jayanthu) **University Nominee**	(Dr. B. S. Sastry) **Subject Expert**	(Mr. S. Venkata Chary) **Industrial Expert**	(Dr. M.V.S. Babu) **Special Invitee Member**	(Dr. Satya Prakash) **BOS-Member**
Dr. Atma Ram Sahu **BOS-Member**	(Mr. G. D. N. Raju) **BOS-Member**	(Ms. P. S. Mounika) **BOS-Member**	(Mr. A. K. Sanjay) **BOS-Member**	(Dr. A. Charan Kumar) **BOS-Chairman**

UNIT-III
Raising Methods
Steps involved in – open raising by drilling, blasting, and mucking; Two and three compartmental raising, Jora raising, long hole drilling, Alimak raise climber, raise borers, applications and limitations.

UNIT-IV
Stoping Methods
Classification of stoping methods; Factors affecting selection of stoping methods; Stoping without supports: Open stopping, overhand, underhand, breast stoping; Sublevel stoping, room and pillar- their applicability, limitations, merits and demerits.

UNIT-V
Special Stoping Methods
Shrinkage stoping; Cut and fill stoping; Square set stoping; Long-hole stoping; V.C.R Stoping; Top slicing, sublevel caving and block caving- their applicability, limitations, merits, and demerits.

Textbook(s)

1. D. J. Deshmukh, Elements of Mining Technology, Volume-II, Dennett & Co.,2016.
2. Y. P. Chacharkar, A study of Metalliferous Mining methods, Lovely Prakashan, 1994.

Reference(s)

1. Edited by Peter Darling, SME Mining Engineering Handbook Volume I & II, Published by Society for Mining, Metallurgy, and Exploration (U.S.), 2011.
2. Edited by Richard C. Bullock, Richard L. Bullock, W. A. Hustrulid, William A. Hustrulid, Underground Mining Methods Engineering Fundamentals and International Case Studies, Published by Society for Mining, Metallurgy, and Exploration, 2001.

Weblink(s)

1. https://nptel.ac.in/courses/123105006

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University Nominee	**Subject Expert**	**Industrial Expert**	**Special Invitee Member**	**BOS-Member**
Dr. Atma Ram Sahu	(Mr. G. D. N. Raju)	(Ms. P. S. Mounika)	(Mr. A. K. Sanjay)	(Dr. A. Charan Kumar)
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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. I Sem. (5th Semester)			
Course Code	**Geostatistics** (Professional Elective-I)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Development of Mineral Deposits, Surface mining,		3	0	0	3

Course Objectives

1. To discuss the schools of Geostatistics, estimation models for mine evaluation.
2. To elaborate semi-variogram and co-variogram.
3. To educate on extension variance and estimation variance.
4. To impart the knowledge on integrated geological-geostatistical system.
5. To communicate the geostatistical applications.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Comprehend the schools of Geostatistics, estimation models for mine evaluation.
CO2:	Interpret semi-variogram and co-variogram.
CO3:	Comprehend the extension variance and estimation variance.
CO4:	Analyze the integrated geological-geostatistical system.
CO5:	Identify the geostatistical applications.

Syllabus

UNIT-I

Introduction to Geostatistics

Definition, schools of Geostatistics, estimation models for mine evaluation- average method, polygonal or triangular method, deterministic mathematical model, independent random model, trend with random noise, correlated random model and trend with correlated random residuals.

UNIT-II

Semi-variogram and Co-variogram

Definitions, characteristics and computation in one, two, and three dimensions; Mathematical models; Associated difficulties i.e. anisotropy, non-stationeries, regularization, presence of nugget effect.

UNIT-III

Extension variance and estimation variance

Calculation of estimation variance, the nugget effect and estimation variance, auxiliary function and their examples.

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University Nominee	**Subject Expert**	**Industrial Expert**	**Special Invitee Member**	**BOS-Member**

Dr. Atma Ram Sahu	(Mr. G. D. N. Raju)	(Ms. P. S. Mounika)	(Mr. A. K. Sanjay)	(Dr. A. Charan Kumar)
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Kriging

kriging and optimal valuation, kriging equations in general cases.

UNIT-IV

The Integrated geological-geostatistical system

Statistical analysis, comparative statistical analysis, geostatistical structural analysis, trend analysis; Point kriging; Cross validation; Block kriging; Mineral inventory; Tonnage relations.

UNIT-V

Geostatistical applications

Optimization of exploration drilling; Calculation of mineral inventory; Establishment of grade-tonnage relations; Misclassified tonnage; Grade control plan.

Textbook(s)

1. Issacks and Srivastava, An Introduction to Applied Geostatistics, Oxford, JBH, 1990.

Reference(s)

1. Rendu J.M John Wiley and Sons, An Introduction to Geostatistical methods of Mineral Exploration, 1981.
2. David & Michel, Geostatistical Ore Reserve Estimation, Mc Graw Hill, 1977.

Weblink(s)

1. https://nptel.ac.in/courses/105105170

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. I Sem. (5th Semester)			
Course Code	**Mine Transportation** (Professional Elective-I)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Surface Mining, Underground Coal Mining, Underground Metal Mining		3	0	0	3

Course Objectives

1. To discuss the principles, operations and application of conveyors.
2. To illustrate about rope haulage and its application in mines.
3. To impart the knowledge in various locomotive haulage system and its applications.
4. To elaborate various winding systems and its applications in mines.
5. To expound skip and koepe winding systems in mines.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Assess the principles, operations and application of conveyors.
CO2:	Demonstrate different types of rope haulage and its applications.
CO3:	Identify various locomotive haulage systems.
CO4:	Demonstrate various types of winding systems in mine.
CO5:	Comprehend skip and koepe winding in mines.

Syllabus

UNIT-I

Conveyors

Different types of conveyors-shaker conveyor, belt conveyor, scraper chain conveyor & armored flexible conveyor and their principles of operation, application, merits and demerits; Capacity calculation; Recent developments- High Angle conveyors.

UNIT-II

Rope Haulage

Different types of rope haulage - description with suitability of these haulages and their applications & limitations, merits and demerits; Different types of safety devices on rope haulages including jazz rail, back catch, spring catch, drop warrick, inter-coupled stop block & runway switch, drags, tub retarder; Different types of rope clips, tub couplings; Size of rail sleepers & rail fastening, fish plates, ballast, Jim crow; Super elevation; Diamond crossing.

(Dr. S. Jayanthu) **University Nominee**	(Dr. B. S. Sastry) **Subject Expert**	(Mr. S. Venkata Chary) **Industrial Expert**	(Dr. M.V.S. Babu) **Special Invitee Member**	(Dr. Satya Prakash) **BOS-Member**
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UNIT-III

Locomotive haulage

Types of locomotives; Battery, diesel, electric, compressed air driven locomotives; Construction, limitation, operational features, merits and demerits; Hazards and their prevention; Locomotive haulage calculation; Safety devices of diesel locomotives including flame trap and exhaust conditioner box.

UNIT-IV

Winding system

Function of headgear- height of headgear - different factors, design of headgear, headgear pulley, constructional features and angle of fleet.

Cage

Constructional features, cage suspension gear, detaching hook and its function, safety catches at head gear; Keps-props & guides used in mine shafts; Rigid and flexible guides, guide shoes, guide rope suspension & tensioning arrangement; Guide rope & winding rope changing.

UNIT-V

Skip & Koepe Winding

Skip types & construction, pit top & pit bottom arrangements, advantages and disadvantages; Types of Koepe Winder, Koepe wheel; Two winders working in the same shaft; Different profile of winding drum- merits & demerits, attachment of winding rope to drum; Winding brakes - mechanical-post and calliper brake; Various safety devices on winding system including automatic contrivances for over wind.

Textbook(s)

1. N.T. Karelin, Mine transport. Orient Longmans, 1967.
2. D.J. Deshmukh, Elements of Mining Technology, Volume –III, Dennett & Co., 2016.
3. S. Ghatak, Mine Pumps Haulage and Winding. Coalfield Publishers Skylark, 1995.

Reference(s)

1. S. K. Das, Modern coal mining Technology, Lovely Prakashan, Dhanbad, 1994
2. R. S Khurmi & J.K Gupta, Theory of Machines, Eurasia Publishing House, 2008
3. H. L Hartman Introduction to Mining Engineers, John Wiley & Sons, 1991

Weblink(s)

1. https://nptel.ac.in/courses/123105005

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University Nominee	**Subject Expert**	**Industrial Expert**	**Special Invitee Member**	**BOS-Member**

Dr. Atma Ram Sahu	(Mr. G. D. N. Raju)	(Ms. P. S. Mounika)	(Mr. A. K. Sanjay)	(Dr. A. Charan Kumar)
BOS-Member	**BOS-Member**	**BOS-Member**	**BOS-Member**	**BOS-Chairman**

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. I Sem. (5th Semester)			
Course Code	**Management Principles** (Professional Elective-I)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Surface Mining		3	0	0	3

Course Objectives

1. To introduce the concepts of mine management.
2. To discuss the practices of personal management.
3. To impart the knowledge on operation management and work study.
4. To inculcate about the behavioral sciences for management.
5. To familiarize with the concept of maintenance and marketing management.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Comprehend and practice mine management.
CO2:	Appraise the importance of personal management and human relations
CO3:	Perform work study environment and comprehend operation management.
CO4:	Outline the concepts of behavioural sciences for management.
CO5:	Comprehend the principles of maintenance and marketing management.

Syllabus

UNIT-I

Introduction

Evolution of management; Theory and practice; Principles of scientific management; Elements of management function; Planning; Organization and control; Structure and design of organization for mining enterprises.

UNIT-II

Personal Management

Selection, training and development of human resources for mining enterprises; Leadership; study of traditional leader behavior; Autocratic; Democratic and Laissez-Faire behaviors.

UNIT-III

Operations Management

Determination of norms and standards of operations by work study; Analysis of mine capacities and capability; Production planning; Scheduling and control; Productivity; Concepts and measurements; Application of Ergonomics in mine operation.

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University Nominee	**Subject Expert**	**Industrial Expert**	**Special Invitee Member**	**BOS-Member**

Dr. Atma Ram Sahu	(Mr. G. D. N. Raju)	(Ms. P. S. Mounika)	(Mr. A. K. Sanjay)	(Dr. A. Charan Kumar)
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UNIT-IV

Behavioral Sciences for Management

Conflict management; Conflict in organization; Sources of conflict; Dealing with conflict; Organizing for conflict resolution; Conflict and growth; Individual motivation; Two-way personal communication.

UNIT-V

Maintenance Management

Definition, classifying reliability, types of Maintenance; Break-down, scheduled, preventive, predictive, protective and lean maintenance.

Marketing Management

Strategic planning & marketing management processes, marketing environment, marketing information systems, market management and forecasting; New product development processes.

Textbook(s)

1. I M Pandey, Financial Management, Vikash Publishing House Pvt. Ltd., New Delhi.
2. P. Gopalakrishnan & M. Sundaresam, Materials Management- An Integrate Approach, Prentice Hall India Pvt. Ltd., New Delhi.
3. SC Saksena, Business Administration and Management, Sahitya Bhawan, Agra.

Reference(s)

1. P. Kstler, Marketing Management, Prentice Hall India Pvt. Ltd. New Delhi.
2. M. Telsang, Industrial Engineering and Production Management, S. Chand & Co. Ltd., New Delhi.
3. Lee & Dobbler, Purchasing and Materials Management, Tata Mc-Grand Hill Publishing Co. Ltd. New Delhi.

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University Nominee	**Subject Expert**	**Industrial Expert**	**Special Invitee Member**	**BOS-Member**
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BOS-Member	**BOS-Member**	**BOS-Member**	**BOS-Member**	**BOS-Chairman**

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. I Sem. (5^{th} Semester)			
Course Code	**Rock Excavation Engineering** (Professional Elective-I)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Surface Mining		3	0	0	3

Course Objectives

1. To elaborate the concept of theory of rock breaking.
2. To discuss the rock properties related to rock excavation.
3. To impart the knowledge on rock cutting technology.
4. To demonstrate various rock cutting tools and their applications.
5. To educate about different rock excavation machines and their working.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Comprehend the rock breaking theory.
CO2:	Summarize rock properties related to rock excavation.
CO3:	Appraise the technology used in rock cutting.
CO4:	Classify various rock cutting tools and their applications.
CO5:	Compare various rock excavating machines.

Syllabus

UNIT-I

Introduction

Concept; Historical developments in rock excavation systems; Factors affecting the rock fragmentation; Mechanism of rock breakage and fracture, their application to rock fragmentation methods– explosive action, cutting, ripping and impacts, Energy consumption computations.

UNIT-II

Rock properties

Rock properties related to excavation process; Application of compressive, tensile and tri- axial strengths; Index tests and abrasivity, anisotropy, elasticity, porosity; Laminations, bedding and jointing in rock fragmentation process.

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UNIT-III

Rock cutting technology

Mechanism of drilling – rotary, percussive, rotary percussive; Mechanics of rock cutting, theory of single tool rock cutting; Crack initiation and propagation; Breakage pattern; Rock excavation by cutting action – picks, discs, roller cutters, water jet cutting; Methods of evaluation of drillability and cutability index of rocks.

UNIT-IV

Rock cutting tools

Rock cutting tool materials, different types, relative applications and their choice; Tool shape and size, specific energy consumption, tool wear; Effect of operational parameters on tool performance, maintenance and replacement of cutting tools of excavating machines.

UNIT-V

Rock excavating machines

Excavating machines, principles, operation, applicability and technical indices of road headers; surface miner, TBM'S coalface machines and bucket wheel excavators; Recent Developments in rock excavationmachinery.

Textbook(s)

1. Clark, G.B., Principles of Rock Fragmentation, John Wiley and Sons, New York, 1987.
2. Jimeno, C.L., Jimeno, E.L., Carcedo, F.J.A., Drilling & Blasting of rocks, CRC Press, 1995.

Reference(s)

1. Hartman, H.L., Introductory Mining Engineering, John Wiley and Sons, New York, 1987
2. Chugh, C.P., Diamond Drilling, Oxford-IBH, 1984.
3. B.V. Ghokhle, Rotary, Drilling and Blasting in Large Surface Mines, CRC Press, 2010.
4. M. Rao, K.U., B.Mishra Principles of Rock Drilling, Oxford & IBH, New-Delhi, 1999.

Weblink(s)

1. https://nptel.ac.in/courses/123105007
2. https://nptel.ac.in/courses/123105003

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. I Sem. (5th Semester)			
Course Code 201MM511	**Mine Planning and Design Laboratory**				
Teaching	Total contact hours - 36	L	T	P	C
Prerequisites: Mine Planning and Design		0	0	3	1.5

Course Objectives

1. To discuss the process of mine planning and stages of planning new mines.
2. To impart the knowledge of preparation of plan reports.
3. To elaborate the ventilation and infrastructure planning.
4. To familiarize with the concept of open-pit design.
5. To discuss about the production calculations of different machinery used in mines.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Comprehend and plan different stages in new mines.
CO2:	Analyse and prepare different plan reports.
CO3:	Interpret the design, planning of ventilation and infrastructure in mines.
CO4:	Analyse the concept of open-pit design.
CO5:	Calculate the production obtained by using various machinery in mines.

List of Experiments

1. Determination of stability of slopes by using Janbu Method
2. Determination of stability of slopes by using Bishop Method
3. Design of ventilation circuit using Ventsim software
4. Calculation of dust in underground mine using Ventsim software
5. Assessment of stripping ratio in mines.
6. Estimation of powder factor in an underground mine.
7. Estimation of powder factor in an open cast mine.
8. Production calculation of an opencast mine using shovel-dumper combination.
9. Production calculation of an opencast mine using a Dragline.
10. Assessment of production operations of continuous miner in UG mines.

Additional Experiments

11. Study of production operations of LHD & SDL in UG mines.
12. Study of production operations of a surface miner in OC mines.
13. Study of pillar load and factor of safety.
14. Study of Pit Cut-off grade and its estimation.

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Reading Material(s)

1. J. Bhattacharya, Principles of Mine Planning, Allied Publishers Private Limited, 2016.
2. R D Singh, Principles and Practices of Modern Coal Mining, New Age Publishing, 2005.
3. Mine Planning and Design Laboratory Manual.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. I Sem. (5th Semester)			
Course Code 201MM512	**Mine Ventilation Laboratory**				
Teaching	Total contact hours - 30	L	T	P	C
Prerequisites: Mine Ventilation		0	0	3	1.5

Course Objectives

1. To impart the knowledge on various gas detection equipment
2. To discuss about the mine ventilation systems.
3. To demonstrate about mine ventilation survey.
4. To impart the knowledge on the various flame safety lamps.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Demonstrate different mine gas detection equipment.
CO2:	Compare different types of ventilation control devices.
CO3:	Interpret and perform the mine ventilation survey.
CO4:	Perform the tests using various flame safety lamps.

List of Experiments

1. Study of multi gas detector for measuring mine gasses.
2. Detection of Carbon monoxide (CO) by CO detector.
3. Detection of Methane (CH_4) by Methanometer.
4. Study of flame safety lamp.
5. Detection of Methane by flame safety lamp.
6. Determination of cooling power by Kata thermometer.
7. Determination of relative humidity of mine air by Whirling hygrometer.
8. Determination of air quantity by vane anemometer.
9. Determination of air pressure (mine & duct) by inclined manometer.
10. Determination of air pressure (mine & duct) by pitot tube.

Reading Material(s)

1. D. J. Deshmukh, Elements of Mining Technology, Vol II, Denett & Co., 2016.
2. G. B. Mishra, Mine Environment and Ventilation, Oxford University Press, 1986.
3. Mine Ventilation Laboratory Manual.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. I Sem. (5th Semester)			
Course Code	**Summer Internship / Mini Project-I**				
Teaching	Total contact hours -	L	T	P	C
Prerequisites:		0	0	0	1.5

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. II Sem. (6th Semester)			
Course Code 201MM601	**Computer Applications in Mining**				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Underground Coal Mining, Underground Metal Mining, Surface Mining		3	0	0	3

Course Objectives

1. To discuss the usage of computers and software in exploration, blasting, ground vibration, subsidence.
2. To elaborate various numerical methods and their applications in mining.
3. To introduce different techniques like LIDAR and communication systems used mines.
4. To expound different numerical modeling methods used in mining.
5. To educate the application of computers in ventilation and strata monitoring.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Identify use of computers and software in exploration, blasting, ground vibration, subsidence etc.
CO2:	Summarize various numerical methods and their applications in mining.
CO3:	Outline different tools and techniques like LIDAR and communication systems used in mines.
CO4:	Comprehend various numerical modeling methods used in mining.
CO5:	Relate computer applications in ventilation and strata monitoring.

Syllabus

UNIT-I

Introduction

Types of mining data; Introduction to the standard applications of software (FLAC, SURPAC, MINEX); MS-Office, File handling; Algorithms; Flow charts for mining activities; Computer application in field exploration, blasting, ground vibration, GPS.

UNIT-II

Numerical methods

Finite Element Method (FEM); Finite Difference Method (FDM); Boundary Element Method (BEM); Discrete Element Method (DEM); Their applications in mining.

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Simulation
Introduction to simulation and basics of simulation methods.

UNIT-III
Tools & Techniques
Application of Unmanned Aerial Vehicles; LIDAR systems; Slope Stability Radar (SSR); Communication systems in mines.

UNIT-IV
Numerical modeling in mining
Bord & Pillar Mining method; Long wall mining method; Continuous Mining method; Open-Pit slopes; Dump slopes.

UNIT-V
Applications in Ventilation and strata monitoring
Subsidence analysis; Subsidence prediction in Bord & Pillar Mining method, Long wall mining method; Computer applications in ventilation and strata monitoring - Ventsim.

Textbook(s)

1. Debasis Deb, Finite Element Methods-Concepts and Applications in Geo-mechanics, PHI Learning Pvt. Ltd., New Delhi, 2006.
2. R.V. Ramani, Application of computer methods in the mineral industry, Society of Mining Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, 1977.

Reference(s)

1. Vibhuti N. Misra, Computer Applications in Mineral Industry, Allied Publishers, 2003.
2. Edited by Roussos Dimitrakopoulos, Advances in Applied Strategic Mine Planning, Springer International Publishing, 2018.
3. Howden, VentSim Design User Guide, https://ventsim.com/files/VentsimManual.pdf

Weblink(s)

1. https://nptel.ac.in/courses/123105007
2. https://ventsim.com/tutorials/

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University Nominee	**Subject Expert**	**Industrial Expert**	**Special Invitee Member**	**BOS-Member**

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem. (6th Semester)			
Course Code 201MM602	**Mine Legislation and General safety**				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Underground Coal Mining, Underground Metal Mining, Surface Mining		3	0	0	3

Course Objectives

1. To discuss the history of mining legislation in India, Mines Act and MMDR Act 2015.
2. To elaborate CMR 2017, MMR 1961, the MCR.
3. To familiarize about the Mine rules 1955, Mines Rescue Rules and MVT Rules.
4. To communicate the National Coal Wage Agreement and CMPF Act.
5. To discuss about the general safety aspects in mining.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Outline the history of mining legislation in India
CO2:	Summarize the CMR 2017, MMR 1961, Mineral Concession Rules.
CO3:	Illustrate the Mine rules, Rescue Rules and MVT Rules
CO4:	Summarize the National Coal Wage Agreement and CMPF Act
CO5:	Outline the general safety aspects in mining

Syllabus

UNIT-I

General principles of mining laws; History and development of mine legislation in India; Mines Act 1952; Mines & Minerals (Development & Regulation) Act 2016.

UNIT-II

Coal Mine Regulation 2017; Metalliferous Mines Regulation 1961; Mineral Concession Rules.

UNIT-III

The Mines Rules 1955; The Mines Rescue Rules 1985; Mines Vocational Training Rules 1966.

UNIT-IV

National Coal Wage Agreement; Coal Mines Provident Fund and Miscellaneous Provisions Act 1948; Indian Electricity Rules 1956.

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University Nominee	**Subject Expert**	**Industrial Expert**	**Special Invitee Member**	**BOS-Member**

Dr. Atma Ram Sahu	(Mr. G. D. N. Raju)	(Ms. P. S. Mounika)	(Mr. A. K. Sanjay)	(Dr. A. Charan Kumar)
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UNIT-V

Accident in mines- causes and preventive measures; Various types of injuries; Need for mine safety; Introduction to risk management; Occupational Safety, Health and working conditions 2020.

Textbook(s)

1. R.T. Deshmukh, Mineral and Mine Economics, Myra Publications, Nagpur, 1986.
2. Bare Act, The Mines Rules 1955 and the Mines Rescue Rules 1985, Universal Law Publishing.
3. G. N. Raju, The Coal Mines Regulations 2017, Planet Publishing House, 2017.
4. L. C. Kaku, The Metalliferous Mines Regulations 1961, Lovely Prakashan, 2016.
5. Samir Kumar Das, Mine Safety and Legislation, Lovely Prakashan, 2002.

Reference(s)

1. Prasad & Rakesh, Legislation in Indian Mines - Critical Appraisal, Tara Book Agency, 1999
2. L. C. Kaku, The Coal Mine Regulations, 2017, Lovely Prakashan, 2018.
3. Mines & Minerals (Regulation & Development), Act 1957; Mineral conservation and Development rules; Mineral concession rules- Govt. of India Publication.

Weblink(s)

1. https://www.dgms.gov.in/

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University Nominee	**Subject Expert**	**Industrial Expert**	**Special Invitee Member**	**BOS-Member**
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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. II Sem. (6th Semester)			
Course Code 201MM603	**Rock Mechanics**				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Underground Coal Mining, Surface mining		3	0	0	3

Course Objectives

1. To discuss the importance of rock mechanics and physio-mechanical properties of rock.
2. To expound various stresses and strains in rocks.
3. To illustrate the different in-situ stress measurement techniques and geophysical investigation methods.
4. To impart the knowledge on different rock mass classification and rock failure criterion.
5. To inculcate about various slope failures and their stabilization techniques.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Appraise the importance of rock mechanics and physio-mechanical properties of rock.
CO2:	Analyse the stress-strain in rocks.
CO3:	Outline insitu stress measurement techniques and geophysical investigation methods.
CO4:	Differentiate among various rock mass classifications and rock failure criterion.
CO5:	Analyse the various modes of slope failure and its stabilization techniques.

Syllabus

UNIT-I

Introduction

Definition, importance and application of rock mechanics in mining; Classification of rock; Defects in rock mass.

Physio-Mechanical Properties of Rock

Determination of physio-mechanical properties of rock as per ISRM standard testing procedures; Strength indices and their importance; Parameters influencing strength; Abrasivity of rock and its determination.

UNIT-II

Analysis of Stress and Strain

Analysis of stress and strain in two & three dimensions, principal stresses and strain, stress ellipsoid and stress director's surface; principal stress strain invariants; Determination of maximum shear stress; Octahedral stresses; Differential equilibrium equations; Compatibility equation of stress and strains; Stress concentration around underground openings.

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UNIT-III

In-situ stress measurement

In-situ stress- various methods of stress measurement, hydro-fracturing technique, flat jack technique; Field shear test; Deformability tests in rock mass. Geotechnical properties of rocks; Anisotropy and creep; Rheological models.

UNIT-IV

Rock Mass Classification

Classification of rock mass, importance of rock mass classification, parameters of rock mass classification; RQD, Q–system and Bieniaswski's Geo-mechanics classification of rock mass; Rock Mass Rating (RMR), Laubscher's- MRMR, Rock Structure Rating (RSR) system; Terzaghi Rock load theory, Hoek's-GSI.

Theories of Rock Failure

Coulomb, Mohr and Griffith criteria, empirical formula.

UNIT-V

Influence of water on rock

Exploration and engineering importance of groundwater; Influence of water on rock, permeability of rocks, measurement of permeability.

Slope Stability

Mode of slope failure- plane failure, wedge failure, toppling failure, circular failure and stabilization and protection methods.

Textbook(s)

1. T. Ramamurthy, Engineering in rocks for slopes, foundations and tunnels, PHI Learning Private Limited, 2011.
2. Debasis Deb, Abhiram Kumar Verma, Fundamentals and Application of Rock Mechanics, Prentice Hall India Private Ltd, 2016.

Reference(s)

1. R.E Goodman, Introduction to rock mechanics, John Wiley and Sons, 2006.
2. V.S Vutukuri and K. Katsuyama, Introduction to rock mechanics, Industrial publishing & Consulting Inc, Tokyo, 1994.
3. B.H. G Brady and E. T. Brown, Rock mechanics for underground mining, George Allen and Unwin Ltd, 1979.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. II Sem. (6th Semester)			
Course Code	**Environmental Impact Assessment in Mines** (Professional Elective-II)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Environmental Science		3	0	0	3

Course Objectives

1. To discuss the concept of environmental impact assessment.
2. To elaborate the types and limitations of environmental impact assessment.
3. To impart the knowledge on the components of environmental impact assessment.
4. To educate on the impacts of environmental impact assessment.
5. To expound the statutory requirement for mine environment management.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Comprehend the concept of environmental impact assessment.
CO2:	Assess the types and limitations of environmental impact assessment.
CO3:	Identify the components of environmental impact assessment.
CO4:	Predict the impacts of environmental impact assessment.
CO5:	Appraise the statutory requirement for mine environment management.

Syllabus

UNIT-I
Introduction
Environmental Impact Assessment (EIA); Environmental Impact Statement; EIA in Project Circle; Legal and regulatory aspect in India according to Ministry of Environment and Forests.

UNIT-II
Types and limitations of EIA
Issues and terms of reference in EIA; Participation of Public and Non - Governmental Organizations in environmental decision making.

UNIT-III
Components of EIA
Components of EIA – Processes, Screening, Scoping, Setting, Analysis and mitigation; Matrices; Networks; Checklists; Connections and combination of processes; Cost benefit analysis; Analysis of alternatives; Software packages for EIA; Expert systems in EIA.

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UNIT-IV

Prediction and assessment of impacts

Prediction tools for EIA - Mathematical modeling for impact prediction; Assessment of impacts - Air - Water - soil - noise - biological - socio - cultural environments; Case Studies on Mining.

UNIT-V

Environmental Management

Plan preparation, implementation and review; Mitigation and rehabilitation plans; Policy and guidelines for planning and monitoring programmers; Post project audit; Ethical and quality aspects of Environmental Impact Assessment.

Textbook(s)

1. Lawrence D.P., Environmental Impact Assessment - Practical solutions to recurrent problems, Wiley - Interscience, New Jersey, 2003.
2. Petts J., Handbook of Environmental Impact Assessment, Vol - I and II, Blackwell Science London, 1999.

Reference(s)

1. N. S. Raman, A. R. Gajbhiye, S. R. Khandeshwar, Environmental Impact Assessment Paperback – Import, 2014.
2. R. Rajagopalan, Environmental Studies, OUP, India, 2011.
3. Gurudas Nulkar, Ecology, Equity and the Economy, Ecological society, 2018.
4. Y. Anjaneyulu, Valli Manickam, Environmental Impact Assessment Methodologies, Taylor & Francis, 2011.
5. Marja van Eck, Jules J. Scholten, Stefan A. A. Morel, EIA-methodology Scoping of Alternatives: A Study Based on Ten Representative Cases, Commission for Environmental Impact Assessment Secretariat, 1994.

Weblink(s)

1. https://nptel.ac.in/courses/123105001

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. II Sem. (6th Semester)			
Course Code	**Innovative Mining Systems** (Professional Elective-II)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Nil		3	0	0	3

Course Objectives

1. To discuss the technological innovations in mining operations.
2. To illustrate the systematic concepts for innovative mining.
3. To familiarize about the new developments in mining operations.
4. To impart the knowledge on the new frontiers of mining.
5. To illustrate the concepts of automation and robotics in mining.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Comprehend and analyze the technological life cycle of mining operations.
CO2:	Appraise the basics of system dynamics involved in innovative mining systems.
CO3:	Comprehend the new developments in mining operations.
CO4:	Apprehend the new frontiers of mining in real world.
CO5:	Design and introduce automation and robotics in mining operation.

Syllabus

UNIT-I
Technological innovations
Technology, invention, innovation, research and development – basic types, technology life cycle.

UNIT-II
System concepts
System concepts for innovative mining, methods for stimulating creativity in an organization and current technological needs; Basics of system dynamics, value engineering and Just In Time (JIT)-possible applications.

UNIT-III
Innovations in mining operations
Innovations in unit operations in surface and underground mining including high speed shaft sinking method; Developments in hard rock mining; New developments in long-wall mining and Developments in mine ventilation systems.

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UNIT-IV

New frontiers of mining

Mining in deep sea, outer space and Antarctica; Oil mining; Extraction of coal bed methane; Remote monitoring of long-wall support performance using tele-monitoring device.

UNIT-V

Automation and robotics in mining

Development of various robotic systems and their possible contributions.

Textbook(s)

1. Ehrenburger, V and Fajkos, A., Mining modeling, Elsevier, 1995.

Reference(s)

1. Bawden, W. F., and Archibald., J. F., Innovative Mine Design for the 21st century Elsevier, 1993

Weblink(s)

1. https://eos.org/features/underground-robots-how-robotics-is-changing-the-mining-industry
2. https://www.robotics.org/blog-article.cfm/How-are-Autonomous-Mobile-Robots-Used-to-Inspect-Mines/211

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. II Sem. (6th Semester)			
Course Code	**Mine Construction Engineering** (Professional Elective-II)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Development of Mineral Deposits		3	0	0	3

Course Objectives

1. To expound the geological investigations in mine.
2. To discuss the laying out of shaft lining.
3. To impart knowledge on the design and construction of insets.
4. To familiarize with the underground mechanization.
5. To impart knowledge on the construction of surface infrastructure.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Outline the geological investigations in mine.
CO2:	Comprehend the laying out of shaft lining.
CO3:	Appraise the design and construction of insets.
CO4:	Comprehend the mechanization of underground operations.
CO5:	Appraise the design and construction of surface infrastructure.

Syllabus

UNIT-I

Geological investigations in mines

Size of mine; Environment and ecology; Selection criteria for site of the openings geological investigations, Mine shaft, shaft sinking methods through alluvium, soft and hard rock.

UNIT-II

Shaft lining

Mechanization; Consolidation of loose ground shaft lining; Ground pressure; thickness of lining, design and procedure of laying the lining; Construction of shaft collar heap stead.

UNIT-III

Construction of insets

Design and construction of insets; Shaft bottom, excavation for mechanized decking of cages; Skip loading, pit bottom lay outs, installation of main haulages; Main sump size; Construction of underground substation; First aid room and office.

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UNIT-IV

Underground mechanization

Surface inclines, drivage through soft and hard rock, construction of portals and lining of inclines, lateral and vertical pressures; Underground developments, drivage of roads in stone and coal, mechanization support systems opening of faces; Surface layouts pit top circuits and coal handling and coal preparation plant, railway siding and weigh bridges, surface and underground coal bunkers winding house substation, lamp room.

UNIT-V

Construction of slope and dumps

Construction and Stabilization of Slopes, Construction and Stabilization of dumps, Construction of gabion wall, wire netting, preventing landslides, preventing debris from falling.

Textbook(s)

1. Pazdziora J., Design of Underground hard coal mine, Elsevier Science, 1998.
2. Popov, Working of Mineral Deposits, International Law & Taxation, 2001.

Reference(s)

1. Gurucharan Singh, Building Construction and Materials, Standard Book House, 2018.
2. Handy book of Construction Professionals & Services Hyderabad, Add Contact Publishers, 2018.
3. Rzhevsky, Unit operations in open cast mines, Mir Publisher, 1983.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. II Sem. (6th Semester)			
Course Code	**Mine Hazards and Rescue** (Professional Elective-II)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Mine Ventilation		3	0	0	3

Course Objectives

1. To expound the mechanism of spontaneous heating in mines and Graham's Index.
2. To communicate the different types of explosion and preventive measures.
3. To educate various causes of inundation in mines and preventive measures.
4. To impart knowledge on methods of mine rescue operations.
5. To discuss the various methods of mine illumination.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Outline the techniques to control spontaneous heating and mine fires in mines.
CO2:	Comprehend the techniques to prevent explosion.
CO3:	Comprehend and analyze the techniques to prevent inundation in mines.
CO4:	Summarize the techniques of mine rescue and recovery work.
CO5:	Outline the different methods of mine illumination.

Syllabus

UNIT-I

Introduction

Classification of fires-causes, detection, monitoring and control of surface and underground fires; Preventive measures-firefighting and inertization; Monitoring of atmosphere behind sealed off areas; Re-opening of sealed off areas.

Spontaneous Heating

Mechanism; Factors governing spontaneous heating; Stages of spontaneous heating; Detection and prevention of spontaneous heating; Graham's index.

UNIT-II

Explosions

Types of explosions; Coward's diagram; Ignition temperature; lag on ignition; Inflammability limits of fire damp and coal dust explosion; Causes and preventive measures of firedamp and coal dust explosion; Stone dust and water barriers; Investigation after explosion.

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UNIT-III

Inundations

Causes; Precautionary measures; Precautions to be taken while approaching old workings; Burnside boring apparatus; Design and construction of water dams; Recovery of flooded mines; Dewatering of old working.

Mine Illumination

Photometric terminologies; General lighting arrangements; Standards for underground and surface mine lighting; Factors affecting visual environment; Types of glare and its reduction; Mine lighting and its effect on accidents, production and health; Law of illumination; Type of light sources used in mines- incandescent lamp, fluorescent tube, metal halide lamps, sodium vapour lamps, compact fluorescent lamp and LED; Electric Cap lamp.

UNIT-IV

Mine Dust & Radiation

Dust generation in coal mines, its control measures, diseases, standards, instruments. Dust generation in metal mines, its control measures, diseases, standards, instruments.

UNIT-V

Mine Rescue & Recovery

Mine rescue and equipment; Short distance apparatus; Self-contained breathing apparatus; Reviving apparatus; Self rescuers; Rescue stations; Rescue organization; Reopening of Mines; Rescue and recovery work in connection with fire, explosions, and gases.

Textbook(s)

1. D. J. Deshmukh, Elements of Mining Technology, Volume-II, Denett & Co., 2016.
2. M.A. Ramlu, Mine Disasters and Mine Rescue, CRC Press, 1991.

Reference(s)

1. Dr. G.B. Mishra, Mine Ventilation, Oxford University Press, 1994.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem. (6th Semester)			
Course Code 201MM611	**Computer Applications in Mining Laboratory**				
Teaching	Total contact hours - 30	L	T	P	C
Prerequisites: Computer Applications in Mining		0	0	3	1.5

Course Objectives

1. To introduce the usage of computers and software in exploration, blasting, ground vibration, subsidence.
2. To elaborate the design of pillars, dumps and open pit slopes using numerical modeling.
3. To introduce the concepts of CPM/PERT and blast optimization.
4. To demonstrate the design of open cast and underground mines.
5. To familiarize with various software used in mining industry.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Comprehend the usage of software in various mining operations.
CO2:	Design pillars, dumps and slopes using numerical modeling.
CO3:	Comprehend the concepts of CPM/ PERT and blast optimization.
CO4:	Plan and design open cast and underground mines.

List of Experiments

1. Flowcharts and symbols for mining activities.
2. Design of mine pillars using numerical modeling.
3. Design of open pit slopes using numerical modeling.
4. Design of dump slopes using numerical modeling.
5. Application of CPM/PERT network in mine planning.
6. Optimization of blast design – open cast & underground.
7. Design of support system for underground mining methods.
8. To determine the Open Pit Design for effective mine planning.
9. To determine the Dump Design for effective mine planning.
10. Determination of area of lease boundaries by using coordinates in software.

Reading Material(s)

1. Debasis Deb, Finite Element Methods-Concepts and Applications in Geo-mechanics, PHI Learning Pvt. Ltd., New Delhi, 2006.
2. R.V. Ramani, Application of computer methods in the mineral industry, Society of Mining Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, 1977.
3. Computer Application in Mining Laboratory Manual.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem. (6th Semester)			
Course Code 201MM612	**Mine Rescue Laboratory**				
Teaching	Total contact hours - 30	L	T	P	C
Prerequisites: Mine Ventilation		0	0	3	1.5

Course Objectives

1. To introduce the different types of fire extinguishers.
2. To demonstrate the ways to calculate the noise level.
3. To familiarize the stone dust and water dust barriers used in mines
4. To demonstrate the ways to calculate the illumination at different location in mines.
5. To educate on different rescue apparatus used in mines.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Demonstrate the usage of fire extinguishers.
CO2:	Analyze the noise levels at different location in mines.
CO3:	Design the stone dust barrier in mines
CO4:	Plan the illumination requirement at different location in mines.
CO5:	Demonstrate the different types of rescue apparatus used in underground mines.

List of Experiments

1. Study the behavior of Soda acid fire extinguishers and its application.
2. Study the behavior of CO_2 snow fire extinguishers and its application.
3. Study the Dry chemical fire extinguishers and its application.
4. Determination of noise level at different locations in mines by using noise dosimeter.
5. Designing of stone dust barrier & water barrier in underground mines.
6. Study and maintenance of mine cap lamp.
7. Illumination survey at different workplaces.
8. Study the constructional behavior of supplied air respirators (SCBA apparatus).
9. Self-contained compressed oxygen breathing apparatus.
10. Implementation of gas mask during rescue operation.

Reading Material(s)

1. M.A. Ramlu, Mine Disasters and Mine Rescue, CRC Press, 1991.
2. Mine Rescue Laboratory Manual.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. II Sem. (6th Semester)			
Course Code 201MM613	**Rock Mechanics Laboratory**				
Teaching	Total contact hours - 30	L	T	P	C
Prerequisites: Rock Mechanics		0	0	3	1.5

Course Objectives

1. To impart the knowledge on preparation of rock sample.
2. To impart knowledge on physio-mechanical properties of rock.
3. To illustrate various methods to determine rock properties.
4. To impart the knowledge on various weathering effects on rocks.
5. To elaborate the drill-ability of rock.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Prepare rock samples for testing.
CO2:	Comprehend the Physico-Mechanical properties of rock.
CO3:	Determine the methods to measure the different strength parameters of rock
CO4:	Estimate the weathering effects on rock.
CO5:	Estimate the drill-ability index of rocks.

List of Experiments

1. Preparation of rock specimen.
2. Determination of density (wet and dry) of given rock specimen.
3. Determination of uniaxial compressive strength by uniaxial compressive testing machine.
4. Determination of tensile strength of given rock specimen by Brazilian method.
5. Determination of shear strength of given rock specimen.
6. Determination of point load index of the given rock specimen.
7. Determination of Protodyakonov strength index of given rock specimen.
8. Determination of slake durability index of the give specimen.
9. Determination of Impact Strength Index (ISI) of given rock specimen.
10. Determination of hardness of a given rock specimen by rebound hammer test.

Reading Material(s)

1. T. Ramamurthy, Engineering in rocks for slopes, foundations and tunnels, PHI Learning Private Limited, 2011.
2. Rock Mechanics Laboratory Manual.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. II Sem. (6th Semester)			
Course Code	**GIS Applications in Mining**				
Teaching	Total contact hours - 36	L	T	P	C
Prerequisites: Nil		1	0	2	2

Course Objectives

1. To introduce concepts of GIS to mining students
2. To impart knowledge on the concepts of GIS, coordinate system GIS data and its types
3. To impart knowledge on interpretation of land use.
4. To demonstrate the process of creating thematic maps
5. To illustrate on implementation of GIS interface for practical usage.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Create a base map from topo sheet.
CO2:	Develop a digital elevation model.
CO3:	Create thematic maps.
CO4:	Estimate the features and interpretation.
CO5:	Apply GIS for mining.

List of Experiments

1. Geo-referencing of Toposheet.
2. Preparation of Base map from topo sheet including legend, scale and annotation
3. Digitization of Map/Toposheet
4. Developing Digital Elevation model
5. Interpretation of Land Use/land cover detail from satellite imagery
6. Creation of thematic maps.
7. Estimation of features and interpretation
8. Simple applications of GIS in Water Resources
9. Simple applications of GIS in Transportation
10. Simple applications of GIS in Mining
11. Drone Surveying in GIS

Textbook(s)

1. Anji Reddy M. Remote sensing and geographical information systems. 2008.
2. Lillesand TM and Kiefer RW. Remote sensing and image interpretation. John Wiley and Sons, New York, 2004.

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Weblink(s)

1. QGIS, https://docs.qgis.org/3.22/en/docs/training_manual/

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7th Semester)			
Course Code	**Disaster Management** (Professional Elective-III)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Nil		3	0	0	3

Course Objectives

1. To elaborate the concepts of hazard and disaster.
2. To impart knowledge on classification of hazards and their consequences.
3. To discuss the approaches and measures in disaster management.
4. To elaborate different disaster management techniques.
5. To impart the knowledge on disaster management in India.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Comprehend the concepts of hazard and disaster management.
CO2:	Assess the types of hazards and their consequences.
CO3:	Comprehend the approaches and measures in disaster management.
CO4:	Distinguish various techniques in disaster management.
CO5:	Comprehend the statutory provisions related to disaster management in India.

Syllabus

UNIT-I

Concept of Hazards and Disasters

Concept of environmental hazards, environmental disasters; Different approaches & relation with human ecology – landscape, ecosystem and perception approach, human ecology & its application in geographical researches; Natural hazards and disasters – Man induced hazards & disasters - Natural hazards- Planetary hazards/ disasters- Endogenous hazards - Exogenous hazards.

UNIT-II

Classification of Hazards

Volcanoes- volcanic hazards/disasters, causes and distribution of volcanoes, hazardous effects of volcanic eruptions, environmental impacts of volcanic eruptions; Earthquake Hazards/disasters, causes of earthquakes, distribution of earthquakes, hazardous effects of earthquakes, earthquake hazards in India, human adjustment, perception & mitigation of earthquakes;

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Landslides- causes and impacts; Avalanches-causes and impacts; Infrequent events: Cyclones – Lightning – Hailstorms, cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms-causes, distribution human adjustment, perception & mitigation; Floods, droughts and their impacts.

UNIT-III

Approaches and Measures in Disaster Management

Emerging approaches; Pre- disaster stage-preparedness, emergency stage, post disaster stage-Rehabilitation provision of immediate relief measures to disaster affected people; Prediction of hazards & disasters; Measures of adjustment to natural hazards.

UNIT-IV

Disaster Management in Mines

Disaster Management Plan for opencast mines – Objective, Organization, communication, responsibilities, facilities. Disaster Management Plan for underground mines – Objective, Organization, communication, responsibilities, facilities.

UNIT-V

Disaster Management in India

Ecological planning for sustainability & sustainable development in India; Sustainable rural development: A remedy to disasters; Environmental policies & programmes in India; Institutions & National centers for natural disaster reduction, NDRF, NDMA and other related organizations; Recent disasters in India.

Textbook(s)

1. Jagbir Singh, Disaster management – Future challenges and opportunities, I.K. International publishing house, 2005.
2. Coppala P Damon, Introduction to International Disaster management, ABD publishers**,** 2007.

Reference(s)

1. R. B. Singh, Environmental Geography, Heritage Publishers, New Delhi, 1990.
2. Kates, B.I& White. G.F, The Environment as Hazards, Oxford publishers, NewYork, 1978.
3. R.B. Singh, Disaster Management, Rawat Publication, New Delhi, 2000.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7th Semester)			
Course Code	**Environmental Pollution and Control in Mines** (Professional Elective-III)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Environmental Science		3	0	0	3

Course Objectives

1. To discuss about the air pollution in mines
2. To enlighten about water pollution in mines.
3. To elaborate about noise pollution in mines.
4. To impart the knowledge on the biological land reclamation.
5. To inculcate about the environmental administration in India.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Assess air pollution in mines.
CO2:	Comprehend water pollution in mines.
CO3:	Appraise the importance of noise pollution in mines.
CO4:	Perform the biological land reclamation
CO5:	Perceive the basic information required for the preparation of environmental impact assessment and environmental management plan.

Syllabus

UNIT-I
Air Pollution

Definition; Atmospheric consideration; Basic of meteorology; Ozone layer and greenhouse effect; Contaminant dispersion; Sources of air pollution in mines; Effect of air pollution; Preventive measures of air pollution in mines; National Ambient Air Quality Standards.

UNIT-II
Water Pollution

Sources of water pollutants; Effect of water pollution; Water pollution modeling-Surface water; Biological oxygen demand modeling; Oxygen demanding waste in streams; Chemical oxygen demand; Ground water and its contamination; Acid mine drainage; Waste water treatment.

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UNIT-III

Noise and Vibration Pollution

Sources of noise and vibration in mines; Effects of noise pollution; Measurement of noise; Noise standard and guidelines; Control measures of noise pollution; Noise induced hearing loss; Sound pressure and sound pressure level; Noise dose; Nosie measuring instruments.

Effects of vibration; Hand arm vibration – Causes and control measures; Whole body vibration – Causes and control measures.

UNIT-IV

Land Degradation

Causes of land degradation; Impact of mining activities on land; Land reclamation method-rehabilitation, reclamation, restoration; Factor affecting the land restoration; Land reclamation planning.

UNIT-V

Socio Economic Impacts

Impact on society; Case studies on socio economic impact; Legislation relating to environmental protection; Visual impact due to mining; Environmental impact assessment. Project Affected People, Corporate Social Responsibility.

Textbook(s)

1. C.G. Down., J. Stock, Environmental Impact of Mining, Applied Science Publishers Ltd. London, 1980.
2. B. B. Dhar, Mining and Environment, Ashish Publishing House, New Delhi, 1986.

Reference(s)

1. R. Rajagopalan, Environmental Studies, OUP, India, 2011.
2. Lawrence D.P., Environmental Impact Assessment - Practical solutions to recurrent problems, Wiley - Interscience, New Jersey, 2003.

Weblink(s)

1. https://nptel.ac.in/courses/123105001

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7th Semester)			
Course Code	**Mining Finance and Economics** (Professional Elective-III)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Underground Coal Mining, Underground Metal Mining, Surface Mining		3	0	0	3

Course Objectives

1. To impart the knowledge on National Mineral Policy and mineral conservation.
2. To educate on the mineral taxation laws and pricing mechanism of minerals.
3. To discuss about various sampling methods.
4. To elaborate the different methods of mineral resource estimation.
5. To enlighten about different parameters to be considered in mine finance.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Summarize the various policies, acts, and conservation rules on minerals.
CO2:	Analyze the mineral taxation laws and pricing mechanism of minerals.
CO3:	Interpret various sampling methods.
CO4:	Estimate the reserves using various estimation methods.
CO5:	Analyze the mine finance and model optimum size of mine.

Syllabus

UNIT-I

Mineral resources and policies

Classification of mineral resources: indicated, inferred, proved; various mineral classification systems; National mineral resources; National mineral policy; Strategies for a development of mining industry; resource conservation.

UNIT-II

Trade and taxation on minerals

Mineral taxation, District Mineral Fund (DMF), royalty and subsidies; Mineral imports & Exports; Supply–demand of minerals; Pricing mechanism of minerals.

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UNIT-III
Mine Sampling
Theory of sampling, method of sampling employed in different cases, precaution to be taken, errors that occur during sampling; numerical problems on sampling; Sampling procedure and precaution during sampling of alluvial deposits and dumps, estimation of reserves.

UNIT-IV
Mineral Resource Estimation
Introduction to Resource estimation; Methods of resource estimation: Distance weighing methods- Inverse distance, Inverse distance square; Area of influence methods- polygonal method, triangular method; application of computers in mineral resource estimation.

UNIT-V
Mine Finance
Depreciation – concepts; methods of depreciation; financial and tax implications; preparation of cash flow statements; Discounted cash flow (DCF); Internal Rate of Return; Time value of money; Net Present Value (NPV); determination of optimum size of mine; Mine life.

Textbook(s)

1. R.T. Deshmukh, Mineral and Mine Economics, Myra Publications, Nagpur, 1986.
2. N. L. Sharma and R. K Sinha, Mineral Economics, Oxford and IBH, 1992.
3. I. N. Sinha and Subhash C. Ray, Mine & Mineral Economics, PHI Learning, 2016.

Reference(s)

1. O.P. Khanna, Industrial Management, Dhanpat Rai and Sons, 1999.
2. R. N. P. Arogyaswamy, Courses in Mining Geology, Oxford and IBH Pub., 2017.
3. P. K. Jain, Financial management, Tata McGraw Hill, 1981.
4. S. Krishnaswamy, India's Mineral Resources, Oxford & IBH pub., 1972.
5. W. Hustrulid and M. Kuchta, Open Pit Mine Planning and Design, CRC Press, 2013.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7^{th} Semester)			
Course Code	**Waste Management** (Professional Elective-III)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Surface Mining, Underground Coal Mining, Underground Metal Mining		3	0	0	3

Course Objectives

1. To impart the knowledge of Indian legislation on management of waste.
2. To discuss the characterization of solid and hazardous waste.
3. To elaborate the ways to reduce waste at source.
4. To expound the storage and collection of waste for selection of landfill and its design.
5. To educate on various disposal methods of mine waste.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Demonstrate the importance of waste management.
CO2:	Identify the characterization of solid and hazardous waste.
CO3:	Outline the source reduction of wastes.
CO4:	Summarize the waste storage and collection.
CO5:	Identify the criteria for selection of landfill.

Syllabus

UNIT-I

Introduction

Types and Sources of solid and hazardous wastes; Need for solid and hazardous waste management; Salient features of Indian legislations on management and handling of municipal solid wastes, hazardous wastes, biomedical wastes, electronic wastes, plastics and fly ash.

UNIT-II

Waste Characterization

Waste generation rates and variation; Composition, physical, chemical and biological properties of solid wastes; Hazardous Characteristics; Toxicity Characteristic Leaching Procedure (TCLP) tests; Waste sampling and characterization plan.

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UNIT-III

Source Reduction and Recyclying

Source reduction of wastes; Recycling and reuse; Waste exchange.

UNIT-IV

Storage, Collection of Waste

Handling and segregation of wastes at source; storage and collection of municipal solid wastes; Analysis of Collection system; Optimizing waste allocation; compatibility, storage, labeling and handling of hazardous wastes.

UNIT-V

Disposal and Transport of Waste

Hazardous waste manifests and transport; Waste disposal options; Disposal in landfills; Landfill Classification, types and methods; site selection; design and operation of sanitary landfills

Textbook(s)

1. George Techobanoglous, Integrated Solid Waste Management, McGraw Hill Publication, 1993.
2. John Pichtel, Waste Management Practices: Municipal, Hazardous and Industrial, CRC Press, 2014

Reference(s)

1. Vesilind P.A., Worrell W.A, Solid Waste Engineering, Cengage learning, 2011
2. Charles A. Wentz, Hazardous Waste Management, McGraw Hill Publication, 1995.
3. CPHEEO, Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organisation, Government of India, New Delhi, 2000.
4. M. D. LaGrega, P. L. Buckingham, C.Jeffrey, E vans, Environmental Resources Management, Hazardous waste Management, McGraw-Hill International edition, New York, 2001.

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1. http://cpheeo.gov.in/cms/manual-on-municipal-solid-waste-management-2016.php
2. https://nptel.ac.in/courses/105/106/105106056/

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7th Semester)			
Course Code	**Environmental Management and Planning in Mines** (Professional Elective-IV)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Environmental Science		3	0	0	3

Course Objectives

1. To discuss the environmental issues in mineral industry.
2. To expound about air and water pollution in mines.
3. To elaborate about noise pollution in mines.
4. To impart the knowledge on the biological land reclamation.
5. To educate on the Environmental Administration in India.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Outline the environmental issues in mineral industry.
CO2:	Interpret the air and water pollution in mines.
CO3:	Assess the importance of noise pollution in mines.
CO4:	Comprehend and analyse the biological land reclamation.
CO5:	Perceive the basic information required for the preparation of environmental impact assessment and environmental management plan.

Syllabus

UNIT-I

Introduction

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

Air Pollution

Sources, characterization, ill effects, measurement, monitoring, standards, mitigating measures.

UNIT-II

Water Pollution

Sources, ill effects, water quality parameters – physio-chemical, biological and bacteriological; Water quality criteria, standards, monitoring and mitigating measures; Heavy metal pollution and its abatement; Ground water pollution – detection and management; Acid mine drainage.

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UNIT-III

Noise Pollution and Control

Basics of acoustics; Sound power, intensity and pressure levels; Noise indices, effects, standards, instrumentation, monitoring and control.

Blasting

Environmental aspects of blasting.

UNIT-IV

Biological Land Reclamation

Environmental factors affecting re-vegetation – climatic, physical and chemical factors; Analysis and evaluation of site and soil; Plant species selection; Methods of vegetation establishment; Vegetation survey.

Societal Environment

Societal environment and its management including resettlement and rehabilitation; socio-economic impacts; sustainable development; concept of carrying capacity-based planning.

UNIT-V

Environmental Administration in India

Role of Indian Bureau of Mines, State Pollution Control Board, Central Pollution Control Board. Environmental Impact Assessment - methods of EIA and their applicability; Environmental Management Plan - structure and preparation of EMP; Environmental audit; salient features of Environment Protection Act.

Textbook(s)

1. C. G. Down. and J. Stock, Environmental Impact of Mining, Applied Science Publishers Ltd. London, 1980
2. B. B. Dhar, Mining and Environment, Ashish Publishing House, New Delhi, 1986.

Reference(s)

1. R. Rajagopalan, Environmental Studies, Oxford University Press, 2011.
2. Lawrence D.P., Environmental Impact Assessment - Practical solutions to recurrent problems, Wiley - Interscience, New Jersey, 2003.

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1. https://nptel.ac.in/courses/123105001

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7^{th} Semester)			
Course Code	**Drilling and Rock Fragmentation** (Professional Elective-IV)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Surface Mining		3	0	0	3

Course Objectives

1. To introduce the theory of rock breaking.
2. To expound the mechanism of rock fragmentation using various types of rock drilling.
3. To elaborate the mechanism of rock fragmentation due to explosive action
4. To impart knowledge on the techniques of blast design.
5. To educate the techniques of controlled blasting.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Comprehend the concept of rock breaking theory.
CO2:	Comprehend and analyze the mechanism of different types of rock drilling
CO3:	Analyze the mechanism of rock fragmentation.
CO4:	Comprehend the techniques of the blast design.
CO5:	Outline the techniques of controlled blasting.

Syllabus

UNIT-I

Drilling Methods

Mechanics of rotary, percussive and rotary-percussive drilling, Top hammer and Down-The-Hole hammer drilling; Short and long hole drilling equipment; Pneumatic and hydraulic rock hammers; Types of drill bits and its applications.

UNIT-II

Drillability of Rocks

Drillability of rocks, purpose of drillability, drilling performance-drill rate index, bit wear index; girding of drill bits.

UNIT-III

Mechanism of Rock Breaking

Mechanism of rock breaking, different rock breaking processes; General theory of rock cutting; different cutting tools and its applications; Phases of tool penetration into rock surface; Classification of drilling system; Rock drilling methods; Parameters affecting choice of drilling.

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Mechanics of Rock Fragmentation by blasting

Formation of crater by blast; Mechanics of rock fragmentation and fracture by explosive action.

UNIT-IV

Blasting Accessories

Blasting accessories, blasting parameters.

Design of Blasting Rounds

Design of blasting rounds for opencast and underground mines.

Blasting Results

Blasting efficiency; Mean fragment size; Blown-out shots, Misfires-their causes and remedial measures; Ground vibrations and air over pressure from blasting, mitigative measures.

UNIT-V

Controlled Blasting Technique

Controlled blasting techniques, Safety precautions.

Instrumentation in Blasting

Instrumentation in blasting, borehole pressure transducer, VOD probe, vibration monitor, high speed video camera.

Textbook(s)

1. G.K Pradhan, Drilling & Blasting, Mine Tech publication, 1996.
2. E. Lopez Jimeno, C. Lopez Jimino, Ayala Carcedo, Drilling and blasting of Rocks, Taylor & Fransis, 1995
3. Sushil Bhandari, Engineering Rock Blasting Operations, A.A Balkema/Rotterdam/ Brookfield, 1997.

Reference(s)

1. V.R. Sastry, Advance Drilling & Blasting, Allied Publishers, 1993.
2. E. Hoek and J. Bray, Rock Slope Engineering, The Inst. of Mining & Metallurgy, London, 1981.
3. George B. Clarke, Principles of Rock Fragmentation, Wiley Interscience, 1987.
4. B.V. Ghokhle, Rotary-Drilling and Blasting in Large Surface Mines, CRC Press, 2010.
5. M. Rao, K.U., Prof. S.C Roy, Principles of Rock Drilling, CRC Press, 1998.

Weblink(s)

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2. https://nptel.ac.in/courses/123105003

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7th Semester)			
Course Code	**Rock Slope Engineering** (Professional Elective-IV)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Rock Mechanics		3	0	0	3

Course Objectives

1. To introduce the basic mechanics of rock slope failures
2. To discuss the influence of water on stability of slopes
3. To elaborate the types of slope failure and its influencing parameters
4. To expound the monitoring and stabilization techniques to prevent slope failure.
5. To impart the knowledge on numerical analysis of slope stability.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Comprehend and analyze the parameters affecting slope stability.
CO2:	Appraise the influence of water on stability of slopes
CO3:	Comprehend and analyze the mechanism of different types of slope failure
CO4:	Identify the monitoring and stabilization methods to prevent slope failure.
CO5:	Demonstrate the numerical modeling of slope stability

Syllabus

UNIT-I

Introduction

Rock slope economics; Factors affecting slope stability; Geological investigation; Factor of safety of slopes; Data interpretation for slope stability analysis.

UNIT-II

Determination of shear strength

Determination of shear strength of discontinuities; Direct shear test; Tri-axial test.

Influence of ground water

Influence of ground water on slope and techniques of depressurization; Field measurement of permeability.

UNIT-III

Types of slope failure

Basic mechanisms of slope failure and its analysis - planar, wedge, rotational shear, toppling.

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UNIT-IV
Monitoring of rock slopes
Monitoring and instrumentation techniques of rock slopes; Slope stabilization methods.

UNIT-V
Numerical Modeling
Basic numerical modeling concepts: Continuum and Dis-continuum approach- Limit Equilibrium Method, Finite Difference Method, Discrete Element Method; Use of Slide, FLAC software, Geo slope software.

Textbook(s)

1. Duncan C. Wyllie, Chris Mah, Rock Slope Engineering, Spon Press, 2004.
2. E. Hoek and J. Bray, Rock Slope Engineering, The Institute of Mining & Metallurgy, London, 1981.

Reference(s)

1. R. N. Chowdury, Slope Analysis, Elsevier Scientific Pub, 1978.
2. Debasis Deb, Finite Element methods: Concepts and Applications in Geo mechanics, PHI Learning Pvt Ltd, New Delhi, 2006.
3. Goodman, R.E., Rock Mechanics, John Wiley and Sons, 1989.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem. (7^{th} Semester)			
Course Code	**Tunneling Engineering** (Professional Elective-IV)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Underground Metal Mining		3	0	0	3

Course Objectives

1. To discuss the importance of tunnel engineering technology in underground openings.
2. To expound the mechanism involved during tunneling engineering.
3. To communicate different drilling and blasting methods used in tunnel engineering.
4. To familiarize different equipment used in tunnel engineering.
5. To impart the knowledge on various support systems used in tunnel engineering.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Appraise tunneling engineering in underground openings.
CO2:	Comprehend and analyze the mechanism of tunneling engineering.
CO3:	Identify various drilling and blasting methods used in tunnel engineering.
CO4:	Identify different equipment used in tunnel engineering.
CO5:	Design the support systems in tunnel engineering.

Syllabus

UNIT–I

Introduction

Scope and application; historical developments; art of tunneling, tunnel engineering; future tunneling considerations; types of underground excavations: Tunnel, adit, decline, shaft; parameters influencing location, shape and size; geological aspects; planning and site investigations.

UNIT-II

Tunneling Methods

Types and purpose of tunnels; factors affecting choice of excavation technique; Methods - soft ground tunneling, hard rock tunneling, shallow tunneling, deep tunneling; Shallow tunnels – cut and cover, cover and cut, pipe jacking, jacked box excavation techniques; methods of muck disposal; Supporting; Problems encountered and remedial measures.

(Dr. S. Jayanthu)	(Dr. B. S. Sastry)	(Mr. S. Venkata Chary)	(Dr. M.V.S. Babu)	(Dr. Satya Prakash)
University Nominee	**Subject Expert**	**Industrial Expert**	**Special Invitee Member**	**BOS-Member**

Dr. Atma Ram Sahu	(Mr. G. D. N. Raju)	(Ms. P. S. Mounika)	(Mr. A. K. Sanjay)	(Dr. A. Charan Kumar)
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UNIT-III

Drilling and Blasting

Part A: Drilling - drilling principles; Drilling equipment; Drill selection; Specific drilling; Rock drillability factors; Blasting - explosives, initiators, blasting mechanics.

Part B: Types of cuts- fan, wedge and others; Blast design, tunnel blast performance-powder factor, parameters influencing, models for prediction; Mucking and transportation equipment selection.

UNIT-IV

Mechanization

Tunneling by Road headers and Impact Hammers: Cutting principles, method of excavation, selection, performance, limitations and problems; Tunneling by Tunnel Boring Machines: Boring principles, method of excavation, selection, performance, limitations and problems; Tunnel Boring Machine applications.

UNIT-V

Tunnel supports & services

Supports in tunnels: Principal types of supports and applicability; Ground treatment in Tunneling: Adverse ground conditions and its effect on tunneling; Excavation of large and deep tunnels, caverns; Tunnel services: Ventilation, drainage and pumping; Tunneling hazards.

Textbook(s)

1. Thomas R. Kuesel, Eleyn H. King, Tunnel Engineering - Hand book, Kluwer academic publishers, 1996.
2. R. Srinivasan, Harbor, Dock and Tunnel Engineering, Charotar publishing house, 2009.

Reference(s)

1. Debasis Deb, Finite Element methods: Concepts and Applications in Geomechanics, PHI Learning Pvt. Ltd, New Delhi, 2012.
2. Bernhard Maidl and Markus Thewes, Handbook of Tunnel Engineering: Structures and Methods, Wiley publishers, 2013.

Weblink(s)

1. https://nptel.ac.in/courses/123105003

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7th Semester)			
Course Code	**Mine Strata Control** (Professional Elective-V)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Underground Coal Mining		3	0	0	3

Course Objectives

1. To impart knowledge on the pre and post mining stresses and strata behaviour in mines.
2. To introduce different support systems in underground mines.
3. To discuss different methods of stowing in development and depillaring operations.
4. To elaborate the theories of ground movement
5. To discuss the mechanism of subsidence and its preventions.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Assess the pre and post mining stresses, strata behaviour in mines.
CO2:	Classify the various support systems in underground mines.
CO3:	Distinguish the different methods of stowing in development and depillaring operations.
CO4:	Relate the theories of ground movement.
CO5:	Comprehend the mechanism of subsidence and its preventions.

Syllabus

UNIT-I

Introduction

Definition and concept of ground control in mines; Constraints on ground control; Characteristics of coal measures strata; Pre and Post mining stresses in the rock; Effect of mining parameter on strata control.

UNIT-II

Theories of ground movement

Arch or Dome theory; Beam or Plate theory; Concept of strata pressure redistribution- long wall workings and bord & pillar workings; Manifestation of strata pressure.

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UNIT-III
Types of Supports
Timber & steel supports, Roof bolting, roof stitching, Powered Support; Examination of roof; Method of supporting roadways; Supporting under different conditions: SSR; Withdrawal of supports.

UNIT-IV
Mine Filling
Types of stowing- hand packing, caving, hydraulic, pneumatic and mechanical; Hydraulic profile and H/L ratio; Wear in pipes; Underground stowing arrangements and operations pipe; Rate of stowing; Pipe jams; Depillaring with stowing; Paste back fill.

UNIT-V
Subsidence
Theories of subsidence; Engineering parameters of subsidence- angle of draw and angle of fracture; Magnitude of subsidence; Prediction of subsidence; Subsidence damage; Prevention of subsidence.

Textbook(s)

1. R.D. Singh, Principle and practices of modern coal mining, New Age International Publishers, 2005.
2. Debasis Deb, Finite Element methods: Concepts and Applications in Geomechanics, PHI Learning Pvt. Ltd, New Delhi, 2010.

Reference(s)

1. Peng, S.S. Ground Control, Wiley Publications, New York, 1987.
2. Brady, B.H.G. and Brown, S.T. Rock Mechanics for Underground Mining, Chapman and Hall, 1993.
3. Hoek, E. and Brown, S.T. Underground Excavations in Rocks, Institute of Mining Metallurgy, London, 1980.
4. D.J. Deshmukh, Element of Mining Technology, Vol-1, Denett & Co., 2010.

(Dr. S. Jayanthu)	(Dr. B. S. Sastry)	(Mr. S. Venkata Chary)	(Dr. M.V.S. Babu)	(Dr. Satya Prakash)
University Nominee	**Subject Expert**	**Industrial Expert**	**Special Invitee Member**	**BOS-Member**

Dr. Atma Ram Sahu	(Mr. G. D. N. Raju)	(Ms. P. S. Mounika)	(Mr. A. K. Sanjay)	(Dr. A. Charan Kumar)
BOS-Member	**BOS-Member**	**BOS-Member**	**BOS-Member**	**BOS-Chairman**

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7th Semester)			
Course Code	**Mine Safety Engineering** (Professional Elective-V)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Mine Legislation and General Safety, Surface Mining		3	0	0	3

Course Objectives

1. To discuss the typical accidents prone to occur in mines.
2. To elaborate the accidents associated with different mining activities.
3. To impart the knowledge on statutory safety requirements in mines.
4. To expound safety and risk management practices in mines.
5. To inculcate about miner's health and occupational diseases and their prevention.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Outline typical accidents prone to occur in mines.
CO2:	Analyse various accidents associated with mining works.
CO3:	Comprehend about statutory safety requirements in mines.
CO4:	Summarize safety and risk management practices in mines.
CO5:	Infer typical miners' health issues, occupational diseases and their prevention.

Syllabus

UNIT-I

Introduction

Accident in mines - different types; Accident investigations; Accident analysis; Accident prevention and corrective action, accident proneness; Creating and maintaining safety awareness; ZAP and MAP; Safety meeting and committee; Need for mine safety.

UNIT-II

Accidents

Accidents due to explosives, Common causes and measures for prevention of explosive accidents; Accidents due to electricity, Common causes and measures for prevention of electricity accidents; Accidents due to Inundation, Dangers from surface and underground water and preventive measures.

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UNIT-III

Health and Mine Safety

Definition of health and safety, management's role – function; Evolution of management involvement, management's training, responsibility, cost of health and safety; Role of labour organizations – union impact and involvement; Role of government – statutory controls and directions, spot and regular inspections, enforcement of standards, penalties for violations, collection and distribution of statistical data.

UNIT-IV

Risk Management

System engineering approach to safety, techniques used in safety analysis, generic approach to loss control within mining operations; Safety management and organization; Risk management, risk identification, risk estimation and evaluation, risk minimization techniques in mines, risk analysis using FTA, HAZOP, and ETA etc.,

UNIT-V

Miners Health and Occupational Diseases

Preventive medical examinations; Various types of injuries; Compensable diseases; Medical attention and removable of causative factors in the mines; Occupational diseases.

Textbook(s)

1. B.K. Kejriwal, Safety in Mines, Lovely Prakashan, 2002.
2. Samir Kumar Das, Mine Safety and Legislation, Lovely Prakashan, 2002.

Reference(s)

1. Ridley, J & Channing, J.; Safety at Work; Butterworth-Heinemaan, Oxford, 2001.
2. N.J. Bahr, Taylor and Francis, System Safety Engineering and Risk Assessment: A Practical Approach, NY, 1997.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7th Semester)			
Course Code	**Mine Subsidence Engineering** (Professional Elective-V)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Rock Mechanics		3	0	0	3

Course Objectives

1. To discuss the basic mechanics of mine subsidence.
2. To familiarize with the methods of subsidence prediction.
3. To expound the time influence of subsidence and its impact on structures.
4. To enlighten the effect of subsidence and damages to structures.
5. To illustrate the different control measures to prevent subsidence.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Comprehend and analyze the subsidence mechanism.
CO2:	Outline the different methods of subsidence prediction.
CO3:	Assess the time influence of subsidence and impact on structures.
CO4:	Summarize the effects of subsidence.
CO5	Outline the methods to control subsidence.

Syllabus

UNIT–I

Introduction

Introduction to subsidence, Factors affecting subsidence; Zones of movement in the overlaying beds, vertical and horizontal movement; subsidence trough, angle of draw, angle of break; sub-surface subsidence.

UNIT-II

Subsidence prediction

Different methods of surface subsidence prediction - graphical, analytical, profile function, empirical and theoretical models.

UNIT-III

Time influence and impact on structures

Influence of time on subsidence; example from long wall and board and pillar working; Calculation of ground movement over time; Types of stress on structures; stress-strain behavior of soils.

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UNIT-IV

Effects of subsidence

Effect of subsidence; Mining damage to building, industrial installations, railway lines, pipes & channels.

UNIT-V

Methods to control subsidence

Methods of Mining to control subsidence; Laws governing mining damage; Different standards suggested for mining and building ground in respect to subsidence.

Textbook(s)

1. Kratzsch, Mining subsidence Engineering, Springer-Vertag publications, 1983.
2. Whittakerm B.N. and Raddish, Subsidence-occurrence, prediction and control, Elsvier Publication, 1989.

Reference(s)

1. Brauner, G., Subsidence Due to Underground Mining, Part I, II and III, U.S. Department of Interior, Bureau of Mines, 1973.
2. Peng, S., Surface Subsidence Engineering, SME, New York, 1992.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7th Semester)			
Course Code	**Mine Valuation** (Professional Elective-V)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Development of Mineral Deposits, Surface mining		3	0	0	3

Course Objectives

1. To elaborate the economic importance of mineral industry.
2. To demonstrate various methods of mine valuation.
3. To impart the knowledge on economic feasibility of a mining project.
4. To discuss the methods of project evaluation.
5. To elaborate various sources of mine fund and cost control methods.

Course Outcomes

On Completion of the course, the students will be able to -	
CO1:	Appraise the economic importance of mineral industry.
CO2:	Distinguish the various methods of mine valuation.
CO3:	Evaluate the economic feasibility of a mining project.
CO4:	Summarize the methods of project evaluation.
CO5:	Infer various sources of mine fund and cost control methods.

Syllabus

UNIT-I

Introduction

Economic importance of mineral industry; Risky nature of the mining industry; Demand and Supply analysis; National mineral policy.

Mineral price and pricing

International monetary system; Factors affecting mineral price; Kinds of price quotation; Mineral price index; Mineral prices.

UNIT-II

Mine Economics

Time value of money; Annuity; Redemption of capital, Net present value; Depletion allowance; depreciation; Inflation; Escalation; Rates of return; Hoskold's two rate method.

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UNIT-III
Mining Costs
Capital and operating costs; Factors affecting operating cost; Methods of estimating future costs; Standard cost and forecast; Budget and budgetary control.

UNIT-IV
Project Evaluation
Methods of project evaluation – pay back, annual value, benefit/cost ratio, ERR and IRR, Break Even Analysis; Evaluation of exploratory mining areas and operating mines; Mine project financing, its risks and constraints; Mine taxation; Critical impact of depreciation; Depletion; Type of funding; Reserves;Life on mine profitability.

UNIT-V
Mine Finance
Sources of mine funds – shares, debentures, fixed deposit, sinking fund, capital gearing, P & L account, balance sheet; Typical case studies of mine feasibility; Cost estimation of individual mining operations and overall mining cost; Cost control methods.

Textbook(s)

1. R.T. Deshmukh, Mineral and Mine Economics, Myra Publications, Nagpur, 1986.
2. N. L. Sharma and Sinha, Mineral Economics, Oxford and IBH, 1992.

Reference(s)

1. O.P. Khanna, Industrial Management, Dhanpat Rai and Sons, 1999.
2. W.G. Donald, T.J. O'Neil, Mine Investment Analysis, Society of Mining Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, 1984.
3. R. Victor, The Mining Valuation Handbook, Wiley, 2019.
4. L. William, A Study of Methods of Mine Valuation and Assessment; with Special Reference to the Zinc Mines of Southwestern Wisconsin, General Books, 2013

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7th Semester)			
Course Code	**Product Development**				
Teaching	Total contact hours - 36	L	T	P	C
Prerequisites: Nil		0	1	2	2

The objective of this course is to give opportunity to students to work on interdisciplinary concepts for development of real hardware, software, or mobile application products. A student is expected to work under the supervision of a faculty member on a project whose details are announced by the latter and approved by the Head of the Department in advance.

During the semester, the student is expected to do in depth study, design, fabrication, and testing, maintaining accurate record of his work for continuous mid-semester and end- semester evaluation. The student is expected to put in similar, if not higher, amount of scholastic effort as in another theory course of the same credit value.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7th Semester)			
Course Code	**Summer Internship / Mini Project-II**				
Teaching	Total contact hours -	L	T	P	C
Prerequisites: Nil		0	0	0	3

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. II Sem. (8^{th} Semester)			
Course Code	**Project Work**				
Teaching	Total contact hours -	L	T	P	C
Prerequisites: Nil		0	0	0	12

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List of Open Elective Courses

S. No.	Course	L-T-P	Credit
1	Elements of Mining Technology	3-0-0	3
2	Open Pit Slope Analysis and Design	3-0-0	3
3	Mining and Its Importance	3-0-0	3
4	Remote Sensing & GIS in Mining	3-0-0	3

(Dr. S. Jayanthu) **University Nominee**

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. I Sem. (5th Semester)			
Course Code	**Elements of Mining Technology** (Open Elective-I)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisites: Nil		3	0	0	3

Course Objectives

1. To introduce the concept of different methods of mining.
2. To impart the knowledge of classification of coal seams.
3. To explain the concepts of drilling methods.
4. To impart the knowledge of different explosives and blasting used in mining.
5. To elaborate the concept of latest technologies for mining industry.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Know the various Elements of Mining and stages/phases in Mining
CO2:	Know the concepts of Mining Methods.
CO3:	Know the Drilling methods.
CO4:	Understand the explosives and blasting practice in mines.
CO5:	Understand the application of latest technologies in mining industry

Syllabus

UNIT-I

Introduction to Mining; Types of Mines, Contribution of Mining activities to civilization; Definitions of terms; Status of Mining Industries in the state and in the country; Stages of Mining – Pre-mining, mining, and post-mining – ancillary mining operations; Types of entries to mineral deposits – Shaft, Incline, Decline, Adit – applicable conditions- limitations, compare shaft vs incline.

UNIT-II

Concepts and Definition of terms commonly used in coal and non-coal mining; Classification of the mineral deposits basing on various factors - shallow, deep, very deep, steeply inclined, moderately inclined, inclined vein, massive deposits. Classification of coal seams - Thick, moderately thick, thin seams, I, II, III-degree gassy seams. Classification of methods of working coal-opencast, underground-Bord and Pillar/ longwall-Advancing and retreating.

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UNIT-III

Drilling methods: percussive, rotary, rotary-percussive; Tools used for drilling; Feed mechanism – Screw feed and hydraulic feed mechanism; Mud flushing –sludge and core, Core recovery methods; Reasons for deviation of bore holes. Single tube, double tube and wire line core barrel.

UNIT-IV

Explosives - Uses of explosives in mining industry, characteristics, and classification of explosives – tools, applicability; Initiation of explosives – fuses – safety fuse, cortexfuse. Detonators – types, composition. Different types of blasting practice in mines; Dangers and precaution measures of blasting, Dealing with misfires.

UNIT-V

Applications of Unmanned Aerial Vehicle, Drones, Remote Sensing and Geographical Information System for mining Industry.

Textbook(s)

1. Elements of Mining Technology: Vol-I; D.J. Deshmukh
2. Explosives and Blasting practice; G.K. Pradhan

Reference(s)

1. Elements of Mining Technology Vol-II; D.J. Deshmukh
2. Principles and Practices of Modern Coal Mining: R. D. Singh, New Age International, 1997.
3. Modern Coal Mining Technology: S. K. Das, Lovely Prakashan Publishers,1994.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. II Sem. (6th Semester)			
Course Code	**Open Pit Slope Analysis and Design** (Open Elective-II)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisites: Nil		3	0	0	3

Course Objectives

1. To impart the knowledge on slopes, slope failures and factors that influence slopes.
2. To discuss the geotechnical parameters required for stability studies of a slope.
3. To elaborate the shear strength of intact rock mass and jointed rock mass.
4. To explain the impacts of water in slope stability.
5. To inculcate various methods and techniques used to assess the slope stability.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Classify various modes of slope failure.
CO2:	Comprehend and analyse the geotechnical parameters required for slope stability analysis.
CO3:	Interpret the shear strength of intact rock mass and jointed rock mass.
CO4:	Analyse the flow of water in slope stability.
CO5:	Summarize various methods and techniques used to assess the slope stability.

Syllabus

UNIT-I
Introduction
Types and formation of slopes in surface mines; Mechanism of common modes of slope failure; Factors influencing stability of slopes and planning of slope stability investigations.

UNIT-II
Geotechnical Information
Geotechnical data required for high wall slope stability studies; Collection of geological data and their interpretation for stability studies of high wall slopes.

UNIT-III
Slope Stabilization methods
Construction and Stabilization of Slopes, Construction and Stabilization of dumps, Construction of gabion wall, wire netting, preventing landslides, preventing debris from falling.

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UNIT-IV

Slope Monitoring Instruments

Conventional slope monitoring system; Automatic deformation system; Sub-lateral movement monitoring system; Real-time monitoring system.

UNIT-V

Analysis and Design of Pit Slopes and Waste Dumps

Slope stability assessment methods and techniques; Analysis and design criteria and methodology for high wall slopes and backfill and waste dumps; Introduction to Slope Stability Software.

Textbook(s)

1. Hoek and Bray, Rock Slope Engineering, The Institution of Mining and Metallurgy, 1981.
2. G.B. Mishra, Surface Mining, Dhanbad Publishers, 1978.

Reference(s)

1. R.T. Deshmukh, Opencast Mining, M. Publications, Nagpur, 1996.
2. S. K. Das, Surface Mining Technology, Lovely Prakashan, Dhanbad, 1994.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7th Semester)			
Course Code	**Mining and Its Importance** (Open Elective - III)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisites: Nil		3	0	0	3

Course Objectives

1. To discuss the contribution of mining industry to nation.
2. To elaborate importance of coal mining in India.
3. To illustrate the status and importance of metal mining.
4. To enlighten about sustainable concepts for mining industry.
5. To familiarize with the applications of different sensors in mining industry.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Understand the role of mining industry for development of nation.
CO2:	Classify the coal mining methods.
CO3:	Understand the concepts of metal mining.
CO4:	Assess the sustainable mining practices in India and abroad.
CO5:	Summarize the applications of different sensors for mining industry.

Syllabus

UNIT-I
Introduction
Introduction to mining industry; National and International mineral Scenario; Status of Minerals in National scenario; Role of mining in national economy, infrastructure building and society. Basic mining terminologies, Introduction to Mining Methods.

UNIT-II
Coal Mining
History of coal mining; Coal resources and their geographical distribution; Coal mining in India; Contribution of Indian coal mining industry towards nation; Indian coal classification; Coal Mining Methods – Opencast and Underground.

UNIT-III
Metal Mining
Status of Indian metal mining industry and its contribution towards nation development; Metal mining terminologies; Applicability; Scope and limitations of underground metal mining; Opening of underground deposits.

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UNIT-IV

Sustainable Mining

Introduction to sustainability, Importance of sustainability in mining industry; Examples of Sustainable mining practices followed in India and abroad.

UNIT-V

Transdisciplinary application to Mining Industry

Case studies on application of sensors for real time gas detection, smoke detection, noise and vibrations detection, ground control monitoring, proximity analysis.

Textbook(s)

1. R.D. Singh, Principle and practices of modern coal mining, New Age International Publishers, 2005.
2. Lodhia S. K, Mining and Sustainable Development, Taylor & Francis, 2018

Reference(s)

1. D. J. Deshmukh, Elements of Mining Technology, Vol-I, Denett & Co., 2008.
2. D. J. Deshmukh, Elements of Mining Technology, Vol II, Denett & Co., 2016.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7^{th} Semester)			
Course Code	**Remote Sensing & GIS in Mining** (Open Elective - IV)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisites: Nil		3	0	0	3

Course Objectives

1. To discuss the basic principles of Remote Sensing.
2. To elaborate the concepts of visual and digital image analysis.
3. To illustrate the concepts of GIS.
4. To impart the knowledge on the concept of spatial analysis.
5. To communicate the applications of remote sensing and GIS.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Outline the basic principles of Remote Sensing.
CO2:	Develop the concepts of visual and digital image analysis.
CO3:	Summarize the basic concepts of GIS.
CO4:	Perform spatial analysis.
CO5:	Apply knowledge of remote sensing and GIS in various fields.

Syllabus

UNIT-I

Introduction to remote sensing

Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere; energy interaction with the earth surfaces characteristics of remote sensing systems.

Sensors and platforms

Introduction, types of sensors; airborne remote sensing, space borne remote sensing; image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential.

UNIT-II

Image analysis

Introduction, elements of visual interpretations, digital image processing- image pre-processing, image enhancement, image classification, supervised classification, unsupervised classification.

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Dr. Atma Ram Sahu **BOS-Member**	(Mr. G. D. N. Raju) **BOS-Member**	(Ms. P. S. Mounika) **BOS-Member**	(Mr. A. K. Sanjay) **BOS-Member**	(Dr. A. Charan Kumar) **BOS-Chairman**

UNIT-III

Geographic Information System

Introduction, key components, application areas of GIS, map projections.

Data entry and preparation

Spatial data input, raster data models, vector data models.

UNIT-IV

Spatial data analysis

Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing.

UNIT-V

Applications of Remote sensing and GIS

Land cover and land use pattern, forestry, geology, geomorphology and mining operations.

Textbook(s)

1. Bhatta B, Remote sensing and GIS, Oxford University Press, 2008.
2. Narayan LRA, Remote Sensing and its Applications, Universities Press, 2012.

Reference(s)

1. Lilles and, T.M, R.W. Kiefer and J.W. Chipman, Remote Sensing and Image Interpretation, Wiley India Pvt. Ltd., New Delhi, 2013.
2. Chor Pang Lo and A K W Yeung, Concepts and Techniques of Geographical Information System, Prentice Hall (India), 2006.
3. Kand Tsung Chang, Introduction to Geographic Information Systems, McGraw Hill Higher Education, 2009.
4. George Joseph, Fundamentals of Remote Sensing, Universities Press, 2013.
5. Demers, M.N, Fundamentals of Geographic Information Systems, Wiley India Pvt. Ltd, 2013.

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