DIPLOMA IN ENGINEERING

Duration: 36 Months (3 Years) Eligibility: 10th Pass

Course Structure of Diploma in Mining Engineering (Semester-I)														
Course Details				**External Assessment**		**Internal Assessment**				**Credit Distribution**			**Allotted Credits**
Course Code	**Course Type**	**Course Title**	**Total Marks**	**Major**		**Minor**		**Sessional *****		**L**	**T**	**P**	**Subject wise Distribution**
				Max Marks	**Min Marks**	**Max Marks**	**Min Marks**	**Max Marks**	**Min Marks**				
Theory Group													
2TDDE101	Basic Science	Mathematics-I	100	50	17	20	07	30	15	2	1	0	3
2TDDE102	Engineering Science Course	Applied Mechanics	100	50	17	20	07	30	15	2	1	0	3
2TDDE103	Basic Science	Physics	100	50	17	20	07	30	15	2	1	0	3
2TDDE104	Mandatory Course	Environment Engineering and Safety	100	50	17	20	07	30	15	2	1	0	3
2TDDE105	Humanities	Communication Skills-I	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**		**Lab Performance**		**Sessional**					
2TDDE102	Engineering Science Course	Applied Mechanics	50	25	12	-	-	25	12	-	-	1	1
2TDDE103	Basic Science	Physics	50	25	12	-	-	25	12	-	-	1	1
2TDDE105	Humanities	Communication Skills-I	50	25	12	-	-	25	12	-	-	1	1
Grand Total			**650**							**10**	**5**	**3**	**18**

Minimum Passing Marks are equivalent to Grade D *L- Lectures T- Tutorials P-*
PracticalMajor- Term End Theory / Practical Exam
Minor- Pre-University Test
**** Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50*

DIPLOMA IN ENGINEERING

Duration: 36 Months (3 Years) Eligibility: 10th Pass

Course Structure of Diploma in Mining Engineering (Semester-II)

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
2TDDE201	Basic Science	Mathematics-II	100	50	17	20	07	30	15	2	1	0	3
2TDDE202	Engineering Science Course	Engineering Graphics	100	50	17	20	07	30	15	2	1	0	3
2TDDE203	Basic Science	Chemistry	100	50	17	20	07	30	15	2	1	0	3
2TDDE204	Engineering Science Course	Fundamentals Computer and IT	100	50	17	20	07	30	15	2	1	0	3
2TDDE205	Humanities	Communication Skills-II	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**		**Lab Performance**		**Sessional**					
2TDDE203	Basic Science	Chemistry	50	25	12	-	-	25	12	-	-	1	1
2TDDE204	Engineering Science Course	Fundamentals Computer and IT	50	25	12	-	-	25	12	-	-	1	1
2TDDE206	Engineering Science Course	Workshop Practice	50	25	12	-	-	25	12	-	-	1	1
Grand Total			**650**							**10**	**5**	**3**	**18**

Minimum Passing Marks are equivalent to Grade D **L- Lectures T- Tutorials P-**
PracticalMajor- Term End Theory / Practical Exam

Minor- Pre-University Test

***** Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance, Assignment 50%**

DIPLOMA IN ENGINEERING

Duration: 36 Months (3 Years) Eligibility: 10th Pass

Course Structure of Diploma in Mining Engineering (Semester-III)														
Course Details				**External Assessme**		**Internal Assessment**				**Credit Distribution**			**Allotted Credits**
Course Code	**Course Type**	**Course Title**	**Total Marks**	**Major**		**Minor**		**Sessional *****		**L**	**T**	**P**	**Subject wise Distribution**
				Max Marks	**Min Marks**	**Max Marks**	**Min Marks**	**Max Marks**	**Min Marks**				
Theory Group													
2TDMN301	Professional Core	MINE Surveying 1	100	50	17	20	07	30	15	2	1	0	3
2TDMN302	Professional Core	Element of Mine Technology	100	50	17	20	07	30	15	2	1	0	3
2TDMN303	Professional Core	Mining Method - Opencast Working	100	50	17	20	07	30	15	2	1	0	3
2TDMN304	Professional Core	Rock Engineering and Ground Control	100	50	17	20	07	30	15	2	1	0	3
2TDMN305	Professional Core	Elements of Mining Geology	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**		**Lab Performance**		**Sessional**					
2TDMN301	Professional Core	Mine Surveying 1	50	25	12	-	-	25	12	-	-	1	1
2TDMN302	Professional Core	Element of Mine Technology	50	25	12	-	-	25	12	-	-	1	1
2TDMN304	Professional Core	Rock Engineering and Ground Control	50	25	12	-	-	25	12	-	-	1	1
2TDMN305	Professional Core	Elements of Mining Geology	50	25	12	-	-	25	12	-	-	1	1
Grand Total			**700**							**10**	**5**	**4**	**19**

Minimum Passing Marks are equivalent to Grade D *L- Lectures T- Tutorials P-PracticalMajor- Term End Theory / Practical Exam*

Minor- Pre-University Test

***** Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance, Assignment 50%**

DIPLOMA IN ENGINEERING

Duration: 36 Months (3 Years) Eligibility: 10th Pass

Course Structure of Diploma in Mining Engineering (Semester-IV)													
Course Details				**External Assessment**		**Internal Assessment**				**Credit Distribution**			**Allotted Credits**
Course Code	**Course Type**	**Course Title**	**Total Marks**	**Major**		**Minor**		**Sessional *****		**L**	**T**	**P**	**Subject wise Distribution**
				Max Marks	**Min Marks**	**Max Marks**	**Min Marks**	**Max Marks**	**Min Marks**				
Theory Group													
2TDMN-401	Professional Core	Mine Surveying -II	100	50	17	20	07	30	15	2	1	0	3
2TDMN-402	Professional Core	Economics and Field Geology	100	50	17	20	07	30	15	2	1	0	3
2TDMN-403	Professional Core	Mine Ventilation	100	50	17	20	07	30	15	2	1	0	3
2TDMN-404	Professional Core	Mining Machinery-I	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**		**Lab Performance**		**Sessional**					
2TDMN-401	Professional Core	Mine Surveying -II	50	25	12	-	-	25	12	-	-	1	1
2TDMN-402	Professional Core	Economics and Field Geology	50	25	12	-	-	25	12	-	-	1	1
2TDMN-403	Professional Core	Mine Ventilation	50	25	12	-	-	25	12	-	-	1	1
2TDMN-404	Professional Core	Mining Machinery	50	25	12	-	-	25	12	-	-	1	1
2TDMN-405	Training/Internship	Practical Training Project 1	50	25	12	-	-	25	12	-	-	1	1
2TDMN-406	Professional Core	Mini Project and Seminar	50	25	12	-	-	25	12	-	-	1	1
2TDMN-407	Professional Core	DGS & professional practice 1	50	25	12	-	-	25	12	-	-	1	1
Grand Total			**750**							**8**	**4**	**7**	**19**

Minimum Passing Marks are equivalent to Grade D *L- Lectures T- Tutorials P-*

PracticalMajor- Term End Theory / Practical Exam

Minor- Pre-University Test

***** Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance, Assignment 50%**

DIPLOMA IN ENGINEERING

Duration: 36 Months (3 Years) Eligibility: 10th Pass

Course Structure of Diploma in Mining Engineering (Semester-V)														
Course Details				**External Assessment**		**Internal Assessment**				**Credit Distribution**			**Allotted Credits**
Course Code	**Course Type**	**Course Title**	**Total Marks**	**Major**		**Minor**		**Sessional *****		**L**	**T**	**P**	**Subject wise Distribution**
				Max Marks	**Min Marks**	**Max Marks**	**Min Marks**	**Max Marks**	**Min Marks**				
Theory Group													
2TDMN -501	Professional Core	Underground Coal Mining	100	50	17	20	07	30	15	2	1	0	3
2TDMN -502	Professional Core	Mining Methods – Non Coal	100	50	17	20	07	30	15	2	1	0	3
2TDMN-503	Professional Core	Mine Environment and safety Engineering	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**		**Lab Performance**		**Sessional**					
2TDMN-503	Professional Core	Mine Environment and safety Engineering	50	25	12	-	-	25	12	-	-	1	1
2TDMN-504	Professional Core	Mine Design Lab	50	25	12	-	-	25	12	-	-	1	1
2TDMN-505	Training/Internship	Practical Training Project 2	50	25	12	-	-	25	12	-	-	1	1
2TDMN-505	Training/Internship	Application of GIS & CAD in mining	50	25	12	-	-	25	12	-	-	1	1
Grand Total			**500**							**6**	**3**	**4**	**13**

Minimum Passing Marks are equivalent to Grade D

L- Lectures T- Tutorials P-PracticalMajor- Term End Theory / Practical Exam

Minor- Pre-University Test

***** Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance, Assignment 50%**

DIPLOMA IN ENGINEERING

Duration: 36 Months (3 Years) Eligibility: 10th Pass

Course Structure of Diploma in Mining Engineering (Semester-VI)														
Course Details				**External Assessment**		**Internal Assessment**				**Credit Distribution**			**Allotted Credits**
Course Code	**Course Type**	**Course Title**	**Total Marks**	**Major**		**Minor**		**Sessional *****		**L**	**T**	**P**	**Subject wise Distribution**
				Max Marks	**Min Marks**	**Max Marks**	**Min Marks**	**Max Marks**	**Min Marks**				
Theory Group													
2TDMN-601	Professional Core	Mining Machinery2	100	50	17	20	07	30	15	2	1	0	3
2TDMN-602	Professional Core	Mine Management Legislation and safety	100	50	17	20	07	30	15	2	1	0	3
2TDMN-603	Professional Core	Mine and Minerals economics	100	50	17	20	07	30	15	2	1	0	3
2TDMN-604**	Elective paper	*	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**		**Lab Performance**		**Sessional**					
2TDMN-601	Professional Core	Mining Machinery2	50	25	12	-	-	25	12	-	-	1	1
2TDMN-605	Project Work/Training	Industrial Training	200	100	50	-	-	100	50	-	-	4	4
2TDMN-606	Professional Core	Metal Mining Methods	50	25	12	-	-	25	12	-	-	1	1
Grand Total			**700**							**8**	**4**	**6**	**18**

***Elective Subjects**

1. 2TDMN-604A - Energy Conservation and Management
2. 2TDMN-604B - Renewable Energy

Minimum Passing Marks are equivalent to Grade D *L- Lectures T- Tutorials P-*
PracticalMajor- Term End Theory / Practical Exam

Minor- Pre-University Test

***** Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance, Assignment 50%**

OURSE CODE: 2TDDE 101

Mathematics-I

COURSE OBJECTIVE:

Mathematics forms backbone for all technologies and hence occupies an important place in the curriculum of polytechnic education. The subject is equally important for the future self-development of Polytechnic students. In designing the curriculum for foundation course, the admission level to Polytechnics has been considered as 10th Board examination and mathematical needs of Technical subject have been given due consideration.

Syllabus:

UNIT-I **Permutation:** Meaning of factorial n**,** Permutation of 'n' dissimilar thing taken 'r' at a time

Combination: Combination of n dissimilar things taken 'r' at a time

Binomial Theorem: Statement of the theorem for positive integer, General Term, Middle term, Constant term

UNIT-II **Partial Fractions:** Define a proper-improper fraction**,** Break a fraction into partial fraction whose denominator contains Linear, Repeated linear and Non repeated quadratic factors.

UNIT-III **Determinant:** Concept & principles of determinants **,**Properties of determinant **,** Simple examples.

Complex Numbers: Algebra of Complex Numbers **,**Polar form

UNIT-IV **Trigonometry :**Allied angles, trigonometrical ratios of sum and difference of angles, (only statement),sum and difference of trigonometric ratios (c-d formula),multiple angles (only double angle and half angle),properties of triangle (without proof)

UNIT-V **Matrix:** Definition of matrix, types of matrix, row, column, square, unit, upper and lower triangular, symmetric & skew symmetric, singular and nonsingular matrices, Adjoint of a matrix, inverse of a matrix.

COURSE OUTCOME:

Through this syllabus the diploma student will learn the basic concepts of counting principle through permutation and combination , expansion of a binomial function , breaking up a complex fraction into simpler partial fractions, trigonometric ratio and concept of matrix

TEXT BOOKS:

Engineering Mathematics	Iyenger , SRK.,	Narosa Publshing, New Delhi
Engineering Mathematics I	Agarwal D.C	Meerut:Shree Sai Prakashan
Basic Engineering Mathematics	Dass H. K.	Delhi S. Chand Group
Higher Engineering Mathematics	B.S. Grewal	Delhi, Khanna Publishing

REFERENCE BOOKS:

Calculus	Loomis	Addison Wesley
Applied Mathematics	Abhimanyu singh	Anne books
Engineering Mathematics	Dr. G Balaji	Balaji Publishers

Chairperson **(Board of Studies)** | **Dean** **(Academic Council)** | **(Registrar)** **Seal**

COURSE CODE: 2TDDE 102

Applied Mechanics

COURSE OBJECTIVE:

1. Ability to apply knowledge of mathematics, science, and engineering.
2. Solve for the resultants of any force systems.
3. Determine equivalent force systems.
4. Determine the internal forces in plane frames, simple span trusses and beams.
5. Solve the mechanics problems associated with friction forces.

Syllabus:

UNIT-I **COMPOSITION AND RESOLUTION OF FORCES**

Definition, Effect, characteristics of force, System of Forces, Principle of Transmissibility of Forces, Concept of Resultant Force, Law of Parallelogram of Forces, Triangle of Forces, Polygon of Forces, Determination of Resultant of two or more concurrent forces (analytically and graphically).

PARALLEL FORCES AND COUPLES

Classification of Parallel Forces, Methods of finding resultant Force of parallel forces- analytically graphically, Position of resultant force of parallel forces, Definition, Classification and characteristics of a force Couple, moment of couple.

UNIT-II **MOMENTS AND THEIR APPLICATIONS**

Definition, Types and law of moment, Varignon's Principle of moment and its applications, Lever and its Applications, Types of supports and determination of support reactions of a simply supported beam subjected to point load and uniformly distributed load (UDL).

EQUILIBRIUM OF FORCES

Equilibrium of a system of concurrent forces, Conditions and types of Equilibrium, Lami's Theorem and its applications.

UNIT-III **CENTRE OF GRAVITY**

Difference between Centroid and Center of Gravity (CG), Centroid of standard plane figures and CG of simple solid bodies, Method of finding out Centroid of composite plane laminas and cut sections, Method of finding out CG of Composite solid bodies.

FRICTION

Concept and types of friction, Limiting Friction, coefficient of friction, angle of friction, angle of repose, Laws of friction (Static and Kinetic), Analysis of equilibrium of Bodies resting on Horizontal and inclined Plane, Utility / Nuisance value of friction.

UNIT-IV **SIMPLE LIFTING MECHINES**

Concept of lifting Machines, Definition of Mechanical Advantage, Velocity Ratio and Efficiency of Machines and their relation, Reversibility of Machines and condition for self locking machine, Law of Machines, Maximum mechanical advantage and maximum efficiency of machine, Friction in machine (In terms of Load and effort), Calculation of M. A, V.R. and efficiency of following machines

- Simple wheel and axle
- Differential wheel and axle
- Single purchase crab
- Double purchase crab
- Simple screw jack
- Different System of simple pulley blocks

MOTION OF A PARTICLE

Definition of speed, velocity, acceleration, uniform velocity, uniform acceleration and variable acceleration, Motion under constant acceleration/ retardation (equations of

motion), Motion under force of gravity, Concept of relative velocity, Definition of projectile, velocity of projection , angle of projection, time of light, maximum height, horizontal range and their determination, Definition of angular velocity, angular acceleration and angular displacement, Relation between linear and angular velocity of a particle moving in a circular path, Motion of rotation under constant angular acceleration.

UNIT-V **LAWS OF MOTION**

Newton's Laws of motion and their applications.

WORK, POWER AND ENERGY

Definition unit and graphical representation of work, Definition and unit of power and types of engine power and efficiency of an engine, Definition and concept of Impulse, Definition, unit and types of energies, Total energy of a body falling under gravity.

List of Experiments:

1. Verification of laws of parallelogram of forces.
2. Verification of laws of polygon of forces
3. Verification of laws of moments
4. Determination of forces in the members of Jib Crane
5. Determination of Centroid ofplane lamina by graphical method
6. Determination of coefficient of friction for surfaces of different materials on horizontal plane
7. Determination of coefficient of friction for surfaces of different materials on an inclined plane
8. Determination of mechanicaladvantage, velocity ration and efficiency of the following lifting machines
9. Measurement of B.H.P. of an engine using roap break dynamometer

COURSE OUTCOME:

At the end of the course, the student will be able to:

1. Determine the resultant force and moment for a given system of forces
2. Analyze planar and spatial systems to determine the forces in members of trusses, frames and problems related to friction
3. Calculate the motion characteristics of a body subjected to a given force system.
4. Determine the deformation of a shaft and understand the relationship between different material constants.

TEXT BOOKS:

Applied Mechanics	R.S. Khurmi	S.C. Chand & Co. , New Delhi
Applied Mechanics	I.B. Prasad	Khanna Publishers, New Delhi
Applied Mechanics	R.S. Jog	Anand Publishers, Gwalior
Applied Mechanics	A.R. Page	Deepak Prakashan, Gwalior

REFERENCE BOOKS:

Applied mechanics	R K Rajput	S Chand publication
Engineering Mechanics	R K Bansal	Pearson
Applied mechanics	Henry Taylor Bovey	Nabu

COURSE CODE: 2TDDE 103

Physics

COURSE OBJECTIVE:

1. The development of various diploma engineering topics is primarily based on the fundamental principles. The different principles of physics have a wide range of applications in all the branches of engineering. A reasonably good level of knowledge of physics, therefore, forms sound base for engineering students. Physics can be considered as a basic tool in the hands of an engineer through which he can pure his studies and research work in technical field. The foundation level of the subject acquired by the student is kept in mind for selection of the topics. To create interest in the students more stress is given on the applications, in engineering field

Syllabus:

UNIT- I **UNITS & Measurement, Motion**

Fundamental and derived units, Scalar and vector, Basic requirements to represent vector Symbols, abbreviation, and proculation Linear measurement by vernier calipers, screw gauge and spherometer Angular measurement by angular vernier Motion and its type Linear motion ,Circular motion ,Angular velocity and relation with linear velocity ,Centripetal acceleration, Centripetal and Centrifugal forces Rotatory motion Axis of rotation Moment of Inertia, Radius of gyration Kinetic energy of rotation Numerical problems and solution on the topic

UNIT- II **Molecular Phenomenon Solids, Liquids And Properties Of Matter**

Postulates Of Molecular Kinetic Brownian motion Kinetic and Potential energy of Kinetic theory of gases Postulates Calculation of pressure by Kinetic theory Prove of different gases law by Kinetic theory, Elasticity: Meaning, definition, stress, stain, Hook's law and elastic limit Surface Tension: Meaning, definition, molecular forces, cohesive and adhesive forces, Surface energy, capillary rise and capillary rise method. Viscosity : Meaning, definition, stream line and turbulent flow, critical velocity, Stock's law. Numerical problems and solution on the topic.

UNIT- III **Heat Heating Effect Of Current And Thermoelectricity**

Heat and temperature, concept of heat as molecular motion Transmission of heat, study state and variable state. Concept of heat capacity, specific heat and latent heat. Calorimeter and its uses Thermodynamics Relation between heat and work Mechanical equivalent of heat First law of thermodynamics and its application, Second law of thermodynamics and its application ,Carnot cycle Numerical problems and solution on the topic., Heating effect of electric current: Joule's law, work energy and power in electric circuit, calculation of electric energy. Thermo electricity See back effect and thermoelectric power, Neutral temperature, temperature of inversion and relation between them Thermo electric thermometer and thermo couples. Numerical problems and solution

UNIT- IV **Sound Optics And Optical Instruments**

Reduction of sound waves(Longitudinal and transverse waves)Progressive and stationary waves Basic knowledge of refraction , reflection, interference and diffraction. Ultrasonic, Audible range, Production of ultrasonic, properties an due Refraction, critical angle and total internal reflection, refraction through lenses and problems Power of lenses Spherical and chromatic aberrations Simple and compound microscope, telescope and derivation for their magnifying power Numerical problems and solution on the topic.

UNIT- V **Electrostatics and Electromagnetic Induction Modern Physics, Basic Electronics**

Coulomb's law, Electric field intensity, potential. Capacity, principle of capacitor, types of capacitor, combination of capacitors Electromagnetic Induction: Faraday's law, Lenz's law Self and mutual inductance Transformer and electric motor, Induction coil Photoelectric effect, threshold frequency, Einstein- equation, Photo electric cells Radioactivity : decay constant, Half life, mean life Properties of nucleus, nuclear mass, mass defect Production of x-rays, properties and its uses Thermal emission, semiconductors, Types of semiconductors Explanation of conductor, semiconductor and insulators on the basis of band theory P-N junction, diode as rectifier

List of Experiments:

1. Refractive index of prism (I-D) curve
2. Refractive index of prism (spectrometer)
3. Focal length of a convex lens by u-v method
4. Focal length of a convex lens by displacement method
5. Verification of Ohm's law
6. To find out unknown resistance by meter brid
7. To find out internal radius of hollow tube by vernier calipers.
8. To find out volume of given cylinder by screw gauge.
9. Surface tension by Capillary rise method. Coefficient of viscosity
10. Coefficient of Thermal conductivity by searl's method.
11. Verification of Newton's cooling law.

COURSE OUTCOME:

1. The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competencies *Select proper measuring instrument on the basis of range, least count & precision required for measurement.
2. Analyze properties of material & their use for the selection of material mostly applicable for engineering users.
3. Identify good & bad conductors of heat and proper temperature scale for temperature measurement Identify.
4. Analyze, discriminate and interpret logical sequence of field problems with the study of physics.
5. Analyze variation of sound intensity with respect to distance and follow the principles used in the physical properties, its measurement and selections.

TEXT BOOKS:

Applied Physics Vol. 1 & 2	Saxena and Prabhakar	S Chand
Physics	Halliday And Resnic R	Wiley
Engineering Physics	Gaur And Gupta	Dhanpat rai

REFERENCE BOOKS:

Engineering Physics	B K Pandey	Cengage
Applied Physics	P K Diwan	Wiley

COURSE CODE: 2TDDE 104

Environmental Engineering & Safety

COURSE OBJECTIVE:

1. To improve the quality of life of the local community through management and conservation of natural resources.
2. To ensure that the natural environment is used wisely

as well as judiciously. The natural resources are continuously available for the benefit and enjoyment of future generations.

1. Todecrease vulnerability and improve adaptation capacity among poor local communities associated with Climate Change.

Syllabus:

Introduction to Environment

UNIT-I The Biosphere, biotic and abiotic, An aquatic ecosystem, Types of pollution Impact of hum a being on environment, Impact of environment on human being, Basic approach to improve environmental qualities, Roll of an environmental engineer

UNIT-II **Air Pollution Sources and Effects**

Standard definition of air pollution**,** Composition of natural air**,** Names of air pollutants**,** Classification of air pollutants, primary and secondary pollutants**,** Classification of source of air pollutants on different bases**,** Definition of different types of aerosols, Effect of air pollution on: human health, material properties, vegetation, Major toxic metals and their effects**,** Major environmental phenomenon e.g., acid rain, global warming, green house effect, ozone layer depletion, Air quality standards**,** Brief description of air pollution laws.

UNIT-III **Meteorological Aspects of Air Pollutant Dispersion**

Meteorological parameters influencing air pollution, Environmental laps rate, temperature inversion, atmospheric stability and adiabatic loss rate, Turbulence, topographical effects, Plume behavior, looping, coning, fanning fumigation, lofting , trapping.

Air Pollution Control Methods and Equipments

Natural purification processes of air, Artificial purification methods of air, Brief description of following control equipments along with sketch e.g, gravitation settling chamber, cyclone, scrubber, bag house filter, electrostatic precipitator, Brief description of following processes for the control of gaseous pollutants e. g., absorption, adsorption, condensation, combustion etc.

UNIT-IV **Water Pollution Sources and Classification**

Water resources, Uses of water, Classification of water, Origin, composition and characteristics of domestic waste water as well as industrial waste water, Biochemical oxygen demand, Water pollution laws and standards, Uses of waste water, Classification of waste water, Chemical oxygen demand

Waste water treatment method

basic processes of water treatment, Meaning of primary, secondary and tertiary treatment, Flow chart of a simple effluent treatment plant, Theory of industrial waste treatment, Volume reduction, neutralization and proportion

UNIT-V **Solid Waste Management**

Sources and classification of solid waste, Public health aspects, Disposal methods - open dumping, sanitary, land fill, Incineration, compositing, Potential methods of disposal, Recovery and recycling of paper, glass, metal and plastic

Noise Pollution and Control

Sources of noise pollution, Units of Noise pollution measurement, Allowable limits for different areas, Problems of noise pollution and measures to control it, Noise pollution control devices brief discussion

Safety Practices
Responsibility of employees and employers regarding health and safety,
Fire hazards prevention and precautions, Industrial hazards prevention and protection,
Protection from air and noise pollution

COURSE OUTCOME:

1. After successful completion of this course students will able to
2. Enhance the use of recycled material for construction work and optimize the use of conventional energy sources.
3. Take care of issues related to Conservation & Hazard Management while working as chemical engineer.
4. Assess the effects of pollution on resources.
5. Justify need of renewable energy for sustainable development.
6. Identifyconcept of waste management and methods of recycling.
7. Prepare list of use of do's and don'ts applicable during disasters.

TEXT BOOKS:

Environmental pollution control Engineering	C. S. Rao	PHI
Air pollution and control	Seth	S Chand
Air pollution	M.NRao	TMH

REFERENCE BOOKS:

A Textbook of environmental studies	Dr D K Asthana	S Chand
Fundamentals of air pollution engineering	Richard C. Flagan John H. Seinfeld	Prentice Hall

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COURSE CODE: 2TDDE 105

Communication Skill-I

COURSE OBJECTIVE:

1. The main aim of communicating is to pass information so that other people may know about what you are talking off. This can be through facts or even feelings.

Syllabus:

UNIT- 1 Sentences –simple compound ,complex Articles –usage of 'A' , 'AN', 'THE' Preposition—position of prepositions ,place Relations Time Relations Tenses – past perfect ,present perfect progressive ,past perfect Progressive, simple present and present progressive

UNIT- II Modals , Antonyms ,synonyms ,one word substitution ,jumbled sentences, Idioms and phrases ,correction of sentences with words likely to be confused word formation like prefix and suffix

UNIT- III Comprehension of unseen passage short answer type questions to test understanding of the passage

UNIT- IV Précis –writing -Introductory Remarks, Method of procedure, Summing up

UNIT- V Essay-writing -- Introductory Remarks, Characteristics of a good Essay, Classifications of Essays, Method of collecting materials

COURSE OUTCOME:

1. Through this syllabus the diploma students will learn the basic concept of English. Student should gain the ability to read understand, analyze, intercept and extrapolate from the complex texts that are at the heart of the diver's traditions of the English language.

TEXT BOOKS:

English Conversation Practice	Grant Taylor	TMH
Communication Skills	Somaiya	M/S Somaiya Publication, Bombay
English Grammar, Usage, and Composition	Tickoo & Subramanian,	S. Chand

REFERENCE BOOKS:

Communication for Engineers	P. Prasad	Kataria and sons publications, New Delhi
Effective Business Communication	M.V. Rodriques	Concept Pub. Co., New Delhi
Essentials of Business Communication	Dr. Rajendra Pal & J.S. Korlahalli	S.Chand & Sons, New Delhi.

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COURSE CODE: 2TDDE 201

Mathematics-II

COURSE OBJECTIVE:

1. The main of teaching mathematics is to provide students with an adequate knowledge on the subject to serve as a tool in the learning of various engineering subjects and to solve technical problems encountered during the course of study. It can also serve as a foundation for their future work involving computation.

Syllabus:

UNIT-ICO-ORDINATE GEOMETRY

Co-ordinate System: Cartesian and Polar, Distance, Division, .Area of a triangle, Locus of a point and its equation, Slope of St. Line: Angle between two Straight lines, Parallel and perpendicular Straight lines. Standard and general equation of Straight line. Point of intersection of two straight lines .

UNIT-II STATISTICS

Measures of Central tendency (Mean, Mode, Median),Measures of Dispersion (Mean deviation, standard deviation)

UNIT-III DIFFERENTIAL CALCULUS

Define constant, variable, function, Value of the function, Concept of limit of a function, Definition and concept of differential coefficient as a limit, Standard results, Derivatives of sum, difference, product, quotient of two functions, Differential co-efficient of function of a function, Differential co-efficient of implicit function, Logarithmic Differentiation, Differential coefficient of Parametric function.

UNIT-IV INTEGRAL CALCULUS

Definition as a inverse process of differentiation, Standard Results (including inverse function), Methods of Integration: Substitution, Integration by parts, Breaking up into partial fraction, Concept of Definite Integral

UNIT-V VECTOR ALGEBRA

Concept of Vector and Scalar Quantities, Different types of vectors.
Addition and subtraction of vectors, Components of a vector
Multiplication of two vectors: Scalar Product, Vector Product, Applications (Work done, power & reactive power)

COURSE OUTCOME:

1. Here in this syllabus student will learn some concept of co-ordinate geometry , some part of statistics viz. mean , median , mode , deviation etc. , and of course a brand new concept of differential calculus and integral calculus which play an important role in technical subjects then concept of vector number , how they are added subtracted and multiplied etc.

TEXT BOOKS:

Higher Engineering Mathematics	B.S. Grewal	Khanna publisher
Mathematical Statistics	Ray and Sharma	Ram Prasad publication
Differential Calculus	Gorakh Prasad	Pothishala publication

REFERENCE BOOKS:

Mathematics for Polytechnics	Navjyoti dutta	T.T.T.I. Bhopal
Engineering Mathematics	Dr. S.K. Chouksey	Khanna publisher
Integral Calculus	Gorakh Prasad	TMH

COURSE CODE: 2TDDE 202

Engineering Graphics

COURSE OBJECTIVE:

1. To familiarize with the construction of geometrical figures.
2. To familiarize with the projection of 1D, 2D and 3D elements .
3. To familiarize with the sectioning of solids and development of surfaces.
4. To familiarize with the Preparation and interpretation of building drawing .

Syllabus:

UNIT-I Introduction to Drawing Instruments: Introduction of drawing instruments, materials and their uses, Applications of mini-drafter, Applications of compass and divider, Applications of French curves and spline**,** Pencils grades and their uses

Designation and sizes of drawing sheet and drawing board, Planning and Layout of Drawing Sheet: Planning of drawing sheet as per I. S.: 696-1972 (SP 46: 1988) This should include: Margin, Title Block, Zoning, Revision panel, Folding marks, Numbering of sheet.

UNIT-II CONVENTIONAL REPRESENTATION:

Conventional representation of the following as per BIS practice

COMMON ENGINEERING MATERIALS ELECTRICAL INSTALLATIONS AND FITTINGS

Main switches, (lighting and power), socket outlets (3 pin 5AMP, 3pini5 AMP), bell, buzzer, loud speaker, Aerial, ceiling fan, exhaust fan, Bracket fan, fan regulator, battery and earth point.

ELECTRONICS COMPONENTS

Diode: Zener, varactor, Scotty, step recovery, light emitting diode (LED), PNP and NPN transistors, resistance, capacitor, Inductors (fixed and variable both), IC (8pin and 14pin) SCR, TRIAC, DIAC, UJT, FET, MOSFET, LOGIC GATES

SANITARY FITTINGS

showerhead, wall lavatory basin, comer Lavatory basin, urinal stall, kitchen sink, Indian type WC,Water closets (Asian pan, urissapan, Anglo-Indian, European)

BUILDING

Single and double swing doors and windows.

MECHANICAL COMPONENTS

Internal and external threads, slotted head, Square end and flat, radial arms and ribs, serrated shaft, splined shaft, Chain wheel, bearing, straight and diamond knurling, Compression and tension spring, leaf spring (with and without eye), Spur and helical gear

UNIT-III LINES, LETTERING AND DIMENSIONING:

Introduction of type of lines and their applications, Single stroke vertical, inclined letters (capital and lowercase) And numerals,

Dimensioning: Elements of dimensioning- dimension line, extension line, arrowhead and leader line, Dimensioning system - Aligned and unidirectional, Dimensioning of Arcs and Circles, Angular Dimensioning, Dimension of counter sunk and counter bore.

METRICAL CONSTRUCTIONS AND ENGINEERING CURVES: Divide a line into any number of equal parts by parallel line method bisecting of line and angle.

Construction of triangles and polygons Introduction of conic sections (curves), Construction of Ellipse by Eccentricity and Concentric circles methods, Construction of Parabola by Eccentricity and Rectangle methods Construction of Hyperbola by Eccentricity method Construction of Cycloid, Construction of Involutes of circle and polygon, Construction of Archimedean Spiral of any number of convolutions

UNIT-IV

SCALES:

Introduction of scales and their applications, Concept of reducing, enlarging and full size scale, Classification of scales - plain, diagonal, Vernier, Scale of chord and comparative scales, Definition of R.F, Construction of plain and diagonal scales

ORY OF PROJECTION AND PROJECTION OF POINTS, LINES AND PLANES

Definition of various term associated with theory of projection-

Planes of projection, Quadrants, first & third angle projection method, Projection of points in all the four quadrants.

Projection of lines-

Parallel to HP and VP both.

1. Perpendicular to one plane and parallel to other.
2. Inclined to one plane and parallel to other.
3. Knowledge of projection of line inclined to both the planes

Projection of planes -

1. Perpendicular to HP and VP both
2. Perpendicular to one plane and parallel to other
3. Inclined to one plane and perpendicular to other.
4. Knowledge of projection of plane inclined to both the planes

PROJECTIONS OF SOLIDS:

Projection of cylinder, cone, prism and pyramid. Under the following conditions:

1. Axis parallel to HP and VP

2. Axis perpendicular to HP and parallel to VP

3. Axis perpendicular to VP and parallel to HP

4. Axis inclined to HP and parallel to VP.

5. Axis inclined to VP and parallel to HP.

6. Axis inclined to both HP and VP

UNIT-V SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES:

Section of cone, cylinder, prism and pyramid (Solid resting on its base in the HP i.e. the Axis perpendicular to HP and parallel to VP) in the following cases:

1. Section plane parallel to HP and perpendicular to VP

2. Section plane parallel to VP and perpendicular to HP.

3. Section plane inclined to HP and perpendicular to VP.

4. Section plane inclined to VP and perpendicular to HP.

Drawing True shape of section.

Introduction to development of lateral surface of solids-

Cone, Cylinder, Prism and Pyramids (Simple and truncated), Under the condition - solid resting on its base in the HP and axis, Perpendicular to HP and parallel to VP Development of funnel and elbow

1. INTERSECTION OF SURFACES

   Intersection of following cases -

   Cylinder to cylinder and Prism to prism(With their axis intersecting and perpendicular to each other.)

2. ORTHOGRAPHIC PROJECTIONS & FREE HAND SKETCHING:

   Principles of orthographic projections, Identification of necessary views and superfluous view, Selection of front view, Preparation of necessary orthographic views of simple objects

   From given pictorial views

   - Dimensioning of orthographic views as per standard practice.
   - Free hand sketches of simple objects (Using Pencil, Eraser & Paper only)

3. ISOMETRIC VIEWS

- Concept of isometric projection and isometric view (Isometric Drawing)
- Construction of isometric scale
- Construction of isometric view of polygon and circle
- Construction of isometric view of cone, cylinder, prism and pyramids
- Construction of isometric view of simple objects

From given orthographic views

COURSE OUTCOME:

1. Introduction toengineering design and its place in society
2. Exposure to the visual aspects of engineering design
3. Exposure to engineering graphics standards
4. Exposure to solid modelling
5. Exposure to creating working drawings
6. Ability to draw projections and analysing multiple views of object.

TEXT BOOKS:

Engineering Drawing	N.D. Bhatt	Pearson
Engineering Drawing	R.K. Dhawan	S.Chand
Engineering Drawing	P. S.Gill	S.Chand

REFERENCE BOOKS:

First Year Engineering Drawing	Ac.Parkinson	TMH
Engineering Drawing	Dhananjay	TMH

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COURSE CODE: 2TDDE 203

Chemistry

COURSE OBJECTIVE:

1. The objective of the Chemistry in polytechnique courses is to acquaintthe students with the basic phenomenon/ concepts of chemistry, the student face during course of their studying the industry. The student withthe knowledgeof the basic chemistry will understand and explain scientifically the various chemistry related problems in the industry/engineering field. The student will able to understand the new developments and break through sufficient lying engineering and technology.
2. To appreciate the need and importance of chemistry for industrial and domestic use.
3. To gain the knowledge on existing and future upcoming materials used in device fabrication.
4. To impart basic knowledge related to material selection and the techniques for material analysis.
5. To impart knowledge of green chemical technology and its applications.
6. Demonstrate knowledge of science behind common impurities in water and methods to treat them.
7. Knowledge of methods to determine the calorific value of fuels.
8. Apply the science for understanding corrosion and its prevention.

Syllabus:

UNIT-I ATOMIC STRUCTURE AND RADIO ACTIVITY

Discovery of electron, proton ,neutron and nucleus. Ruther ford's and Bohr's model of an atom. Bohr Burry scheme of filling the electrons in various orbits. Idea of s,p,d,f orbital .Alfa, Gamma and Beta rays, theory of radio activity, Group displacement law, half life period, numerical problems on half life period, fission and fusion.

SURFACE CHEMISTRY AND ITS APPLICATION

True solution, colloidal solution and suspension, lyophobic and lyophillic colloids, optical and electrical properties of colloids, coagulation, coagulants, idea about gels and emulsions.

ELECTROCHEMISTRY

Electrolysis, Faraday's laws of electrolysis, Numerical problems on Faradays Law, electroplating of copper and nickel.

UNIT-II COLLIGATIVE PRPOPERTIES

Osmosis & osmatic pressure, Relative vapour pressure and Routls law. Internal energy (enthalpy) Entrophy, Entrophy fusion free energy, Effect of change in temperature catalysis.

CHEMICAL BONDING AND CATALYSIS

(A) Bonding: Nature of bonds- Electro valent, Co-valent, co-ordinate and hydrogen bond.

(B) Catalysis: Types, theory characteristic, positive, negative, auto and induced catalyst. Catalytic Promoter, and catalytic inhibitors. Industrial Application of catalysis.

WATER:

Sources of water, types of water, hardness of water, its causes, types and removal, Boiler

feed water, harmful - effects of hard water in boiler. Municipal water supply. Numerical on soda lime process. Determination of hardness of water by O. Hener's, EDTA and soap solution method.

UNIT-III METALS AND ALLOYS:

Physical and chemical properties of metals, copper, iron, aluminum, tin, nickel. General principal of metallurgy, minerals/ ores, ore dressing, roasting ,smelting, bassemerisation, fluxes, purification. Explanation of alloying purposes, methods of alloying, composition and uses of alloy like brass, bronze, duralium, German silver, gun metal, solder, stainless steel, casting and bearing alloy.

IONIZATION, PH VALUE CORROSION AND PROTECTION:

Arhenius theory of ionization, factors affecting ionization. pH meaning (numerical), Buffer solutions and Buffer actions, choice of indication (acidimetry and alkalimetry). Explanation of corrosion, types of corrosion, factors effecting corrosion, corrosion control (protection against corrosion), metal and organic coating for corrosion control.

GLASS, CEMENT AND REFRACTORY:

Glass: Basic raw materials for glass, composition and manufacture of glass, varieties of glass and annealing of glass,.

Cement : Constituting compounds in cement, Composition of Portland Cement, its manufacture, setting and hardening of cement.

Refractories : Meaning, characteristics , use of common refractory materials.

UNIT-IV HIGH POLYMERS, RUBBER AND INSULATORS:

Polymerization and condensation, classification of plastics, Compounding and Moulding constituents of plastics. Preparation Properties and uses of PVC, polyethene, polystyrene, polyamides, polyesters , Bakelite. Synthetic fibers - nylon, rayon, decron, and polyesters.

Definition characteristics , classification and properties of insulators. Glass, wool and thermo cole Idea about rubber and vulcanization.

LUBRICANTS, PAINTS AND VARNISHES:

Lubricants: Meaning , type and theory of lubricants, properties of a good lubricants, Flash and fire point and cloud point, emulsification number, viscosity. Paints and Varnishes : Meaning, ingredients and characteristics of good paints and varnishes, their engineering applications.

UNIT-V FUELS, FIRE EXTINGUISHERS AND EXPLOSIVES:

Classification of fuel, gross and net calorific value, Determination of a solid fuel by bomb calorimeter, octane and octane number. Proximate analysis of fuel, its utility, crude petroleum, products of fractional distillation .

Fire extinguishers - Description and use.

Explosives - Meaning, types, characteristic and use of explosives. Name Dynamite, lead azide, T.N.T., Picric acid, R.D.X.

POLLUTION AND CONTROL:

Introduction and chemical toxicology, air and water pollution, control of air and water pollution. Harmful effect of different gases like carbon mono-oxide, carbon dioxide, sulphur dioxide, nitric oxide, nitrous and lead.

LIST OF EXPERIMENTS:

1. To identify one Anion and Cation in a given sample.
2. Determination of flesh point and fire point of a given sample of oil by Abel's apparatus.
3. Determination of viscosity by Red Wood Viscometer no. 1and no. 2.
4. RedoximetryTitration :

1. Percentage of Iron in given sample of alloy.
2. Determination of strength of ferrous ammonium sulphate.
3. Determination of strength of anhydrous ferrous sulphate and ferrous sulphate.

Determination of hardness of water by :

1. EDTA Method and Soap Solution Method

1. Determination of solid content in the given sample of water.
2. Determination of percentage of moisture in the given sample of coal by proximate analysis.

COURSE OUTCOME:

After the completion of the course, the learner will be able to:

1. Analyze the need, design and perform a set of experiments.
2. Differentiate hard and soft water, solve the related numerical problems on water purification and its significance in industry and daily life.
3. Apply the principles of green chemistry in designing alternative reaction methodologies to minimize hazards and environmental degradation.
4. Understand the causes of corrosion, its consequences and methods to minimize corrosion to improve industrial designs.
5. Explain the properties, separation techniques ofnatural gas and crude oil along with potential applications and role of petrochemicals in national economy.
6. Equipped with basic knowledge of polymers and its application.

TEXT BOOKS:

Physical Chemistry	Bahl and Tuli	TMH
Inorganic Chemistry	Satyaprakash	S Chand
Engineering Chemistry	Rao	Pearson

REFERENCE BOOKS:

Applied Chemistry	H.N. Sahni	Deepak Prakash
Polymer Chemistry	O.P. Mishra	Khanna publisher
Applied Chemistry	Shrivastava & Singhal	Pbs Publication, Bhopal.

COURSE CODE: 2TDDE 204

Fundamentals Computer & IT

COURSE OBJECTIVES:

1. Learn basic principles of using Windows operation system.
2. Learn and practice basickeyboarding and mouse use.
3. Be able to access the Internet, Worldwide Web, as well as use Internet directories and search engines, and locate www addresses.
4. Be able to find and evaluate information on the Web (learn how to be critical and evaluate what is valid and reliable).
5. Learn basic computer and keyboarding related vocabulary in English.
6. Learn the basics of e-mail, such as sending, forwarding and receiving mail, attaching documents, creating mailboxes, filters, and address books.
7. Learn basic word processing skills with Microsoft Word, such as text input and formatting, editing, cut, copy and paste, spell check, margin and tab controls, keyboard shortcuts, printing, as well as how to include some graphics such as pictures and charts.
8. In general, develop an intuitive sense of how computers work and how they can be used to make your academic work more efficient.

Syllabus:

UNIT- I **Computer Organization, Evolution And Generation Of Computer Systems:**
Block Diagram of computer system: Central Processing Unit, Memory unit ,ALU, Control unit Input & Output devices. Input Device Categorizing input hardware :Key Board, Card readers, Scanning Devices ,Bar Code Readers, OCR, OMR, MICR, Pointing Device, Mouse and its types ,light pen Touch Devices, Web camera ,microphone Joystick, Digitizing tablet. Output Device printers, Dot matrix, Printers, Plotters, and Monitors: CRT, TFT, Plasma, LCD Projector, DLP Projector, Speaker. Computer System Characteristics and capabilities Memory Capabilities, Repeatability Types of Computers & its Application Analog, Digital & Hybrid, General & Special Purpose Computer, Application of computer system Computer Generations & Classification of Computer Systems Minis, Mainframes & Super Computer Evolution of micro Comparative study w.r.t. speed, data bus, controllers, memory, peripheral interface of PC to Pentium computer systems. Decimal, Binary, Octal, Hexadecimal number

UNIT- II **Number System, Codes & Data Representation, Storage Devices**
Systems Inter-Conversion from decimal to binary, octal, hexadecimal, conversion of binary number System to decimal, hexadecimal. Codes used for information exchange between computers–ASCII, Unicode, Data representation- Bit, Nibble, Byte, Kilo Byte, Mega Byte, Giga Byte, Tera Byte, Peta Byte etc Storage Fundamentals, Primary & Secondary Storage. RAM, dynamic and static ROM, PROM, EPROM, EEPROM, ape storage Devices, Characteristics & limitations, Floppy &theirtypes. Direct access Storage– Hard Disk, Disk Cartridges, Mass Storage Device Optical Disk , CD Rom, DVD, flash drive, ZIP drive

UNIT- III **Computer Software's & Language**
System Software V/s Application Software. Types of System Software, Operating System, Loader, Linker, Language Processor, Assembler, Compiler and Interpreter, Device Driver. CLASSIFICATION AND CHARACTERISTICS OF LANGUAGES Machine language, Assembly language, High-level language, Generations of Computer Language Application Software: working with MSOFFICE components, creating editing, formatting and printing documents using MSWORD, Data analysis and charting with MSEXCEL, Creating and presenting slide show using MS POWERPOINT

UNIT- IV **Concept of Operating System, System security**

Introduction, Functions of operating system, Types –batch, single user, multiuser, multiprogramming, multitasking, multi threading, real-time , embedded, Network, Distributed CLI(Command Line Interface) and GUI modes of O.S. Booting Process, BIOS, POST, Boot Strap Loader Introduction to viruses, worms, Trojans, Anti Viruses scanning & Removal of Viruses ,safety measures- Firewall, updates, Patches

UNIT- V **Internet Applications:**

Introduction to internet, different services of internet- www, E-Mail, Chat (Textual/Voice), website access and information search, Browsers And Search Engines

LIST OF EXPERIMENTS:

1 .Study the uses of input and output device

2. Study the uses of storage devices

3. Backup of data on tape, floppy & hard disk, CD, DVD and in PEN drive

4. Use of windows media player, recording, editing playing sound and video files

5. PRACTICE ON WINDOWS 2000/ XP/Vista

Starting Windows, Exploring the desktop, Arranging windows, my Creating Shortcuts, Practice on moving and Practice on Windows Explorer File organization: creating, copying, moving, renaming and deleting and Practice on Windows Accessories Creating editing, formatting, previewing and printing documents using Shutting down windows.

6. PRACTICE ON MICROSOFT EXCEL

Creating editing, formatting, saving, previewing and printing worksheet.
Use of formula and functions.
Split windows and freeze pans.
Create, edit, modify, print worksheet/charts.
Import & Export D
Pivot table- create, modify
Sorting & Filter data
Header, footer, Watermark.

7. PRACTICE ON POWERPOINT

Create, edit, insert, move, slides.
Open and save presentation.
Insert Object, picture, Diagram, chart, Table, Movie & Sound,
Slide design, layout, background.
slide show, setup, action button, animation scheme, custom animation,

COURSE OUTCOMES:

1. Demonstrate a basic understanding of computer hardware and software.
2. Demonstrate problem-solving skills.
3. Apply logical skills to programming in a variety of languages.
4. Utilize web technologies.
5. Demonstrate basic understanding of network principles.
6. Working effectively in teams.
7. Apply the skills that are the focus of this program to business scenarios.

TEXT BOOKS:

A First Course in Computers	S . Jaiswal	Golgotha Publication
Computers Today	Suresh K. Basandra	Galgotia Publication
Understanding windows	Chapman	BPB Publication

REFERENCE BOOKS:

the Complete Guide to Microsoft Office Professional,	Ron Mansfield	Sybex /BPB Asian Edition
Inside IBM PC.	Norton Peter	TMH
Multimedia Making it work	Tay Vaughan	Tata McGrawHill

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COURSE CODE: 2TDDE 206

Workshop Practices

COURSE OBJECTIVE:

1. Workshop Practice is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the technicians working in the various engineering industries and workshops.
2. To familiarize with the basics of tools and Equipments used in fitting, carpentry, foundry, welding andsmithy
3. To familiarize with theproductionof simple models in the above trades.

Syllabus:

UNIT- I **Carpentry Shop**

1.1 Introduction to various types of wood such as Deodar, Kail, Partal, Teak, Mango, Sheesham, etc. (Demonstration and their identification).

1.2 Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed.

Job, I Marking, sawing, planning and chiseling & their practice

1.3 Introduction to various types of wooden joints, their relative advantages, and uses.

Job II Preparation of Half lap joint

Job III Preparation of Cross-lap Joint

UNIT- II **Fitting Shop**

2.1 Introduction to fitting shop tools, common materials used in fitting shop, Identification of materials. (e.g. Steel, Brass, Copper, Aluminium etc.). Identification of various sections of steel such as Flat, Angle, Tee, Channel, Bar Girder, Square, Z-Section, etc.

2.2 Description and demonstration of various types of workbenches. holding devices and files. Precautions while filling.

2.3 Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.

Job I Marking of job, use of marking tools and measuring instruments.

Job II Filing a dimensioned rectangular or Square piece of an accuracy of ± 0.5mm

Job III Filing practice (Production of flat surfaces) Checking by a straight edge.
Job IV Making a cutout from a square piece of MS Flat using a Hand hacksaw.

2.4 Care and maintenance of measuring tools like calipers, steel rule, try square, vernier calipers, micrometer, height gauge, and combination set. Handling of measuring instruments, checking of zero error, finding of least count.

UNIT- III **Welding Shop**

3.1 Introduction to welding and its importance in engineering practice; types of welding; common materials that can be welded, introduction to welding equipment e.g. a.c. welding set, d.c. rectifier, Electrode holder, electrodes

3.2 Electric arc welding, (ac. and dc.) precautions while using electric arc welding,

Practice in setting current and voltage for striking proper arc.

Job I Practice of striking arc while using an electric arc welding set.

Job II Welding practice on electric arc welding for making uniform and Straight weld beads

3.3 Various types of joints and end Preparation.

Job III Preparation of butt joint by electric arc welding.

Job IV Preparation of lap joint by electric arc welding.

Job V Preparation of Tee joint by electric arc welding.

UNIT- IV Smithy Shop

4.1 Demonstration and detailed explanation of tools and equipment used. Forging operations in Smithy shop. Safety measures to be observed in the smithy shop.

4.2 Demonstration and description of bending operation, upsetting operation, description and specification of anvils, swage blocks, hammers etc.

4.3 Demonstration and description of tongs, fullers, swages etc.

Job I To forge an L-Hook.

Job II To forge a chisel

Job III To prepare a cube from an M.S. round by forging method.

UNIT- V Foundry Shop

5.1 Use of foundry tools and other equipment for the Preparation of molding sand mixture.

5.2 Preparation of green sand molds kept ready for pouring in the following case:

Job, I Using two molding boxes (hand cut molds).

Job II Using patterns (Single piece pattern and Split pattern).

Job III Preparation of one casting (Wax, Aluminum or cast-iron Demonstration only)

COURSE OUTCOME:

On completion of this course, students will be able to

1. Make half lap joint and dovetail joint in carpentry.
1. Make welded lap joint, butt joint and T-joint.
1. Prepare sand mould for cube, conical bush, pipes and V pulley.
2. Prepare sand mould for cube, conical bush.
3. Make parts like square box in foundry.

Text Books:

● "A first course on workshop practice – Theory, Practice and Work Book"	.S K Hazara Choudhary, Gopal.T.V, Kumar.T, and Murali.G,	Suma Publications, Chennai, 2005

Reference Books:

1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay
2. Workshop Technology by Manchanda Vol. I,II,III India Publishing House, Jalandhar.
3. Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd. New Delhi
4. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
5. Workshop Technoogy by B.S. Raghuwanshi, Dhanpat Rai and Co., New Delhi
6. Workshop Technology by HS Bawa, Tata McGraw Hill Publishers, New Delhi

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Subject Code : 2TDMN301

Mine Surveying-I

RATIONALE:

The important job functions of mine surveyor include the activities of detailed surveying, plotting of survey data and setting out works.

It is therefore essential to give emphasis on the development of skills on using various survey instruments and their application in underground mines for preparation plans & sections of workings. In addition, for providing basic principles of surveying and leveling, it is necessary to arrange appropriate field exercises and small projects.

OBJECTIVES:

Student will be able to

1. Acquire skills of using various survey instruments.
2. Develop skills of preparation of mine plan & section.
3. Understand and apply principles and method of survey to conduct subsidence survey.
4. Carryout and suggest the repairs needed to survey instruments.
5. Understand and apply various statutory provisions of regulation while preparing mine plan & section.

Unit I - INTRODUCTION TO SURVEYING

Definition of surveying, objects of surveying,
Plane and Geodetic surveying. Classification & Basic principles of surveying.
Chain Surveying :
Principle of chain surveying. Equipments in
chain surveying, cross staff , optical square its principle and use.
Different operations in chain surveying,
Ranging: direct & reciprocal ranging. Line ranger structure, principle of working and its use. Chaining: Chaining on flat & slopping ground, obstacle in chaining(No numerical).
Errors in changing. Offsetting.

Unit II - **COMPASS SURVEYING**

2.1 The Prismatic & Surveyors compass, theirComparison.
Bearing of a line: Definitions: True & Magnetic Meridian; True and Magnetic bearings, Fore & Back bearings,Declination.
Whole circle bearing system & Quadrantal Bearing system.
Conversion of bearings fromone system to other. Calculation of
angles from bearings. Calculation of bearings from angles.
Local attraction: Sources, detection & its elimination. Magnetic Dip & Magnetic declination. Calculation of True bearings.
Traversing with compass: Closed and open traverse; Plotting a compass traverse; Checks for open & closed
traverse; Closing error, Graphical adjustment of closing error.

Unit III - **PLANE TABLE SURVEYING**

Introduction, Plane table and its accessories, Temporary adjustments of Plane table, centering, levelling, orienting the plane table by method of back sighting by method of magneticneedle.

Methods of plane tabling Radiation, Intersection,Traversing, Resection method.

Advantages & disadvantages of plane table survey, Errorsin plane table survey.

Unit IV - **LEVELLING**

Definitions of the terms used in Levelling. Concept of datum, Back sight, Foresight stations, change point, height of instrument. Dumpy and tilling level Construction and temporary adjustments. Levelling staff, their types. balancing of back sight and Fore sight distances. Holding and Reading the staff, simple and differential levelling, and booking of readings.

Reduction of levels by

Collimation system and by Rise & fall system. arithmetic check, computation of missing readings.

Classification of levelling: Differential, Reciprocal, and Fly levelling, Profile levelling, cross sectioning. Plotting of a profile and cross section.

Difficulties in levelling, common mistakes in levelling. Permanent adjustments of Dumpy & Tilling level. Automatic level (General idea only)

Study and use of level

Auto set level, Temporary adjustments.

Unit V - CONTOURING

Introduction and concept, definitions, purpose, Characteristic of

Contour line, contour interval, factors affecting contour interval, Horizontal equivalent. Methods of Locating contours Direct method, Indirect method. Interpolation of contours by estimation, arithmetical and by graphical method. Plotting of contour maps. Uses of contour map.

LIST OF PRACTICAL

1. Demonstration of measuring chain, tape, ranging road, peg, arrow, optical square, line ranger.
2. Laying and ranging a chain line and taking offsets by tape on either side.
3. Chain and cross-staff survey for finding out area of a given field.
4. Perform temporary adjustment of prismatic compass and observing fore & back bearing and calculation of included angles from observed bearings.
5. Measure fore & back bearing of five sided closed traverse, identify stations affected by local attraction and calculate corrected bearings
6. Demonstration of plane table and accessories, temporary adjustment, locating points by radiation.
7. Methods of plane Tabling- orientation of plane table by back sighting and locating details by intersection method.
8. Demonstration of Dumpy level and tilting level.
9. Carrying out, Temporary adjustments of dumpy level and conduct simple levelling, recording readings in levelling book and apply arithmetic check.
10. Differential levelling with Dumpy level- recording in level book, reduction of levels by both methods, apply arithmetic check.

11. Fly levelling for carrying benchmark at a station at least 300 m away by tilting level.
12. Demonstration of auto level.
13. Draw Contour line of given area using level.
14. Generate Profile of given area using Contour data.
15. Draw 2D Contour of given data using available software.
16. Draw 3D contour of an area using available software.

REFERENCE BOOKS :

Author	**Title**	**Year of publication**	**Publisher**
T. P. Kanetkar & S. V. Kulkarni	Surveying and leveling Vol. I & II	1995	Pune Vidyapith Griha Prakashan Pune.
B.C. Punmia	Surveying-I & II		
Amarjit Aggarwal.	Surveying & Levelling	1992	H.Tata International Publication, Delhi- 51

Chairperson (Board of Studies) **Dean (Academic Council)** **(Registrar) Seal**

Subject Code : 2TDMN302

Elements of Mining Technology

RATIONALE:

The student of first year of Mining & Mine surveying must be aware of the Mineral Industry in the country and the Departments, which deal with mineral exploration, exploitation, safety, conservation and control of the mining industry. All technical definitions and terminologies connected with above are included here, as the students at this stage must be acquainted with these to cope up with the contents at later stage. Blasting is an important operation in all the mining operations. Knowledge of all the types of explosive, their properties and selection for different conditions/situation types of detonator/fuses etc is a must for them. Also it is essential for a mining engineer to understand systems of support of the mine workings. These all aspects have been included in the subject.

OBJECTIVES:

After undergoing the course of study the student shall be able to

1. State the various organizations engaged in coal and noncoal mining, their role and functions.
2. Understand various technical terms, operations involved in coal & noncoal mining.
3. Understand properties of explosives, procedure of conducting shot firing operation in undergroundcoalmines with due regards to safety.
4. Understand the procedure of erection of temporary supports in underground coalmines.
5. State the major method of extraction of coal used in underground coal mines, their conditions ofapplicability.

Unit I - **Introduction to Mineral & Important MiningOrganizations**

Definition of minerals.

Uses of important minerals mined e.g. Coal, Iron ore, copper, zinc, bauxite, gold, manganese, mica, uranium etc.

Important Organizations involved like DGMS, IBM, GSI, CIL, MECL, CIMFR, CMPDIL etc their role and functions

Unit II - **Mining Terminology & Definition.**

Common terminologies used in coal mining.

Common terminologies used in metalmining.

Common terminologies used in mine ventilation and environment.

Common terminologies used in mine supports. Simple definition, explanation, purposes and sketches.

Unit III - Explosives & Accessories

Common explosive bases, Properties of Explosives, High Explosive & Low explosive,their comparison.

Permitted explosives their types, composition, properties, uses, advantages & disadvantages. Brand names of some commonly used explosive of each type.

A detonator, common types of detonators, plain detonators, instantaneous and delay action detonators their construction, uses, comparison etc. low tension & high-tension detonators.

Safety fuses, detonating cords, detonating relays.
Exploders

Unit IV - **Shot Firing**

Drilling patterns for shot firing on machine cut face, instone drift etc.

Shot Firing tools

Face preparation for shot firing,
Preparation of priming charge, charging of hole in coal and rock in under ground working only, Direct and inverse initiation, shot firing circuits, procedure of shot firing of holes in gassy mine, precautions. Simultaneous & delay firing.

4.4 Solid blasting, conditions to be satisfied before doing solid blasting, advantages of solid blasting, drilling patterns used with solid blasting

Unit V - Safety in Shot firing operation.

Explosive required for blasting in coal/rock. Powder factor, detonator factor.
Precaution to improve blasting results.
Misfires, causes, remedy and method of relieving dealing with misfires, blown out shots, blown through shots causes and precautions.
Purpose of stemming, Stemming materials used for shot firing, water ampoules for stemming.
Storage of explosives, Magazines
Disposal of outdated explosives.

Unit VI - Introduction to coal mining method

Classifications of method of working
Board & Pillar
Open cast method.
Long wall.
Applicability condition for selection of each methodsof working. Layout of each method.
Advantages & disadvantages

LIST OF PRACTICAL

1. Errection of prop support At the face and incline road Ways.
2. Settings of cog support at junctions.
3. Setting of Cross Bar in the gallery.
4. Withdrawal of supports by Using Sylvester machine.
5. Demonstration of different Types of permitted Explosives Cartridges.
6. Demonstration of Instantaneous Electric Detonator
7. Demonstration of delay Detonator used for Shot firing in underground Mines.
8. Demonstration of shot Firing tools.
9. Demonstration of single Shot and multi shot exploder.
10. Study of different Drill hole patterns used For blasting in stone drifts
11. Demonstration of Preparation of Priming Cartridge.
12. Demonstration of methods of Charging of holes (Direct & Inverse initiation) for Blasting in undergroundMines.
13. Demonstration of various Shot firing circuits.
14. Detection of misfire Shot and dealing with The misfire.
15. Sketch and Specifications Of explosive magazine

REFERENCE:

Author	Title	Year of Publication	Publisher
G.K. Pradhan	Explosive and Blasting Techniques	1996	Mintech publication Bhubaneshwar.
S.K. Das	Explosives and Blasting Techniques	1993	Lovely prakashan Dhanbad.
D.J. Deshmukh	Mining Technology Vol.- I	1995	Central techno publication, Nagpur

Subject Code : 2TDMN303

Mining Methods - Opencast Working

After obtaining Diploma in Mining Engineering Diploma Engineer required to supervise operations involved in opencast mines, the number of opencast mines are increasing to enhance production rate and due to present policy of linking large opencast mines to the super thermal power plant. Thus Diploma engineer must have knowledge of unit operations involved. Type of machineries used their applicability and working, knowledge of explosive used and procedure for carrying out blasting operation in large opencast mines by deep hole blasting. All these are essential aspects areincluded in subject opencast mining in Third year of the programme.

COURSE OUTCOMES:

After undergoing the course of study the student shall be able to

1. **Supervise operations involved in the opencast mining both coal and non-coal.**
2. **Supervise the operations of the equipment used in opencast mines.**
3. **Select suitable explosive for deep hole blasting in large opencast mines.**
4. **Supervise/carryout blasting operation to give the optimum results from the blast.**

Take proper care of environmental aspects, which may get affected due toblasting and other opencast mining activity

Unit I - INTRODUCTION TO OPENCAST MINING

Classification of Surface Mining methods,Factors affecting choice of opencast mining methods; Advantages and disadvantages of opencast mining

Stripping Ratio: Maximum allowable strippingratio, Overall stripping ratio, Break even stripping ratio

1.3 Benches parameters: Height, width, angleof slope, toe, crest, statutory provisions regarding height, width, angle of slope etc.

Unit II - UP OF DEPOSIT

Unit operations involved, site preparation,Box cut, Entry system in opencast mines
Opencast mine layout, factor determining choices of layout, overburden excavation, Disposal of overburden, overcasting etc,
Sample layouts for Lime Stone, Copper, Coal,Iron ore deposits, method of work, machines required, manpower, OMS etc.

Unit III - OPENCAST MINING MACHINERY

Classification of Excavating equipment,selection, choices of opencast mining machinery. Excavators shovel, Rope shovel, hydraulic shovel, application, advantages,disadvantages, comparison Rope shoveland hydraulic shovel, operating parameter,output of a shovel. Various attachments toshovel. Back hoe, operating parameter,application. Dragline, operating parameters, applicability,working, advantages, disadvantages, comparison with shovel. Bucket wheelandBucketchain excavators.Application, advantages & disadvantages, operation, workingmethods by Bucket wheel excavator,terrace cut, Dropping cut etc.
Rippers. Scrappers, bulldozer etc.
Surface miner its application, working. In pitcrushing system
Precautionary measures while use of HEMM.

Unit IV - OPENCAST EXPLOSIVES

Explosives used in opencast mine, ANFO,slurry explosive, emulsion explosives, Heavy ANFO explosive, LOX, their properties, composition etc. Boosters.

Initiation system, non-electric initiation system, Raydets, Nonel, Shock Tubes, electronic detonators, etc.

Bulk explosive system, site mixed slurry, sitemixed Emulsion, Bulk-loading system. Advantages, ANFO precautions while mixing,

handling and use, Conditions for usingbulk explosives.

Unit V - BLASTING PRACTICE IN OPENCAST MINES

Bench blasting terminology, Blast hole geometry, hole depth, burden, spacing, sub grade drilling, bottom change, column charge, stemming height.. Factors to be considered while blast designing

Simple numerical on blast design for thebench of surfaces mine

Single and multiple rows blasting their comparison, Sequence of blasting in single& multiple row. Precautions while chargingand firing of holes in deep hole blasting, deck charging, muffled blasting, control blasting techniques, secondary blasting/breaking in opencast mines.

Transport of Explosives in bulk, precautionswhile drilling and blasting of deep holes.

Unit VI - ENVIRONMENTAL ASPECTS OF OPENCAST MINING

Environmental aspects of opencast mining Fly rock, ground vibration, air blast their causes & prevention. Noise pollution, water pollution, Degradation of land, land reclamation.

Salient features of environment protection Act,EMP and Environment impact assessment.

Slope stability: Causes of un-stability,forms of failure preventive measures.

STRATEGY OF IMPLEMENTATION:

Conducting theory classes, practical, Industrial visits, seminars, group discussion, and assignment on different topics shall complete the curriculum.

REFERENCE BOOKS:

Author	Title	Publisher
G.K. Pradhan	Explosive and Blasting Techniques	Mintech publication Bhubaneshwar.
S.K. Das	Surface Mining Technology	Lovely Prakashan Dhanbad.
S.K. Das	Explosives and Blasting Techniques	Lovely Prakashan Dhanbad.
D.J. Deshmukh	Elements of Mining Technology Vol I	Central techno publication, Nagpur
G.B. Misra	Surface Mining	Oxford University Press, Calcutta

Subject Code : 2TDMN304

ROCK ENGINEERING and GROUND CONTROL

The Diploma holder in Mining and Mine surveying must have knowledge of Rock engineering as the underground opening are subject to accumulation of stress which make opening unstable, therefore he must understand the kind of support required to stabilize the opening. He also required to work as technical asst. in various Technical and Research Institutes, therefore he must have knowledge of different properties of rock and procedure of determining the properties of rock in laboratory and insides the mine. The mining engineer should have knowledge of Rock burst, bumps, precautions measure and methods of prediction etc.

COURSE OUTCOMES:

After undergoing the course of study the student shall be able to

1. Classify to rock mass.
2. Identify the kind of support required to the excavation.
3. Conduct different laboratory test to determine properties of rock.
4. Carryout monitoring, predict and supervise and carryout preventivemeasures for rock burst, bumps etc.
5. Carryout and supervise roof bolting and stitching operation.

Unit I - ORIGIN of SOIL & ITS FORMATION

Weathering, Post Depositional changes, Sediment Mineral Stability.

Unit II - SOIL as THREE PHASE SYSTEM

Weight and Volume relationship, Inter relationship between three phase elements, Density and unit weight relationship

Unit III - PERMEABILITY and SEEPAGE

Darchy's Law, Effective Permeability, Laboratory determination of permeability (Falling and Constant Head), Seepage force and different heads, Quick Sand condition

Unit IV - SHEAR STRENGTH of EARTHPRESSURE THEORIES

Columb's Law of shear strength, Direct and tri axial shear test, Rankine's theory of earth pressure, Active, passive and earth pressure at rest, Simple application on Cohesion less backfills.

Unit V - STABILITY of SLOPES

Finite and infinite Slopes, Factor of safety and slip surfaces, Method of slices for c-ϕ soil, Friction circle method, Tailor's and Bishop method, Stability number, Application to opencast mining.

Group B

Unit I - INTRODUCTION TO ROCK MECHANICS

Concept of stress and strain in rock, stress due to weight of strata, vertical lateral stresses.

Stress due to tectonic and orogenic force, Residual stresses, Induced stresses.

Field stresses

Introduction to elementary rock mass classification based on strength, hardness, RQD, Bieniawski RMRclassification.

Unit II - ROCK MASS PROPERTIES

Strength Properties: Compressive strength, Tensile Strength, Shear Strength, Flexural Strength.

Strength Indices- Point Load Strength index, Impact Strength index, Protodykonov strength index. Rebound hardness, insitu stress by flat jack

Material Characteristics: Brittle material, Ductile material, Elastic material, Plastic material.

Time dependent properties: creep, Creep curve, factors contributing Creep. Deformation, weatherability.

Unit III - ROCK TESTING

Uni axial compressive strength, Tensile strength – Brazilian test, Bending test. Shear strength test- punch shear test, Direct shear test on Rock cube, Tri axial method.

Determination of strength indices- pointload strength index, Protodykonov strength index, impact strength index.

Unit IV - ROCK BRUST AND BUMPS

Rock burst, Bumps, causes controlling measures, factors affecting pronenessto rock burst/Bumps.

Pillar Design- factors considered. Pillar design by tributary area approach, determination of factor of safety.

Group C

Unit I - MONITORING GROUND MOVEMENT

Classification of field instrumentation for ground control and rock mechanics studies.

Closure meters: Telescopic closure meter, Tape closure meter/ extensometer, and Remote indicating closure meter.

Borehole Extensometer: Rod type; Magnetic type.

Stress Meter, Bolt meter, Rock Bolt Pull Out Tester, Load Cell.Their application, working principle Construction etc.

Unit II - GROUND CONTROL

Theories of mechanics of strata behavior: Dome or arch theory, Beam theory.

Function of roof bolts. Principle of Action Roof Bolts.

Varieties of Roof Bolts: Slot and Wedge, Expansion shell Grouted Roof Bolts, Resin Roof Bolts.

Anchorage Testing of Roof Bolts.

Bolt density.

Code of practice for roof bolting in underground mines.

Roof stitching, Principle of Roof stitching, Cable Bolting.

PRACTICAL:

1. **Sand bottle method of field density and void ratio**
2. **Determination of Plastic Limit, Liquid Limit and Shrinkage Limit**
3. **Falling head permeameter for permeability**
4. **Direct shear test for soil**
5. **Preparation of rock sample for laboratory testing.**
6. **Determination of uniaxial compressive strength of a rock sample.**
7. **Determination of tensile strength (Brazilian test) of a rock sample.**
8. **Determination of shear strength. of a rock sample.**
9. **Determination of point load strength index.**
10. **Determination of Protodykonov strength index.**
11. **Determination of impact strength index.**
12. **Demonstration of use of flat jack for in-situ stress determination.**
13. **Demonstration of Closure Meters, Extensometer, Stress cells and Load Cells**
14. **Demonstration of various Rock bolts.**
15. **Study of anchorage testing of rock bolts.**
16. **Demonstration of cable bolting.**

STRATEGY OF IMPLEMENTATION:

Conducting theory classes, practical, Industrial visits seminars group discussion,and assignment on different topics shall complete the curriculum for the subject.

REFERENCE BOOKS:

Author	Title	Publisher
D.J. Deshmukh	Elements of Mining Technology Vol I	Central techno publication, Nagpur
S.K. Das	Modern Coal mining Technology	Mintech publication Bhubaneshwar.
B.S. Verma	The elements of mechanics of mining ground	Tuhin& Co. Lucknow
Dr. B.P. Verma	Rock Mechanics for Engineers.	Khanna Publication Delhi.

Subject Code : 2TDMN305

Elements of Mining Geology

Unit I - GENERAL GEOLOGY

Branches
Sub branches
Essential
Allied
Scope of geology
Origin of Earth
Age of Earth
Interior of Earth
Isostacy
Plate Tectonic Theory & Continental drift

Unit II - MINERALOGY

Elements of crystallography
Characteristic symmetry elements
Elements of crystal system
Definition of Mineral
Classification of Minerals.
Physical and chemical properties ofMinerals.
Physical Chemical and Optical properties of following groups of rock forming minerals- Quartz,Pyroxene, Olivine, Amphobil,

Unit III - PETROLOGY

Rock cycle and characteristics of various Rocktypes
Igneous Rocks
Origin
Forms and structures
Classification, occurrence & uses.
Sedimentary Rocks
Origin & classification
Structure
Occurrence & uses
Metamorphic Rocks
Origin & Classification
Structure
Occurrence & Uses

Unit IV - PHYSICAL GEOLOGY

Weathering
definition of weathering
factors affecting weathering
types of weathering
Weathering & soil formation, weatheringprofile in various climatic region.
Land form produced by river, wind, glacier,ocean.
Earth quake
Definition of Earth Quake, epicenter,hypocenter.
Siesmic zones
Volcano
definition ,types & Land form

Unit V - STRUCTURAL GEOLOGY

Strike & Dip
Apparent Dip
True Dip
Dip-strike Problems
Folds-classification & Recognition in field
Faults- classification & Recognition in field
Unconformity- classification & Recognition infield
Joints and cleavages
Outlier and Inlier

Unit VI - COAL GEOLOGY

Physical & chemical properties
Origin, occurrence and distribution
Ranks of coal
Banded constituents of coal.
Structural features of coal seam.
Commercial classification of coal.

Unit VII - GEOLOG ICAL MAPS

Drawing of Geological section of maps.
Description of Geological maps.
characteristics of contour line.

LIST OF PRATICAL

1. Identification of Minerals in sets. Colour, Form, Cleavage, Fracture, Luster & Streak using Moh's scaleof hardness.

2. Identification of Minerals on the basis of physical properties in hand specimens.
    a. Quartz group
    b. Feldspar group
    c. Mica group
    d. Amphibole group
    e. Pyroxene group
    f. Feldspathoid group
    g. Miscellaneous silicate group
    h. Non-silicates.
3. Identification of Igneous Rocks in Hand specimen.

4. Identification of sedimentary rocks in Hand specimen.
5. Identification of Metamorphic rocks in Hand specimen.
6. Drawing of Geological section Maps (any ten)
7. Draw profile from contour map along a given line using available software.
8. Indentify the rank of given coal specimen.
9. Indentify the structural band of coal specimen.
10. Measure the dip & strike of inclined plane using Bronton compass .
11. Measure the hing & axil plane of fold in given model.

REFERENCE:

AUTHOR	TITLE	YEAR OF PUBLICATION	PLACE OF PUBLICATION & PUBLISHER
P.K. Mukherjee	A text book of Geology	1986	The world press pvt.Ltd. Calcutta.
A.K. Dutta	Physical Geology	1962	A. K. Bose Ranchi.
S.W. Chiplonkar	Structural Geology		
Pravin singh	Engineering & General Geology	2016	Katsons, Delhi

Sub. Code : 2TDMN401

Mine Surveying –II

UNIT: 1 Triangulation: Introduction-principle-purpose, classification triangulation system-Reconnaissance selection of stations-station map signals well conditioned triangles - base of verification- base of expansions. Forms triangulation - Simple chain triangulation - Double triangles - Theodolites used for triangulation - Base line measurements - corrections, problems based on corrections.

UNIT: 2 Tachometric Survey: Principles of Tachometry - Difference between Theodolite and Tachometer, Tachometer construction stadia rod -common method of Tachometry, Stadia method Tangential method, angular Tachometry, Tachometric constants Numerical problems. Based on various methods - Field work Method of booking - Errors and precision, Auto reduction tachometer - calculations of volume, mineral stock pile - (by taping profile & Tachometric survey)

UNIT: 3 Setting Out: Setting out a point of known rectangular coordinates, points for foundation, shaft surveys, selection and fixing of underground stations, difficulties in underground curve laying, Introduction to U/g curves, numerical examples. Giving and maintaining direction and gradient for inclined shafts, slopes, levels and tunnels, maintaining alignment. Auxiliary Telescope-Top and side telescope surveying for open pits.

UNIT: 4 Underground Survey: Introduction, purpose, advantages of correlation surveys, Description of methods used in correlation survey, underground traversing and setting of new road ways, Stope surveying- purpose and advantages, Classification of stope surveying-Methods and instruments used.

UNIT: 5 Astronomy Basic: Terms and definitions, Determination of true meridian, Latitude and longitude. Miscellaneous:- Map projection system, Correlation of mine survey to the National Grid, Gyrotheodolite, Principle photogrammetion and its application in Mining, The role of the mine surveyor and his legal, responsibilities, The provision and maintenance of statutory mine plans, Maintenance of survey instruments.

RECOMMENDED BOOKS:

1. Surveying (Vol-II & III) Kanetakar

2. Mine surveying Agor

3. Surveying Ponamiya

4. U.M.S.

5. Mine surveying (Vol-II & III) S . Ghatak

Sub. Code : 2TDMN402

ECONOMIC & FIELD GEOLOGY

COURSE OUTCOMES:

After undergoing the course of study the student shall be able to

1. Identify landforms in field
2. Explain the relation of landforms for mineral deposit and mining activity
3. Outline stratigraphy of India and mineral deposits
4. Identify the fossils
5. Explain the principle of formation of mineral deposit
6. Describe mode of occurrence, distribution and uses of ores.
7. Investigate minerals in field using geological, geophysical, geochemicalmethod of prospecting
8. Mark the mineral prospect zone using remote sensing techniques.
9. Delineate suitable site for dam and reservoir and tunnel

Unit I - Geomorphology

- Definition of landform
- Forces changing the landforms
  - Endogenetic1.2.2Exogenetic
- Geomorphic agents and their landforms

1.3.1 landforms produced by mass movement

- Fluvial landforms
  Aeolian landforms
  - Glacial landforms
- coastal landforms
- landform produced by groundwater

Unit II - **Paleontology**

Definition of fossil
Mode of preservation of fossil
Uses of fossils
Classification of animal and plant kingdom
Morphology and geological range of occurrence of animal fossils - order Foraminifera(Phylum protozoa),class corals (phylum Coelenterata) ,phylum brachiopoda, classgastropoda(phylum mollusca and class trilobite
Morphology and geological range of occurrence plant fossils-Glassopteris, gangamopteris, Ptolophillum

Unit III - Stratigraphy

priciples of stratigraphy
3.1standered stratigraphic and time scale

3.3Tectonic divisions of india
Stratigraphy of india
Stratigraphic succession ,lithology, distributionand economic mineral deposits of Precambrian basement in singhbhum and Dharwar,
3.4 .2 Stratigraphic succession ,lithology,distributionand economic mineral deposits of Cuddapah supergroup, vindhyan supergroup and Gondwana super group

Unit IV - Economic Geology

Definition of ore, gangue, tenor
process of formation of ore deposits
morphology of principal type of ore deposits
4.4Classification of ore deposits
Origin, mode of occurrence, distribution anduses of gold, iron, copper, manganese, chromium, Aluminum ,Pb, zinc and petroleum
Metallogenic provinces of India
ore deposit through geological time in India

Unit V - Exploration & Prospecting

definition of prospecting and exploration
Geophysical prospecting
Geochemical prospecting
Geobotanical prospecting
5.2 Remote sensing techniques for exploration

Unit VI - Engineering Geology
6.1 Geological investigation for site selection of dam and reservoir, tunnel, hill slope and rock cutting

Unit VII - Geology Mapping
Features of geological maps
topography
lithology
geological structure
signs and symbols
field equipment
For geological mapping
features of toposheet
Method of collection of sample
completion and tracking of outcrop

PRACTICAL:

1. Outcrop map preparation and interpretation. (Any Ten including Horizontal,Vertical and Inclined/Fault & fold outcrop)
2. Toposheet interpretation and preparation of geological map on toposheet(Jharia, Raniganj and Rajmahal coal fields)

3. Identification of ore mineral": Galena, Chalacopyrite, Magnetite, Hematite)
4. Identification of fossils : Trinobite, Gastropots, Glassopteries, Gangamopteris, foraminifera.
5. Identification of landforms in satellite image : Fluvial, Aeolian, Glacitr, Landform.
6. Interpretation of satellite image for Demarcation of outcrops of Vindhyan Supergroup, Cuddapah Supergroup, Singhbhum group on it

STRATEGY OF IMPLEMENTATION:

Conducting theory classes, practical, Industrial visits, seminars, group discussion,and assignment on different topics shall complete the curriculum for the subject.

REFERENCE BOOKS:

Author	Title	Publisher
Praveen Singh	Engineering and General Geology	Catson Educational Series
Umeshwar Prasad	Economic Mineral Deposit	CBS Publisher, New Delhi
D K Todd	Ground Water Hydrology	Willey and Sons, New
K R Karanth	Hydrology	Tata Mcgraw Hills, New
		Delhi
P.K. Mukherjee	A text book of Geology	The world press pvt. Ltd.
		Calcutta.
A Laberson	Geology of Petroleum	
M B Dobrine	Introduction of Geophysical	Mcgraw Hills
	Prospecting	
F.H. Lahee	Field Geology	

Sub.Code : 2TDMN403

MINE VENTILATION

COURSE OUTCOMES:

After undergoing the course of study the student shall be able to

1. **Take measurement of quantity of air, pressure, humidity and cooling power of the mine air, and take corrective action if these do not meet the desired standards.**
2. **Detect presence of inflammable and toxic/noxious gases in the mine and take precautions to remove the some and make the working places safe.**
3. **Provide and maintain ventilation appliances in their districts so as to ensure compliance with standards of ventilation prescribed.**
4. **Generally appreciate the ventilation system of a mine as a whole and importance of maintaining safe and comfortable working conditions inside the mine.**

Unit I - MINE AIR

Different Gases / Damps found in mines, Definition of damps, their threshold limits, physiological effects, source of production and detection, Degree of gassiness of seam.

Flame safety lamps, its principle, construction, safety features, and comparison. Detection of Methane by flame safety lamp.

Methanometer its principle of working, construction. Principle of other method of detection of methane (description of equipment not required)

Unit II - **MINE CLIMATE**

Purpose and standards of ventilation,standards for minimum & maximumvelocity of air for different locations.

Pressure, ventilating press, waterguage.

Temperature, sources of heat in mines.

Moisture content of mine air relative humidity, wet bulb temperature, measurement of relative humidity.

Cooling power of mine air, determination of coiling power, methodsof improving cooling power of mine air, effect of heat and humidity on miners.

Unit III - **NATURAL VENTILATION**

Natural ventilation Pressure, geothermic gradient, Factors causing NVP, Effect of seasonal changes on direction of Natural ventilation, limitation of Natural ventilation.

Motive column, calculation of naturalventilation pressure.

Unit IV - **ARTIFICIAL VENTILATION**

Different types of fans used in mines: centrifugal & axial flow, their principle of working, Exhaust & forcing type. Purposes of evasee& volute casing.Reversal of air current, and characteristics curves of fans. Fans in series and parallel,

Comparison between axial flow &Centrifugal fan; exhaust & forcing Fan.

Fan laws, Manometric efficiency overall

efficiency, theoretical depression producedby fan.
Numerical on fan laws.

Unit V - **DISTRIBUTION & COURSING OF AIR IN MINES**

Laws of air flow in Mines, Atkinson's formula splitting, advantages &disadvantages, Numerical on splitting,equivalent orifice. Numerical onequivalent orifice.

Ventilation appliances, Auxiliary ventilation: Different methods, advantages& disadvantages, hazards associated withauxiliary ventilation, precautions required.

Booster fan: purpose, dangers associated, Precautions before installation.

Numerical on Booster fan,

Ascensional and Descensional ventilation,Advantages and disadvantages.

Unit VI - **VENTILATION SURVEY**

Scope and importance of ventilation survey, survey interval and location of survey station, ventilation plan.

Measurement of quantity & pressure difference, anemometer, pitot static tube, Manometer.

Conduct of Pressure & quantity survey, precautions during and before conducting ventilation survey.

PRACTICAL:

1. Demonstration of co-detector and measurement of carbon monoxide usingCo-detector.
2. Demonstration of Methanometer and measurement of methane using Methanometer.
3. Dismantling & assembling of different types of Flame safety lamps.
4. Detection of Methane using flame safety lamp
5. Demonstration of whirling hygrometer and determination of relative humidity using whirling hygrometer.
6. Demonstration of Kata thermometer and determination of cooling power byKata thermometer.
7. Demonstration of water gauge and measurement of fan water gauge.
8. Demonstration of centrifugal mine fan.
9. Demonstration of Reversal arrangement of centrifugal mine fan.
10. Demonstration of Axial flow fan.
11. Demonstration of various ventilation devices.
12. Demonstration of vane Anemometer and determination of quantity by Anemometer.
13. Demonstration of velometer and measurement of air velocity by velometer.
14. Demonstration of Inclined manometer and pitot static tube and determination of velocity pressure.
15. Study of ventilation plan and conventional signs used in it.

STRATEGY OF IMPLEMENTATION:

Conducting theory classes, practical, Industrial visits seminars group discussion,and assignment on different topics shall complete the curriculum for the subject.

REFERENCE BOOKS:

Author	Title	Publisher
D.J. Deshmukh	Elements of Mining Technology Vol II	Central techno publication, Nagpur
G.B. Misra	Mine Environment & Ventilation	Oxford University Press, Calcutta
M.A. Ramlu	Mine Disaster & Mine Rescue	Oxford University Press, Calcutta

Sub. Code : 2TDMN404

MINING MACHINERY – I

COURSE OUTCOMES:

After undergoing the course of study the student shall be able to

1. Have general knowledge of electrical supply system
2. Understand basic principles of motors, transformers, instruments etc.
3. Connect above equipments to supply.
4. Understand and implement different units and standards of measurements.
5. Understand the working of I.C. Engines
6. Understand the working of different types of compressors.
7. Select appropriate engineering materials required for various machines components.
8. Supervise installation, maintenance of ropes and attachments; safeoperation and understand the methods of dealing with breakdowns.

Unit I - Electric Circuit

Resistance, Current, Voltage, Work, Power andEnergy Ohm's Law
AC Current – Three phase & Single phaseStorage Batteries- Constructing & working

Unit II - Electrical Machine

DC Machine: Construction & principles of operating, Magnetization and load characteristics of series, shunt and compound generators and motors. Motor starter, speed control and their field of applications.

AC Motors: Construction and principles of operation , types of transformers, Efficiency and Regulations, Auto transformer

Single phase Transformer: Construction and principles of operation , types of transformers, Efficiency and Regulations, Auto transformer

Unit III - Power Supply System

Transmission & distributing of Electrical power by overhead lines and cables Types of cables, layout of underground cables, shaft cables protection system and switchgear for mines like Relays, circuit breaker and fuses.

Earthling and types of earthling Indian Electricity Rules General and with special reference to mines.

Unit IV - Engineering Materials

Chemical composition, properties and uses of following ferrous Metals: Cast iron, steel, Wrought iron, manganese steel, nickel steel, chromium steel, nickel- chromium steel, stainless steel.

Nonferrous: Aluminium, copper, nickel, bronze, brass, copper nickel alloys, Aluminium alloys etc.

Unit V - Electronic Components, Fundamental of Semi

conductor, P & N Types, P N Juction, Diodes & their Applications,Special Diodes, Transistor, Amplifiers

Unit VI - Machines

Internal Combustion Engine: Classification, Otto cycle, Diesel cycle. Two stroke & four stroke petrol engine. Two stroke & four stroke Diesel engine. Different systems like fuel

injection, fuel ignition for petrol & diesel engines.

Air compressor: Classification, Definitions of different terms such as inlet pressure, discharge pressure, capacity, theoretical power, break power, free air delivery.

Compressor efficiencies, Working of reciprocating Compressor. Single stage & multistage. Linter

cooling, After cooling, Conditions of maximumefficiency, Uses of compressed air (no derivation and proof of formula.) Rotary compressor: Rootsblower, vane type blower, screw compressor,turbo blower, turbo compressor, centrifugal &axial flow compressor (no derivation of formula.) Brakes & Clutches: Breaks : Classification,Construction & working of block brakes,internal expanding brakes, hydraulic brakes,vacuum brakes (no numerical problems) Clutches : Construction & working of plateclutches, cone clutches, centrifugal clutch,claw clutch (no numerical problems)

Hydraulics & Hydraulic machines: Properties of fluid, components of hydraulic circuits and their symbols, constructional details and working ofhydraulic of shaper and hydraulic press.

Types of pumps. Working principle of centrifugal pump, working principle of reciprocating pump. Uses of pumps in mining industry.

Unit VII - **WIRE ROPES**

Classification of different types of wire ropes, Stranded rope, Non stranded rope, Different types of stranded rope, Different types of Non stranded rope, Lays of rope, Different definition like Space factor, static load, dynamic load, factor of safety.

Selection of wire rope, Care and maintenance in ropes, Types of deterioration in the ropes Testing of wire ropes.

Types of Rope capping, White metal capping (cone socket type capel), Wedge type capping (Reliance rope capel), Capping with split capel and rivets (Split capel), Recapping, Rope splicing procedure

STRATEGY OF IMPLEMENTATION:

Conducting theory classes, practical, Industrial visits, seminars, group discussion,and assignment on different topics shall complete the curriculum for the subject.

REFERENCE BOOKS:

Author	Title	Publisher
Edward Huges	Electrical Technology	
H. Cotton	Electrical Technology	C.B.S. Publisher
B.L. Theraja	Electrical Technology	S.Chand
Malvino	Electronic Principles	
P.L.Ballaney	Thermal Engineering	
Avner	Engineering Metallurgy	Mcgraw Hill
R.S.Khurmi	Theory of Machines	S.Chand
D.J. DESHMUKH	Vol- III	Central techno
		publication, Nagpur.
S. GHATAK	Mine pump, haulage, winding.	Coal Field Publisher
		Asansol.

Sub. Code : **2TDMN405**

Practical TrainingProject –I

Learning from textbooks, lectures and other study material does not suffice for Holistic learning. Practical ,hands-onlearning is essential for better Understanding of work processes and business functions.

The practical training activityis important for students to relate their theoretical knowledge to practical aspects of the studied courses, in terms of mining unit operations, process and concepts, and impact of its activities on health, safety, environment and society.

Benefitsofindustrialvisitstodiplomastudents:

1. Industrialvisitshelpthemgainhands-onexperienceofhowindustry operations are executed
2. Industryvisitsbridgethegapbetweentheoreticaltrainingandpractical learning in a real-life environment
3. Industryvisitsprovideopportunityforactive/interactivelearning experiences in-classaswell outside the classroomenvironment
4. Withindustryvisits,studentsareabletobetteridentifytheirprospective areas of work in the overall organizational function.
5. Industryvisitshelpenhanceinterpersonalskillsandcommunicationtechniques.
6. Studentsbecomemoreawareofindustrypracticesandregulations during industry visits.
7. Industryvisitsbroadentheoutlookofstudentswithexposuretodifferent workforces from different industries.

COURSEOUTCOMES:

Afterundergoing the course ofstudythe studentshall have

1. Exposure toactualworking environment
2. Acquisitionofskillsneededatactualworkplacetobesupplementedbytraining
3. Followsafetypracticesandregulationsinside the industry
4. Developemployabilityskills
5. Preparereports

STRATEGYOFIMPLEMENTATION:

Conducting Industrial visits, seminars, group discussion, and practical assignmentsondifferenttopicsshallcompletethecurriculumforthesubject.

Sub. Code : **2TDMN406**

Mini Project and Seminar

In spite of theory concept students acquire, various industries also need to know their capacity to complete projects using their specific initiative. The importance of mini project includes, it gives a chance to use their brain and hands, students can share their knowledge, increase self-confident.

The small project and seminar allow students to experience solving real world problems, working with other people under deadlines and with often ambiguous guidance.

Mini projects for diploma students gives an edge over the race of recruitment to work hard to ensure a good career.

Course Outcomes:

After undergoing the course of study the student shall be able to

1. Use their technical knowledge to solve real world problems
2. Complete small projects using their specific initiative
3. Experience solving real world problems

Suggested broad areas for Project & Seminar:

1. Extraction of coal by different methods
2. Different development and depillaring method of Board and pillar method
3. Various longwall method based on direction of face advance, cyclic, non-cycling unit, double unit.
4. Indian Geological Formations, Prospecting and Exploration
5. Application of principles of mechanics and strength of materials for general and specialized engineering aspects connected with mining structures, machine mechanism or their parts
6. Conduct survey to plot positions of underground workings, establish underground bench marks incorporate on mine plan and prepare sections of underground workings for proper planning of production and excavation operations.
7. Conduct laboratory and insitu tests on rock mass, understand the kind of support required to stabilize the excavation, reinforce the excavation openings by bolting/stitching and monitor the performance of support system
8. Maintain the adequate ventilation in underground workings and ensuresafe & comfortable working conditions inside the mine
9. Use and maintenance of mining machines for getting desired result
10. Concerned faculty can assign any project related to their courses of studies

STRATEGY OF IMPLEMENTATION:

Conducting Industrial visits to assign area for project and seminar.

Sub. Code : **2TDMN407**

Development of Life Skills- I and professional Practice

Rationale:

In today's competitive world, the nature of organizations is changing at very rapid speed. In this situation the responsibility of diploma holder is not unique. He will be a part of a team in the organization. As such the individual skills are not sufficient to work at his best.

This subject will develop the student as an effective member of the team. It will Develop the abilities and skills to perform at highest degree of quality as an individual as well as amember of core group or team. Such skills will enhance his capabilities in the field of searching,assimilating information, managing the given task, handling people effectively, solving challengingproblems.

THE SUBJECT IS CLASSIFIED UNDER HUMAN SCIENCE. Objectives: The

students will be able to:

1. Develop team spirit i.e. concept of working in teams
2. Apply problem solving skills for a given situation
3. Use effective presentation techniques
4. Apply techniques of effective time management
5. Apply task management techniques for given projects
6. Enhance leadership traits
7. Resolve conflict by appropriate method
8. Survive self in today's competitive world
9. Face interview without fear
10. Follow moral and ethics
11. Convince people to avoid frustration

CONTENTS: Interaction by faculty / professional

Unit I - SOCIAL SKILLS

Society, Social Structure, Develop Sympathy And Empathy.

Unit II - Swot Analysis – Concept, How to make use of SWOT.

Unit III - Inter personal Relation

Sources of conflict, Resolution of conflict ,Ways to enhance interpersonal rela

Unit IV - Problem Solving

(I) STEPS IN PROBLEM SOLVING,

1.Identify and clarify the problem,

2.Information gathering related to problem,

3.Evaluate the evidence,

4)Consider alternative solutions and their implications,

5)Choose and implement the best alternative,

6)Review

II) Problem solving technique.(any one technique may be considered)

1)Trial and error, 2) Brain storming, 3) Lateral thinking

Unit V - Presentation Skills

Body language --

Dress like the audience

Posture, Gestures, Eye contact and facialexpression. STAGE FRIGHT,

Voice and language – Volume, Pitch, Inflection, Speed, PausePronunciation, Articulation, Language, Practice of speech.

Use of aids –OHP,LCD projector, white board

Unit VI - Group discussion and Interview technique –

Introduction to group discussion,
Ways to carry out groupdiscussion,
Parameters— Contact, body language, analytical and logicalthinking, decision making

INTERVIEW TECHNIQUE

Necessity,
Tips for handling common questions.

Unit VII - Working in Teams

Understand and work within the dynamics of a groups.Tips to work effectively in teams,

Establish good rapport, interest with others and work effectivelywith them to meet common objectives,

Tips to provide and accept feedback in a constructive andconsiderate way ,
Leadership in teams, Handling frustrations in group.

Unit VIII - Task Management

Introduction,

Task identification,
Task planning ,organizing andexecution, Closing the task

CONTENTS: PRACTICAL -

List of Assignment: (Any Eight Assignment)

1. SWOT analysis:- Analyse yourself with respect to your strength and weaknesses,opportunities and threats. Following points will be useful for doing SWOT.
   a) Your past experiences,
   b) Achievements,
   c) Failures,
   d) Feedback from others etc.
2. Undergo a test on reading skill/memory skill administered by your teacher.
3. Solve the true life problem.
4. Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slump area, social activities like giving cloths to poor etc.(One activity per group)
5. Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher.
6. Watch/listen an informative session on social activities. Make a report on topic of your interest using audio/visual aids. Make a report on the programme. ####
7. Conduct an interview of a personality and write a report on it.
8. Discuss a topic in a group and prepare minutes of discussion. Write thorough description of the topic discussed
9. Arrange an exhibition, displaying flow-charts, posters, paper cutting, photographs etc on the topic given by your teacher.

Note: - Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic. The **term work** will consist of any eight assignments.

Mini Project on Task Management: Decide any task to be completed in a stipulated time with the help of teacher. Write a report considering various steps in task management.

LEARNING RESOURCES:

BOOKS:

Sr. No	Title of the book	Author	Publisher
1	Adams Time management	Marshall Cooks	Viva Books
2	Basic Managerial Skills for All	E.H. Mc Grath , S.J.	Pretice Hall of India
3	Body Language	Allen Pease	Sudha Publications Pvt. Ltd.
4	Creativity and problem solving	Lowe and Phil	Kogan Page (I) P Ltd
5	Decision making & Problem Solving	by Adair, J	Orient Longman
6	Develop Your Assertiveness	Bishop , Sue	Kogan Page India
7	Make Every Minute Count	Marion E Haynes	Kogan page India
8	Organizational Behavior	Steven L McShane and Mary Ann Glinow	Tata McGraw Hill
9	Organizational Behavior	Stephen P. Robbins	Pretice Hall of India, Pvt Ltd
10	Presentation Skills	Michael Hatton (Canada – India Project)	ISTE New Delhi
11	Stress Management Through Yoga and Meditation	--	Sterling Publisher Pvt Ltd
12	Target setting and Goal Achievement	Richard Hale ,Peter Whilom	Kogan page India
13	Time management	Chakravarty, Ajanta	Rupa and Company
14	Working in Teams	Harding ham .A	Orient Longman

Subject Title : Professional Practices-II (Group -II)

Rationale:

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and their attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

Objectives:

Student will be able to:

1. Acquire information from different sources
2. Prepare notes for given topic
3. Present given topic in a seminar
4. Interact with peers to share thoughts
5. Prepare a report on industrial visit, expert lecture

Sl. No.	Activity Heads	Activities	Suggested Hrs
1.	Acquire information from different sources	Topic related to the branch and current area of interest i.e. articles in internet on which research or review is undergoing may be decided for the students group. The group may be restricted to maximum 5 students. Literature survey from Internet , print media and nearby practices may be undertaken. Minimum of 10 to 15 papers may be suggested for reading to get an overview and idea of matters.	
2.	Prepare notes for given topic	Making review or concept to be penned down in form of a article .(the article or review may be of 8 – 10 pages length in digital form of 12 font size in Times New Roman font)	
3.	Present given topic in a seminar	A seminar or conference or work shop on branch related topic is to be decided and all students in group of 5-6 students may be asked to present their views.	
4.	Interact with peers to share thoughts	A power point presentation of the article prepared in stage 2 may be presented before the classmates and faculty members.	
5.	Prepare a report on industrial visit, expert lecture	A topic on best practices and product / software development may be assigned to the student group. The group may be asked to prepare a survey, come to opinion making and list out the activities to develop the activities with SWOT analysis.	

Sub. Code : **2TDMN501**

Underground coal mining method

RATIONALE:

Most of the students/pass outs from this institute join the Coal Mining Sector after their diploma course. As such it is very important that the students have knowledge about the common methods of working coal with special reference to Indian Coal Mining, This subject is introduced to understand Methods of Mining of coal
e.g. Board and pillar working development and depillaring, Long wall methods both advancing and retreating, special methods for working under special difficult situation and of contiguous seams etc.

Course outcome

After undergoing the course of study the student shall be able to

1. Select suitable method of working the coal, based on different factors and geological conditions.
2. Plan for extraction of coal by board and pillar method
3. Supervise the Mining of coal by board and pillar method and get the development and depillaringoperations carried out with safety.
4. Employ suitable support system to strata control
5. Supervise the Mining of coal by long wall methods.
6. Select the appropriate method for thick seam mining
7. Supervise operation in difficult areas and of mining of contiguous seams.
8. Predict and Measure the subsidence by suitable instrument
9. Take steps to avoid the effects of surface subsidence due to mining operation.

Unit I - Factors influencing Choice of Mining methods
Classification of method of working
board and pillar method of coal mining
Variant of board and pillar method
Classification of Board and pillar mining method
Design of board and pillar methodSize of panel, barrier, pillar
Width of boards
Mining Process
Cyclic and Continuous mining
Development
Development by blasting off the solid, coal cutting Machine,Gathering arm loader and shuttle cars
Extraction of pillars
Problems in the extraction of pillarsPrinciples of pillar extraction Splitting of pillars
Factors influencing choice of pillar extraction Extraction of pillar in Thick and steep seam with caving
Extraction of pillar in Thick and steep seam with stowing
Room and pillar miningThe vermelles method The Slant Method
The Sub level Method
Manpower calculation and O MS
open and close panel system
line of extraction and numbering of pillars
Advantage and disadvantage of Board and Pillar method
Precaution while working near restricted area1.2.13Working near fire area
working below waterlogged area

working below depillared goaf

Unit II - Longwall method

Applicability

Design of Longwall panel

factors affecting length of Longwall face, barrier width, gateroad length

Longwall advancing

Longwall retreating

Cyclic Longwall

non cyclic Longwall

different machine used

2,4 layout of DERD manpower calculation

Thick seam working with Longwall top slicing and sub level

Longwall caving and stowing

Unit III - Mining of thick coal seam

Choice of method of thick coal seamSlice mining

Main slicing Method

Inclined Slicing

Horizontal slicing

Diagonal slicing

Transversely inclined slicing

Sublevel Caving

Working steep and moderately thick seam

The Velenjee Method

Descending shield method of mining

Unit IV - Subsidence in coal mines

Theories of subsidence

Vertical and Normal theories

Dome theory

Beam or plate theory

Trough theory

Continuum theory

.6 Particulate theory

Mechanics of development of subsidence

Engineering parameter of subsidenceAngle of Drew

Angle of fracture

Prediction of subsidence

Prevention of subsidence damage

Measurement of subsidence

Routine measurement

Instruments

Measuring Techniques

Unit V - - Strata Control in coal mines

Characteristic of coal measure strata

Theories of Mechanics of strata behaviors

Effect of mining parameter in strata control

Roof Fall and fracture due to miningBoard and pillar working

Long wall working

roof support

Timber support

Steel support

Power support

Roof bolt

Goaf control

caving

strip packing

solid packing

Sessional

1. Study of friction props, its construction, setting and withdrawal.
2. Study of Hydraulic props its construction, setting and withdrawal.
3. Study of fore poling method of support.
4. Study of withdrawal of support from the goaf.
5. Study of Requirements and preparation before starting depillaring operation.
6. Study of Systematic supports in depillaring area.
7. Surface Arrangements for sand stowing.
8. Design of panel for working a seam liable to spontaneous combustion based on incubation period.
9. PREPARATION OF SHEETS
    1. Development by any one method of board and pillar working.
    2. Depillaring layout, showing extraction methods of a stook.
    3. Contiguous working of coal seam.
    4. Arrangement at the S.D.L. face.
10. PREPARATION OF DRAWING SHEETS :
    1. Any one – long wall method of working.
    2. A face layout for double drum Shrearer at long wall face.
    3. Precaution to reduce/avoid surface subsidence.

REFERENCE BOOKS

Author	**Title**	**Publisher**
T.N. Singh	Underground winning of coal	Oxford and IBM
S.K. Das	Modern coal mining Technology	Lovely Prakashan, Dhanbad
D.J. Deshmukh	Elements of mining technology	Central techno publication ,Nagpur
R.D. Singh	Principles and practice of modern coal mining	New age International (p) limited, New delhi

Sub. Code : **2TDMN502**

MINING METHODS – NON COAL

After obtaining Diploma in Mining Engineering many of the students join the metaliferrous mines as foreman. They are required to supervise operations involved in underground metal mines. Also shaft sinking is the unique feature of the mining process and Diploma holder needto supervise the entire process of shaft sinking. The knowledge of underground metal mining, shaft sinking and boring is essential for the student.

COURSE OUTCOMES:

After undergoing the course of study the student shall be able to

1. Supervise development operations in metal mines
2. Supervise stopping operations in underground metal mines
3. Select appropriate method of shaft sinking
4. Supervise the process of shaft sinking and carryout the supporting, lining of the sinkingshaft
5. Supervise the Boring operation on the site of Boring / Drilling
6. Demonstrate surface arrangement, assembly and working of rotary boring
7. Demonstrate operation of core barrels
8. Perform Bore hole survey
9. Demonstrates various mining operations using mining models
10. Integrate compliance with regulations

Unit I - UNDERGROUND DEVELOPMENT

Terminology used in metal mines
Types of ore bodies
Types of underground opening, location of openings
Opening up of a mineral deposit by vertical shaft,inclined shaft, Adit
Level interval, factor considered while deciding levelinterval/length of back
Drivage of raises and winzes

Driving manually, Modern methods Alimak, Longhole method, Drop raising, Raise Boring.

mmon supports in metal mines

Unit II - PORTED STOPING METHODS

ssification and choice of stoping Methods

pen stoping methods, underhand, overhand, Breast g, sublevel stoping, Blast hole stoping, VCR , Shrinkaged, their conditions of applicability, Sequence of pment, stoping operation, Cycle of operations etc. System oval of ore from stope

Unit III - SUPPORTED & CAVING METHODS

Artificially supported methods Cut and Fill, Square Set, Stulled stoping Methods. Their applicability, stope Preparation, stoping operation, cycle of operation, relative merits and demerits etc.

Caving methods - Top slicing, Sublevel caving andblock caving methods, applicability, stope preparation stoping, cycle of operation etc.

PROVISIONS OF MMR 1961 regarding Means of Access and Egress, Ladders and ladder ways

Unit IV - SHAFT SINKING

Size, shape, Factors considered for location of shaft, marking center, and shaft-centering arrangement

Ordinary sinking up to rock head, sinking of shaft below rock head- operation of drilling, charging and blasting and mucking operation. Disposal of debris

Shaft lining: Temporary lining, Permanent lining of shaft: Brick, monolithic, reinforced concrete lining, shaft tubing's etc.

Walling scaffold, rider, ledge formation, underpinning, water garland crib etc.

Unit V - L METHODS OF SHAFT SINKING

5.1 Different special methods of shaft sinking, condition of applicability of each method, Description etc.

dening and Deepening of shaft

Unit VI - BORING

Purpose of boring, classification of boring methods, applicability of boring methods

Drill Bits for various types of drilling/boring

Surface arrangement, assembly, working of Rotary boring, Screw and hydraulic feed mechanism

Core recovery, core barrels, Recover of broken tools, Bits

Bore hole survey, Deviation of boreholes

REFERENCE BOOKS

Author	Title	Publisher
DJ Deshmukh	Elements of Mining Technology Vol I, II	Central techno publication, Nagpur
HL Hartman	Introductory Mining Engineering	AWiley- Interscience Publication, Singapore
Cummins & Givens	SME Mining Engineering Handbook, Vol. I & II	A.I.M.M. New-York

Sub. Code : **2TDMN503**

Mine Environment & Safety Engineering

RATIONALE:

Mining is the hazardous profession involving fires, explosions of firedamp and coal dust, inundation of water are the common hazards which have resulted in calamities causing deaths of large number of miners all over the world. The mining engineer therefore be aware of hazards, their causes and methods of preventing them. However, whenever such calamities do occur rescue and recovery operations are necessary to save the life and property in mines. The mining engineer has to be well acquainted with these operations. The subject of Mine Environment covers topics on these activities.

OBJECTIVES:

After undergoing the course of study the student shall be able to

1- Take precautionary measures against occurrence of the firedamp and coal dust explosions.
2- Take precautionary measures against occurrence of spontaneous heating, its detectionand conduct sealing off operations.
3- Detect presence of fire and supervise the fire fighting operations.
4- Ensure safe withdrawal of persons in case of any eventuality of explosion, fire andinundation.
5- Take part in sealing off and reopening operations
6- After undergoing further training in rescue work, take part in rescue operations.

DETAILED CONTENTS:

Unit I - MINE FIRES

Surface fire and underground fires, their causes, detection and prevention. Classification of fires, Portable fire extinguishers their applicability, places of portable fire extinguishers in mines, maintenance of fire extinguishers.

Spontaneous heating: Mechanism of spontaneous Heating, factors governing spontaneous heating, methods for study of spontaneous combustion of coal: crossing point method. Stages of spontaneous heating, Detection of spontaneous heating: Physical or sensory indicators, Precautions for prevention of spontaneous heating.

Model standing orders in event of fire.

Dealing with spontaneous heating & fires: Various methods, Sealing off: selection of site for fire stoppings, construction of fire stopping, fittings to stopping, inspection and maintenance of fire stoppings.

Unit II - SAMPLING OF MINE ATMOSPHERE & INTERPRETATION

Sampling from sealed off area: Sampling line, Methods of sampling from behind thefire stopping, frequency of sampling.

Sampling accessible places: water, air displacement method, evacuated sample holder type.

Composition and behavior of gases in sealed off area, interpretation regarding condition of heating: Graham's ratio; interpretation regarding explosibility: Cowards Diagram. Elementary knowledge of gas chromatography.

Reopening of sealed off area: Factors governing decision of reopening, methods of reopening, selection of methods of reopening, precautions to be taken while reopening.

Unit III - FIRE DAMP EXPLOSION

Introduction, Composition of firedamp Modes of emission of Firedamp, Degree of gassiness, methane layering.

Mechanism of fire damp explosion, Flammability of firedamp, lower and upper limit of explosibility of firedamp, factors governing limits of flammability, lag on ignition. Explosive limits of other flammable gases.

Causes of fire damp explosion and its prevention. Characteristic of firedamp explosion

Unit IV - COAL DUST EXPLOSION

Mechanism of Coal Dust explosion, Flammability limits of coal dust, factors governing explosibility of coal dust, Characteristics of coal dust explosion.

Causes of coal dust explosion, Prevention of coal dust explosion.

Generalized stone dusting, Quantity of stone dust, Types and properties of stone dust, stone dusting plan.

Stone dust barriers, types of stone dust barriers, specifications and construction, location of primary and secondary types of barriers. Situations under which barrier may fail, maintenance and care of stone dust barriers. Water barrier, Triggered barrier.

Unit V - INUNDATION

Surface and underground causes of Inundation and its prevention.

water dams, bulkhead doors.

Procedure of and precaution while approaching old water logged areas, pattern ofbore holes, Dewatering, burn side safety boring apparatus.

Standard of lighting in underground & opencast mines, cap lamps, its construction,maintenance and care, cap lamp room

Unit VI - MINE RESCUE

Introduction, classification of mine rescues apparatus, modern self contained breathing apparatus BG 174, its construction, application and scope. Common tests of self contained compressed oxygen breathing apparatus. 6.2 Chemical oxygen self-rescuers, gas mask, filter self-rescuers: their construction, application and limitations. Fresh air hose type breathing apparatus. 6.3 Fresh air base: location, personnel & equipments

required. Layout of FAB. 6.4 Resuscitation, Modern reviving apparatus

REFERENCE BOOKS:

Author	Title	Year of publication	Publisher
D.J. Deshmukh	Elements of Mining Technology Vol II	1995	Central techno publication, Nagpur
G.B. Misra	Mine Environment & Ventilation	1993	Oxford University Press, Calcutta
M.A. Ramlu	Mine Disaster & Mine Rescue	1997	Oxford University Press, Calcutta

Sub. Code : **2TDMN503(P)**

Mine Environment Lab

Rationale:

Theory of environment engineering has to be demonstrated into practices. Hands-on-experience areessential to study different fittings, rescue apparatus and equipments used in mine environment.

Objectives:

- Demonstration of equipments and fitting used in mine environment
- Study of rescue apparatus

List of Experiments (any 10)

1. Demonstration of various portable fire extinguishers.

2. Determination of crossing point temperature.

3. Demonstration of various temporary stoppings.

4. Demonstration of preparatory stopping.

5. Demonstration of construction of fire stopping and fittings to it

6. Demonstration of sampling of atmosphere from behind the fire stopping.

7. Demonstration of sampling equipments and collection of air samples at accessible places.
8. Preparation of sampling & dusting plan in zones & sections.
9. Collection of mine dust samples.
10. Demonstration of stone dust barrier and maintenance of stone dust barrier.

11 . Demonstration of Burnside safety boring apparatus.

12. Demonstration of electric cap lamp.

13. Demonstration of Self-contained closed ckt compressed oxygen breathing apparatus (B.G 1 74).

1 4. Demonstration of Gas mask.

15. Demonstration of Filter Self-Rescuer.

16. Demonstration of reviving apparatus.

17. Mock rehearsal during disaster in mines

18. Investigation of fire in nearby mines
19. Quality circle in safety of mines

20. local Visit to rescue station/room

Sub. Code : **2TDMN504(P)**

Mine Design Lab

Rationale:

Mining has to be planned and designed with due regards to economics, techniques, environment, safety and conservation. To make the mining production feasible with stated parameters, the skill of mining layout and design is required for mining technician.

Objectives:

1. to transfer the skill of mine layout and design
2. brain storming session for appropriate mining planning
3. dissemination of attitude for apt

mine designList of Experiments (any

10)

1. Layout of manual bord and pillar method
2. Layout of mechanised bord and pillar method (LHD/SDL/Continuous minersetc)
3. Layout of long wall advancing method.
4. Layout of long wall retreating method.
5. Layout of manual surface iron/bauxite ore mine with an output of 1000tonne /day.
6. Layout of shovel-dumper combination/dragline/bucket wheel excavator.
7. Layout of open cast slope failure in Indian Coal Mines.
8. Formation of benches in open cast mines as per coal mine regulations
9. Pit top and Pit bottom layout of coal mine
10. Pit top and bottom layout of metal mine
11. Manpower calculation and OMS in assumed mine
12. Open & closed system of power support
13. Design of caving v/s stowing coal mining
14. Design of supported v/s unsupported metal mining
15. Design of non-cyclic v/s cyclic mining
16. Top slicing and sub level caving layout
17. Techno-economic analysis of mining
18. Calculation of stripping ratio and pit limit
19. Design of Haul roads
20. Design of box cut
21. Design of air circulation/distribution in underground mines

Sub. Code : **2TDMN505(P)**

Practical Training Project –II

Learning from textbooks, lectures and other study material does not suffice for Holistic learning. Practical ,hands-on learning is essential for better Understanding of work processes and business functions.

The practical training activities important for students to relate their theoretical knowledge to practical aspects of the studied courses, in terms of mining unit operations, process and concepts, and impact of its activities on health, safety, environment and society.

Benefit so find us trial visits to diploma students:

8. Industrial visits help them gain hands-on experience of how industry operations are executed
9. Industry visits bridge the gap between the or etical training and practical learning in a real-life environment
10. Industry visits provide opportunity for active/interactive learning experiences in-class as well outside the class room environment
11. With industry visits, student sareable to better identify their prospective areas of work in the overall organizational function.
12. Industry visits help enhance inter personal skills and communication techniques.
13. Students become more aware of industry practice sand regulations during industry visits.
14. Industryvisitsbroadentheoutlookofstudentswithexposuretodifferent workforces from different industries.

COURSEOUTCOMES:

After undergoing the course of study the student shall have

6. Exposure to actual working environment
7. Acquisition of skills needed at actual work place to be supplemented by training
8. Follow safety practices and regulations inside the industry
9. Develop employability skills
10. Prepare reports

STRATEGYOFIMPLEMENTATION:

Conducting Industrial visits, seminars, group discussion, and practical assignments on different topics shall complete the curriculum for the subject.

Sub. Code : **2TDMN506(P)**

Application of GIS and Auto CAD in Mining

To give emphasis on scientific and systematic exploitation of coal / minerals and to ensure sustainability of the resources, mining industry has realised the importance of technologies such as, GIS and Auto CAD for mining.

Use of GIS for mining has brought about a revolution by ensuring cost efficient and detailed studies of the concerned area. GIS for mining help in creation of maps that are an amalgamation of all the information regarding the concerned area.

Further, a system can be design to improve mine production efficiency, provide data query, information analysis and technical decision support for mine. It can be a GIS integrated system based on AutoCAD that can support image-text interactive queries and automatic drawing.

For this a basic knowledge of GIS software and Auto CAD software is required.

Course Outcomes:

After undergoing the course of study the student shall be able to

1. **Topographical & Physiographical mapping**
2. **Mineral mapping to identify potential mineral zones**
3. **Geological database creation**
4. **Map updation for mineral exploration**
5. **Surface mapping**
6. **Data Analysis and Report Generation**
7. **Assist in the preparation of blueprints and other engineering plans**
8. **Create precise 2- and 3-dimensional drawings**

Suggestive Works:

Demonstration and Concept building: Introduction to GIS, Hardware and Softwarerequirements, Scanning of maps, Printing of maps, Geographic Data, SpatialData, Non-spatial Data input

1. **Map Scale: Type and conversion, Vertical Exaggeration, Enlargement and reduction**
2. **Map Projection: Concept, Classification, Polyconic Projection, MercatorProjection**
3. **Representation of Statistical Data: Choropleths, Isopleths dots unimodel, two dimensional and 3 dimensional diagrams**
4. **Relief Representation Techniques: Profile identification and representation of land forms from toposheets**
5. **Demonstration of Raster and Vector model for representing geographic features using GIS**

6. **Demonstration of attributes and spatial data in GIS**
7. **Preparation of Topographical sheet using GIS**
8. **Preparation of Physiographical mapusing GIS**
9. **Creation of geological database using GIS**
10. **Surface mapping using GIS**
11. **Data Analysis and Report Generation**
12. **Demonstration of CAD techniques for drawing**
13. **Draw rectangles and circles with cross-hatching and automaticdimensioning using Auto CAD Software**
14. **Demonstration of used of AutoCAD in mine design**
15. **Demonstration of common features for manipulation of 3D drawing in CAD**
16. **Preparation of CAD generated drawing**

STRATEGY OF IMPLEMENTATION:

Conducting practical, Industrial visits, seminars, group discussion, and assignment on different topics shall complete the curriculum for the subject.

REFERENCE BOOKS:

Author	Title	Publisher
RL Singh	**Elements of Practical Geography**	**Kalyani Publishers.**
BG Tamaskar & VM Deshmukh	**Geographical Interpretation of Indian Topographical Maps**	**Orient Longman Ltd.**
FE Croxton, DJ Cowden & S Klein	**Applied General Statistics**	**Practice Hill India**
K Ramamurti	**Map Interpretation**	**Racks Printer**
KK Gupta & VC Tyagi	**Working with Maps**	**Survey of India**
	Understanding Map Projection	**GIS by ESRI, 2003-2004, USA**

Sub. Code : **2TDMN601**

MINING MACHINERY – II

A large number of mining machineries are used in the mine right from the winding of men and material through shafts, transport of material, wire, power for drilling, cutting and loading of coal on the faces. Pumping operations are also essentialto deal with accumulation of water in underground workings. A mining engineer should be aware of the types of machineries available for these operations, their principles of operations and suitability of these equipments under different conditions, so that they can supervise the selection, installation and day-to-day operation and elementarymaintenance of these equipments.

COURSE OUTCOMES:

After undergoing the course of study the student shall be able to

1. Supervise the transportation of coal/mineral by different types of rope haulages
2. Provide and maintain the safety devices to be provided on rope haulages.
3. Supervise the operation of locomotive haulages for transportation ofmineral/material
4. Supervise the operation of different types of conveyers for transportation of mineral/material
5. Supervise the operation of coal cutting machines and power loaders on the coal faces
6. Supervise the installation and operation of water pumps for dealing with water in mines
7. Supervise the winding of coal/minerals from underground to surface and movement of coal/mineral on the surface.
8. Supervise installation, maintenance of ropes and attachments; safe operation and understand the methods of dealing with breakdowns.
9. Supervise operations of coalface machineries
10. Select most appropriate electrical cable for list of activities
11. Clarify assembly instructions of joint box
12. Provide and maintain the electrical appliances / switchgears etc.
13. Supervise the safe installation and operation of gate and boxes
14. Integrate compliance with regulations

Unit I - TRANSPORT OF ORE

Different types of haulages
Description of each haulage system.
Direct rope haulage
Endless rope haulage
Main and Tail rope haulage
Gravity haulage
Safety devices used on rope haulagesystem
Stop block/Buffers
Back stay
Monkey catch
Age craft Device
Runaway Switch
Drop Warwick
Locomotive Haulage different types /Applicability
Diesel locomotive
Electric locomotive
Air compressed locomotive
Battery locomotives.
Definition of draw bar pull, Ideal gradient,
Super elevation
Different Types of Conveyor
Chain conveyor
Plate conveyor
Belt conveyor
Condition of Suitability of each type
Advantageous and disadvantages
Introduction to Arial Ropeways

Unit II - **WINDING IN SHAFT**

Purpose of Winding
Main equipments used for Winding
Head gear
Headgear pulley
Cage/Skip
Winding Rope
Winding drum
Guides
Keps
Suspension Gear
Different types of winding
Drum winding

Koepe Winding
Drum winding different types
Cylindrical drum
Conical drum
Cylindroconical drum
Bicydroconical drum
Provisions on winding drum

Flanges
Depth indicator
Mechanical Brakes (differenttypes)
Automatic Contrivance
Angle of fleet
Guides different types
Rigid guides
Flexible cable
Causes of cage oscillation
Cage suspension Gear Rope Capel
D link and bull chain
Safety hook
Triangular distribution plate
Bridle chain
Different types of keps
Rigid keps
2.10.2 Davies improved kepsgear.
List of safety devices used in winding.
Characteristics curves
Smooth winding cycle
Koepe winding

Unit III - **MINE PUMPS**

Sources of water in Mines
Classification of Mine Pumps
Reciprocating Pump
Single acting
Double acting
Ram pumps
Centrifugal Pumps
Turbine Pumps
Installation of pump
Operation of pump
Fitting on pump
Starting and stopping of pump
Face pumps
Characteristics Curves of Centrifugal and turbine pumps.
Calculations for pump discharge etc.
Snoring of pump, its prevention.
Water hammer.

Unit IV - **COAL CUTTING MACHINE**

Purpose of coal cutting machine
Classification of coal cuttingMachine.
Different types of cut
Different parts of CCM
Cutting gear arrangements of chain
Introduction of continuous miner
Different types of mechanicalLoaders.

Unit V - **ELECTRIC POWER SUPPLY**

Types of cables used in mines
Permanent cable
Different types, construction
Semi flexible cable Different types, construction
Flexible cable
Different types, construction
Screening of cable
Cable joint box

Repair of cable
Bleeding of cable
Cable care and maintenance duringUse and storage

Unit VI - **GATE END BOX**

Construction of gate end box
Safety provision in gate end box
Pilot Circuit
Different circuits for protection

PRACTICAL:

1 Study and sketch of different types of rope haulage
2 Demonstration of different models of safety devices uses on rope haulage
3 Demonstration of different types of drum winder models
4 Demonstration of different parts in cage suspension gear and their function
5 Sketches of different parts
   a. Reliance rope cable
   b. D-link
   c. Safety hook
   d. Triangular distribution plate
   e. Bull chain
   f. Cage.
6 Study of Rope splicing method
7 Study of different types of reciprocating pumps
8 Study of different types of Centrifugal pump
9 Study of face pump
10 Study of different types of coal cutting m/c
11 Identification of different types of Electrical power cables used in mine12 Study of gate and box and its different circuits

REFERENCE BOOKS

AUTHOR	TITLE	PUBLICATION
DJ DESHMUKH	VOL- III	Central Techno Publication, Nagpur.
S GHATAK	Mine Pump, Haulage, Winding	Coal Field Publisher Asansol

Sub. Code : **2TDMN602**

Mine Management, Legislation & Safety

RATIONALE:

A Mining Engineer must know the provisions contained in the Mines Act, Rules and Regulations, as his prime responsibility is to ensure that the operations under his charge are carried out as per the provisions of these laws. He should also be able to carry out operations taking proper precautions to avoid accidents. He should be able to make inspections of various places under his charge. As a supervisor, he shall be required to know the basics of recruitment and training rules applicable to mining industry. The course covers these aspects of legislation, Safety and management, pertaining to certain provisions of the statute.

OBJECTIVES:

After undergoing the course of study, the student shall be able to

1- Provide and maintain the health and sanitary, first aid and medical appliances/facilitiesas per the provisions of Mines Act & Rules.

2- Supervise and enforce compliance of provisions of Regulations, from subordinate staffas per duties allotted to them under these regulations.

3- Prepare and maintain plans and section as per the provisions of mines regulations.4- Enforce compliance of provisions related to access and egress under regulations.

5- Supervise and carryout blasting operations and enforce compliance by provisions ofregulation related to explosives and blasting.

6- Take precaution and prevent accidents due to fall of roofs, explosive and blasting.

7- Carry out day to day supervision in the mine to achieve the production target withMaximum economy and safety

Unit I - MINES ACT 1952

1 .1 Important definition eg. Adolescent, adult, child, Employed, Mine, Open castworking, Relay, Shift, Serious bodily injury.

1 .2 Provisions under chapter V,

1 .3 Provision for health and safety.

1 .4 Hours & Limitations of Employment, Act 28 to 48.

1.5 Provisions regarding leave with wages, Act 49 to 56

Unit II - MINES RULES 1955

Provisions regarding health & sanitation, first aid and medical appliances.

Mines Rules- Provisions connected with leave with wages and over time andwelfare amenities. Employment of persons, Rule 46 to 52

Unit III - COAL MINES REGULATIONS 2017

Important definitions.

Duties and responsibilities of workman, competent person & officials. Provisions ofReg. 38, 39, 40, 41,42,43, 44, 45, 46,47, 48, 49,50,53, 56

Plans and sections Reg. 64, 65, 68, 69

Means of access & egress. Reg.70 to 75

Provisions regarding winding in shaft Reg. 76 to 90.

Transport of men & material Reg. 92 to 103

Mine working Reg. 104 to 132

Precautions against dangers from the dust gas & water Reg. 133 to 152.

Ventilation Reg. 153 to 173

3.1 0 Provisions regarding lighting and safety lamp – Reg. 174 to 182

3.1 1 Explosives & Blasting. Reg. 183 to 207

3.1 2 Provisions regarding machinery, plant & equipments and important provisions on miscellaneous regulations.

Unit IV - MINE ACCIDENTS

Types of mine accidents, their classifications,

Causes of accidents due to fall of roof, explosives and blasting, haulage andwinding and their preventions.

Cause and prevention of accidents due to, fires, explosions and inundations. Safety statistics, safety drive and organization of safety in the mines/area etc.

Unit V - MANAGEMENT

Types of business organizations, organization of Coal India Ltd. Supervision qualities of good supervisors, Leadership, functions of industrial leadership, delegation ofresponsibility Principles of time study, Wage and payment Trade unions, their functions.

Strikes and lockouts

Unit VI - GENRAL SAFETY

Circulars, Bylaws & Standing orders.

Philosophy of safety , unsafe acts and conditions

Accident investigation, precaution and monitoring

Systematic support rules for coal mine with Board and pillar method of working.

Conditions for solid blasting with P5 explosives.

Precautions for use of Auxiliary fan underground.

Procedure for dealing with misfire.

Precautions regarding Blown through shots.

Model standing order in the event of stoppage of main mechanical ventilator.

Maximum air velocity.

Unit VII - INSPECTION PROCEDURE :

Procedure of inspection of old working, Haulage roadways, sinking shaft, working shaft,

Winding rope, Sealed off area, subsidence and goaf area.

Unit VIII - MINES RESCUE RULES :

Important provisions of coal mines rescue rules. 3.1 Organization & equipment in mines. 3.2 Rescue station. 3.3 Conduct of rescue work

REFERENCE BOOKS:

AUTHOR	TITLE	YEAR OF PUBLICATION	PLACE OF PUBLICATION & PUBLISHER
Central Government	Mines Act 1952	Latest Edition	Lovely Prakashan
Central Government	Mines Rules 1955	Latest Edition	Lovely Prakashan
Central Government	Coal Mines Regulation 2017 & MMR1961	Latest Edition	Lovely Prakashan
Central Government	Mine Rescue Rule 1985	Latest Edition	Lovely Prakashan
Central Government	DGMS Circulars	Latest Edition	Shining Printers, Asansol
B.K. Kejriwal	Safety in mines, Kejriwal, BK	Latest Edition	Lovely Prakashan

Sub. Code : **2TDMN603**

Mineral and Mine economics

Rationale

Minerals are the basic resources for development of nation. Mineral have been long in use since from prehistoric age. Modern world is mostly dependent on mineral whether it be as Fertilizer for food; coal, petroleum, natural gas and atomic energy as source of power or countless other use in life like automobile, airplane, ships, communication, chemical all are derived from mineral .Minerals are backbone in raising the standers of living of mankind. Minerals occurs in earth crust. Feasibility of Exploration and mining of minerals Involve economic aspect..Loss and profit of mining operation depends upon various factors whichis to be known before setting mining industries .Permission to start and close of Mining are govern by laws and legislation framed by government. Failure and success of mining can be estimated by knowing mine economic in the early stage of mining.

COURSE OUTCOMES:

After undergoing the course of study the student will be able to

11. List mineral industries in India
12. Classify mineral resources
13. Analyzed mineral inventory of India
14. Describe mineral legislation in India and National mineral policy.
15. Discuss conservation, consumption and substitute of minerals
16. Explain method of sampling and selection of sampling procedure
17. Preparation of samples for computation of reserve and grade
18. Asses the Environment Impact of mining
19. Calculate valuation and depreciation of mining
20. Evaluate mine leasing procedure.
21. Preparation of ores for ores dressing, and outline various method of ore dressing.

Unit I - Indian mineral industries scenario

Indian mineral industries at a glance-

Mineral Production, Production of Metals & Alloys
,Foreign Trade, Average Daily Employment in Mines, Consumption of Minerals, Productions of Mineral-basedProducts

Mineral laws and legislation in India

Mines & Minerals (Development & Regulation) Act,1957with all amendments
Mineral Concession Rules, 1960 with all amendments
Mineral Conservation & Development Rules,1988 withall amendments
National Mineral Exploration Trust Rules, 2015 Mines & Minerals (Contribution to District MineralFoundation) Rules, 2015
Minerals (Evidence of Mineral Contents) Rules, 2015
Mineral (Auction) Rules, 2015
Minerals (Other than Atomic and Hydro CarbonsEnergy Minerals) Concession Rules, 2016 with all amendments
Minerals (Other than Atomic and Hydro Carbons EnergyMinerals) Concession Rules, 2016
1.2.8 Mineral Conservation and Development Rules, 2017

National Mineral Policy

NMP 1993
Huda committee 2005
NMP 2008

Mineral resource and reserve-National andInternational classification system

JORC Code
UNFC code

Outlines of National Mineral Inventory Location, geology , exploration , physicochemical analysis, reserve/resource estimates, parameters of estimation, end-use grade, etc. classification adopted and categorization of reserves/resources along with terminologies and codes assigned to asper UNFC .of minerals in inventory

1.6 Mineral conservation and substitution

Unit II - Sampling

principal
Estimation of sample sizeEquipment for sampling Types of sampling Processing of sampling Error and precaution

Salting of sample

Method of salting Precaution against salting

Unit III - Reserve and Grade

Method for computation of reserve- Geometric andGraphic Method
Averaging assays-erratic high assay Method of calculation of Average grade

Unit IV - Valuing mining properties

Valuation of operating mines
Purpose of valuation
Basis of valuation
Factor determining value
Annual profit
Grade of ore
4.13.3 Price of product
Cost of production
Direct and indirect costs
Accounting
General expensesDepreciation Depletion Developing cost
Rate of production
life
ore reserve
present value of future earning

Compound interest method
Hoskold method
Comparison of method
Discount for hazard
Deferment

Unit V - Mine Taxation

Principles of mine taxationThe Four R
Basic principles
Mining Taxation structure Mineral sector taxation method

Unit VI - Royalty

Concept of Royalty and its Definition
Royalty Regime in IndiaRoyalty on Coal
Royalty for Minor MineralsAdministration of Royalty Dead Rent

Unit VII - Mine leasing procedure

Final mine closure plan

Unit VIII - Inventory Control

Category of stores Duties of storekeeper Control of store
Store record ABC analysis

Unit IX - Environment aspect of mining

Environment and sustainable developmentAir pollution
Noise pollution Water pollution
Environment Impact Assessment(EIA)Component of EIA
Process Of EIA Methodology of EIA

Unit X - Ore dressing or beneficiation

Definition
Method of ore dressing Preparation of ore for ore dressing

REFERENCE BOOKS

Author	Title	Publisher
K K Chatterjee	An introduction to Mineral economics	New age International Publisher
R T Desmukh	Mineral and Mine Economics	
IBM	Element of mineral exploration	IBM
RNP Arogyaswamy	Courses in mining Geology	Oxford and IBH
H E McKinstry	Mining Geology	Asia Publishing House , New Delhi

Sub. Code : **2TDMN605(P)**

Project

Course outcome

After undergoing the course of study the student shall be able to

1. Prepare a report of a problem in mining area.
2. Identify the problems related to mining by visiting the project area.
3. Suggest appropriate method to resolve the problems.
4. Competent to visualize the problem in the form of report.

Content:

1. Each student has to submit a project report (other than practical training report) underthe guidance of a supervisor (Lecture) from the institute.
2. The topic of project will be deicide by the supervisor.
3. The topic of project will cover the micro study or investigation or innovation concern tounsolved/unseen problems of mining.
4. Project may be also concern to fulfill the gap between curriculum and industry.
5. Project may be aim to skilling the students with research aptitude by adopting Cognitiveand Psychomotor domain of learning.
6. Supervisor will examine the report of project submitted by the student. The evaluationof project will be in the light of learning domain. That is Cognitive and Psychomotor.
7. Framing the title of project, supervisor has to decide the objective or outcomes ofproject on the basis of element of learning domain.

Sub. Code : **2TDMN606(P)**

METAL MINING METHODS

After obtaining Diploma in Mining Engineering many of the students join the metaliferrous mines, works as R & D Technician, Entrepreneur / Lease holder / Mine owner. They are also required to supervise operations involved in underground metal mines. Also shaft sinking is the unique feature of the mining process and Diploma holder need to supervise the entire process of shaft sinking. The right kind of knowledge and skill is essential for the student.

COURSE OUTCOMES:

After undergoing the course of study the student shall be able to

1. Select suitable method for metalliferous deposits for given geological, physic-mechanical properties of rock
2. Demonstrate layout of metal mining methods
3. Supervise stopping operations in underground metal mines
4. Demonstrate appropriate method of shaft sinking
5. Supervise the process of shaft sinking and carryout the supporting, lining of thesinking shaft
6. Demonstrate Boring operation on the site of Boring / Drilling
7. Demonstrate surface arrangement, assembly and working of rotary boring
8. Demonstrate operation of core barrels
9. Perform Bore hole survey
10. Integrate compliance with regulations

SESSIONAL:

1. Various terms, factors influencing selection of method of work and classificationof underground methods
2. Application of Vertical Crater Retreat (VCR) method of mining in moderatestrength of wall rocks (in raising)
3. Design of Shrinkage stoping method
4. Design of Cut and fill methods used in different Indian deposits
5. Designing sub-level stoping for an ore body width varying 10-15 mts.
6. Designing Square-set stoping for excavation of manganese ore deposit
7. Design of Caving method (any one)
8. Designing an underground metalliferous mine on given geological, physic-mechanical properties of rock
9. Comparison of various stoping methods
10. Various systems of ore drawing from stope
11. Listing of problems related to mining at greater depth
12. Application of leaching technique in ore mining
13. Special method of shaft sinking
14. Temporary lining in shaft

15. Permanent Brick lining in shaft
16. Concrete lining in shaft
17. Demonstration of surface arrangement, assembly and working of rotary boring
18. Demonstration of core barrels
19. Demonstration of different types of drill bits used in boring
20. Performing Bore hole survey

REFERENCE BOOKS

Author	Title	Publisher
DJ Deshmukh	Elements of Mining Technology Vol I, II	Central techno publication, Nagpur
HL Hartman	Introductory Mining Engineering	AWiley- Interscience Publication, Singapore
Cummins & Givens	SME Mining Engineering Handbook, Vol. I & II	A.I.M.M. New-York