

**CURRICULUM FOR  
DIPLOMA OF ASSOCIATE  
ENGINEER  
IN  
MINING TECHNOLOGY  
(3 - Years Course)**

**MINING TECHNOLOGY  
SCHEME OF STUDIES**

CODE NO.	SUBJECT	FIRST YEAR			PAGE
		T	P	C	
		Math 113	Math-I	3	
Phy 133	Applied Physics*	2	3	3	3
Ch. 143	Applied Chemistry*	2	3	3	7
MIN 132	Introduction to Mining	2	0	2	10
MT 133	Elementary Drawing	1	6	3	12
Comp 132	Computer – I	1	3	2	15
Eng 112	Functional English	2	0	2	19
GEN 111	Islamiat & Pak Studies	1	0	1	20
MIN 144	Practical Training	0	12	4	29
	<b>TOTAL</b>	<b>14</b>	<b>27</b>	<b>23</b>	

CODE NO.	SUBJECT	SECOND YEAR			PAGE
		T	P	C	
		Math 212	Math-II	2	
MIN 213	Mine Ventilation	2	3	3	33
MIN 223	Geology – I.	2	3	3	36
MIN 273	Mine Power, Drainage and Material Handling	2	3	3	38
ET 243	Applied Electricity.	2	3	3	40
MIN 253	Surveying – I.	2	3	3	44
Comp 262	Computer-II	1	3	2	46
GEN 211	Islamiat & Pak Studies	1	0	1	49
MIN 263	Practical Training.	0	9	3	56
	<b>TOTAL</b>	<b>14</b>	<b>27</b>	<b>23</b>	

CODE NO.	SUBJECT	THIRD YEAR			PAGE
		T	P	C	
		MIN 313	Coal Mining.	2	
MIN 333	Underground Mining	2	3	3	63
MIN 332	Geology – II.	2	0	2	66
MIN 353	Surface Mining and Environmental Control	2	3	3	67
MIN 354	Surveying – II.	2	6	4	69
MIN 312	Mine Management, Economics and Legislations	2	0	2	71
MIN 372	Rescue & Safety.	1	3	2	72
MIN 302	Explosives and Blasting	2	0	2	75
GEN 311	Islamiat & Pak Studies	1	0	1	78
MIN 392	Practical Training.	0	6	2	85
	<b>TOTAL</b>	<b>16</b>	<b>24</b>	<b>24</b>	

\*Phy 133 and Ch 143 are common for Land & Mine Surveying Technology and Mining Technology.

**SYLLABI FOR THREE YEARS DIPLOMA COURSE IN  
MINING TECHNOLOGY**

**Math – 113**

**Math-I**

<b>Total contact hours</b>	96	<b>T</b>	<b>P</b>	<b>C</b>
Theory		3	0	3

Pre-requisite: Must have completed a course of Elective Mathematics at Matric level.

- AIMS** After completing the course the students will be able to
1. Solve problems of Algebra, Trigonometry, vectors. Menstruation, Matrices and Determinants.
  2. Develop skill, mathematical attitudes and logical perception in the use of mathematical instruments as required in the technological fields.
  3. Acquire mathematical clarity and insight in the solution of technical problems.

**COURSE CONTENTS**

**1 QUADRATIC EQUATIONS 6 Hrs**

- 1.1 Standard Form
- 1.2 Solution
- 1.3 Nature of roots
- 1.4 Sum & Product of roots
- 1.5 Formation
- 1.6 Problems

**2 ARITHMETIC PROGRESSION AND SERIES 3Hrs**

- 2.1 Sequence
- 2.2 Series
- 2.3 Nth terms
- 2.4 Sum of the first n terms
- 2.5 Means
- 2.6 Problems

**3 GEOMETRIC PROGRESSION AND SERIES 3Hrs**

- 3.1 nth term
- 3.2 sum of the first n terms
- 3.3 Means
- 3.4 Infinite Geometric progression
- 3.5 Problems

**4 BINOMIAL THEOREM 6 Hrs**

- 4.1 Factorials
- 4.2 Binomial Expression
- 4.3 Binomial Co-efficient
- 4.4 Statement
- 4.5 The General Term
- 4.6 The Binomial Series.
- 4.7 Problems

**5 PARTIAL FRACTIONS 6 Hrs**

- 5.1 Introduction
- 5.2 Linear Distinct Factors Case I
- 5.3 Linear Repeated Factors Case II
- 5.4 Quadratic Distinct Factors Case III
- 5.5 Quadratic Repeated Factors Case IV
- 5.6 Problems

**6 FUNDAMENTALS OF TRIGONOMETRY 6 Hrs**

- 6.1 Angles
- 6.2 Quadrants
- 6.3 Measurements of Angles
- 6.4 Relation between Sexagesimal & circular system
- 6.5 Relation between Length of a Circular Arc & the Radian Measure of its central Angle
- 6.6 Problems

<b>7</b>	<b>TRIGONOMETRIC FUNCTIONS AND RATIOS</b>	<b>6 Hrs</b>
7.1	trigonometric functions of any angle	
7.2	Signs of trigonometric Functions	
7.3	Trigonometric Ratios of particular Angles	
7.4	Fundamental Identities	
7.5	Problems	
<b>8</b>	<b>GENERAL IDENTITIES</b>	<b>6 Hrs</b>
8.1	The Fundamental Law	
8.2	Deductions	
8.3	Sum & Difference Formulae	
8.4	Double Angle Identities	
8.5	Half Angle Identities	
8.6	Conversion of sum or difference to products	
8.7	Problems	
<b>9</b>	<b>SOLUTION OF TRIANGLES</b>	<b>6 Hrs</b>
9.1	The law of Sines	
9.2	The law of Cosines	
9.3	Measurement of Heights & Distances	
9.4	Problems	
<b>10</b>	<b>MENSURATION OF SOLIDS</b>	<b>30 Hrs</b>
10.1	Review of regular plane figures and Simpson's Rule	
10.2	Prisms	
10.3	Cylinders	
10.4	Pyramids	
10.5	Cones	
10.6	Frusta	
10.7	Spheres	
<b>11</b>	<b>VECTORS</b>	<b>9 Hrs</b>
11.1	Scalars & Vectors	
11.2	Addition & Subtraction	
11.3	The unit Vectors $i, j, k$	
11.4	Direction Cosines	
11.5	Scalar or Dot Product	
11.6	Deductions	
11.7	Dot product in terms of orthogonal components	
11.8	Deductions	
11.9	Analytic Expression for $a \times b$ .	
11.10	Problems.	
<b>12</b>	<b>MATRICES AND DETERMINANTS</b>	<b>9 Hrs</b>
12.1	Definition of Matrix	
12.2	Rows & Columns	
12.3	Order of a Matrix	
12.4	Algebra of Matrices	
12.5	Determinants	
12.6	Properties of Determinants	
12.7	Solution of Linear Equations	
12.8	Problems	

**Total Contact Hours**

Theory 72

Practical 108

<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>3</b>	<b>3</b>

**OBJECTIVES**

This course is designed to impart knowledge on the physical properties of bodies with particular reference to the engineering application.

**DESCRIPTION**

Measurements, Scalars and Vectors, Motion and Force, Gravitation, Equilibrium, Friction, Work, Energy and Power, Machines, Heat and Temperature, Motion in two Dimensions, Lights, Geometrical Optics, Electronics.

<b>Sr .No</b>	<b>Contents</b>	<b>Hours</b>
<b>1</b>	<b>Measurements.</b> 1.1 Fundamental units and derived units. 1.2 Various systems of units and S.I. Units. 1.3 Concept of dimension/dimensional formula 1.4 Conversation from one system to other significant figures.	<b>06</b>
<b>2</b>	<b>Scalars and Vectors.</b> Vectors representations, addition, subtraction and multiplication, parallelogram law of forces, composition and resolution of vectors, diagrams. Rectangular component of a vector, dot product and cross product. Solution of numerical examples.	<b>06</b>
<b>3</b>	<b>Motion and Force.</b> Rest and motion, velocity, acceleration and deceleration. Equations of uniformly acceleration rectilinear motion. Motion under gravity, Newton's laws of motion, mass and weight, momentum and impulse, law of conservation of momentum and impulse, law of conservation of momentum. Numerical example on the above topics.	<b>06</b>
<b>4</b>	<b>Gravitation.</b> 4.1 Gravitation and gravity. 4.2 Law of universal gravitation. 4.3 Determination of mass of earth. 4.4 Variation of "g" with altitude and depth. 4.5 Numerical examples on the above topics.	<b>04</b>
<b>5</b>	<b>Equilibrium.</b> 5.1 Concurrent and non-concurrent forces. 5.2 Conditions of equilibrium for :- i. Concurrent forces. ii- Non-concurrent forces. 5.3 Equilibrium of objects supported by wires and ropes. 5.4 Centre of gravity, couples. 5.5 Torque and moment of couples. 5.6 Beam and ladders in equilibrium. 5.7 Numerical examples on the above topics.	<b>04</b>
<b>6</b>	<b>Friction.</b> 6.1 Co-efficient of friction, angle of friction, angle of contact of friction. 6.2 Laws of friction. 6.3 Motion of a body on a rough inclined plane. 6.4 Methods of reducing friction. 6.5 Numerical example on the above topics.	<b>04</b>
<b>7</b>	<b>Work, Energy and Power.</b> 7.1 Units of works. 7.2 Works done by a body moving in the gravitational field or work done by a variable force. 7.3 Power and its units. 7.4 Energy and its units. 7.5 Kinds of energy i.e. Kinetic and potential energy. 7.6 Inter conservation of K.E. and P.E.	<b>04</b>

	7.7 Conservation of energy. Numerical examples on the above topics.	
	<b>Machines.</b>	<b>06</b>
8	8.1 Definition of machine. Purpose of machines.	
	8.2 Mechanical advantage.	
	8.3 Efficiency. Kinds of simple machines.	
	8.4 Principle of work.	
	8.5 Mechanical applications.	
	8.6 Numerical examples on the above mentioned top	
	<b>Heat and Temperature.</b>	
9	9.1 Specific heat and its measurements.	
	9.2 Thermal expansion, Relation between three types of expansions.	<b>04</b>
	9.3 Modes of transfers of heats.	
	9.4 Thermodynamics.	
	9.5 Laws of thermodynamics.	
	9.6 Carnot's cycle (heat engine).	
	9.7 Entropy.	
	9.8 Numerical examples on the above topics.	
	9.9 Three tests in one year of each of one hours duration.	
	<b>Motion in two Dimensions</b>	
10	Projectile motion, motion in a circle, centripetal force, centrifugal force, angular displacement, angular velocity, radian degree, relation between linear & angular motion.	<b>04</b>
	Numerical examples on the above topics.	
	<b>Lights.</b>	
11	11.1 Review laws of reflection and refraction.	
	11.2 Image formation by mirrors and lenses. Wave theory of light.	<b>10</b>
	11.3 Nature of light.	
	11.4 Quantum theory of light.	
	11.5 Ordinary light and monochromatic light.	
	11.6 Dispersion of light.	
	11.7 Rainbow, Electromagnetic spectrum.	
	11.8 Emission of light by an atom.	
	11.9 Velocity of light.	
	11.10 Polarization of light waves.	
	<b>Geometrical Optics.</b>	
12	12.1 Geometrical optics lens.	
	12.2 Types of lenses.	
	12.3 Centre of curvature.	<b>10</b>
	12.4 Radius of curvature.	
	12.5 Principal axis.	
	12.6 Principal focus.	
	12.7 Focal length.	
	12.8 Optical Centre.	
	12.9 Power of a lens.	
	12.10 Rules for geometrical construction of image.	
	12.11 Deviation of lens formula.	
	12.12 Linear magnification.	
	12.13 Angular magnification.	
	12.14 Convex lens and image positions formed by it.	
	12.15 Derivation of formula for magnifying power in optical instruments.	
	12.16 Near and far points important lens defects.	
	12.17 How can these defects be removed.	
	<b>Electronics:</b>	
	Matter Atomic Number, Mass Number, Normal/Ground state of an atom,, Excited an Ionized atom, Energy Bands in Solids, Conductors. Semi-Conductors and Insulator, Intrinsic and Extrinsic Semi Conductors (N Types and P Types Semi Conductor ), P-N Junction, Forward Biased and Reverse Biased of P-N Junction, Semi Conductors diodes, PNP and NPN Transistor and their functions.	

**PHYSICS( PRACTICALS)**

Sr.No	Practical
1	Volume of a solid cylinder using a vernier calipers
2	Capacity of a test tube using vernier calipers
3	Volume of a small sphere using a micrometer screw-gauge
4	Area of cross section of a wire using a micrometer screw gauge
5	Radius of curvature of spherical mirror using a spherometer and calculation of its focal length
6	Addition of vectors by Rectangular components
7	Value of 'g' by free fall method
8	Conditions of equilibrium 'g' by simple pendulum and length of Second's pendulum
9	Verification of the following relations of the simple pendulum i) Time period is independent of mass ii) Time period is directly proportional to $\sqrt{L}$ of displacement and length
	Surface tension of a liquid by capillary rise method
10	Young's Modulus of a wire by Searle's Apparatus
11	Determine specific heat of a solids by calorimeter
12	Determine moment of inertia
13	Determine mechanical advantage of inclined plane
14	Velocity of periodic waves by ripple tank
15	Frequency by Melde's Apparatus
16	Laws of vibration of stretched strings
17	Velocity of sound in air at 0°C by resonance tube apparatus using first resonance position and applying end correction
18	Velocity of sound in air at 0°C by resonance tube using two resonance positions
19	Focal length of a convex lens by parallax method
20	Focal length of a convex lens by displacement method
21	Focal length of a concave lens by using a concave mirror
22	Focal length of a concave lens by using a convex lens
23	Refractive index of the material of a prism by critical angle method
24	Refractive index of a liquid using a concave mirror
25	Refractive index of glass using a spectrometer
26	Wave length of sodium light by Newton's Rings
27	Wave length by diffraction grating
28	Setting up of a compound microscope : determination of its magnifying power

**Total Contact Hours**

Theory 72

Practical 108

<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>3</b>	<b>3</b>

**OBJECTIVES**

This course has been designed to impart through understanding of the subject with special application of theoretical knowledge and practical problem.

**DESCRIPTION**

Review of Basic Chemistry, Water, Acid, Bases and Salt, Chemical Bonding, Chemistry of Building Materials, Chemistry of Carbon, Corrosion, Refractory Materials and Abrasives.

Sr.No	Contents	Hours
1	i) Review of basic chemistry:- Matter, mixture, compound, element, Radical, Valency formula, atom, atomic weight, atomic number, Structural formula weight, Periodic Table, Numerical problems. ii) Define Chemistry, state units of measurements, Define SI system measurement of mass length, time and other physical quantities, Metal, Non-Metals Symbol, Atoms and Molecules, Atomic mass, Molecular, Mass, Gram Atomic Mass, Gram Molecular Mass, Avogadro's number, Law of constant composition, Percentage composition. i) Chemical equation, how to write it. iii) Characteristics and balancing, chemical reaction and its types.	
2	Water:- Sources of water. Impurities of water, their removal. Hard and soft water. Causes and effects of hard water.	
3	Removal of hardness of water. Composition of water and its structure. Water as solvent. Hydration. Hydrolysis.	
4	Practical on removal of hardness and water solvent Factors affecting solubility Saturated, unsaturated and super saturated solutions.	
5	Acids, bases and salt i) Definition of Acids bases and salts. ii) Manufacturing of $H_2SO_4$ , $HCl$ and $HNO_3$ iii) Properties of acid base salts and their uses.	
6	Action of acids on alkalies, Metal and non Metals. <b>CHEMICAL BONDING</b> i) Chemical bonding  Types of chemical bonds, e.g. Ionic, bonds, Covalent bonds, (Polar and non-polar). i) Chemistry of building materials, e.g. Cement, glass, plastic and polymers, Steel, and Fiber Glass; Their Extraction, composition, properties and uses.	
7	<b>CHEMISTRY OF CARBON</b> i) Allotropic forms of carbon ii) Minerals bases on carbon e.g. diamond, graphite, coal. iii) Their properties and uses Analysis of coal.	
8	<b>CORROSION</b> i) Causes and effects of Corrosion ii) Protective measures against corrosion.	



9	iii) Rusting of Iron. <b>TYPES OF CORROSION.</b> Refractory Materials and Abrasives i) Introduction to Refractories ii) Classification of Refractories iii) Properties and Uses. iv) Introduction to Abrasives. Artificial and Natural Abrasives and their uses.	
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**CHEMISTRY( PRACTICAL)**

Sr.No	Practical
1	To prepare standard solution of Oxalic acid and with its help standardize a solution of $\text{NaOH}$ .
2	Prepare approximate N/10 solution of $\text{H}_2\text{SO}_4$ and determine its exact normality by titration it against standard N/10 $\text{NaOH}$
3	To determine the heat of Neutralization of strong base ( $\text{NaOH}$ )
4	To separate a mixture of various inks by paper chromatography
5	To construct the ball and spring models of some simple chemical compounds
6	To construct the model of $\text{NaCl}$ crystal
7	To determine the molecular weight by observing the depression in the freezing point by cryoscopy
8	Qualitative analysis of salts
9	Detection of elements in organic compounds i.e. C, H <sub>2</sub> , N <sub>2</sub> , S and Halogens
10	Identification of different solutions using (a) litmus (paper/solution) (b)PH paper
11	Temporary and permanent hard water and its removal
12	To determine the number of molecules of water of crystallization in sodium carbonate (washing soda) crystals

<b>Total Contact Hours</b>	<b>T</b>	<b>P</b>	<b>C</b>
Theory 72	2	0	2
Practical 0			

**OBJECTIVES**

The main purpose of this course is to impart basic knowledge to the students regarding mining, different methods of extraction of ores and processes.

**DESCRIPTION**

Definitions relating to Mining along with sketch, Four stages in the life of mine, Classification of mining method, Mine supports, Drilling & boring, Explosive and blasting, Mine ventilation, Material handling (Loading & Transportation), Mine Water & Disposal, Value and importance of mining in the Pakistan.

Sr.No.	Contents	Hours
<b>1</b>	<p><b>A. DEFINITIONS RELATING TO MINING ALONGWITH SKETCH.</b> Mining, Prospecting, Exploration, Development, Exploitation, Vein, Shoot, Bedded Deposits, Masses, Outcrop, Float, Gossan, Dip, Strike, Apex, Hanging Wall, Foot Wall Shaft, Drift, Crosscut, Level, Sump, Winze, Raise, Stope, Tunnel, Adit, Collar, Ore, Gangue, Country Rock, Waste, Mineral, Metallic, Non-Metallic, Lode, Drives, Draw Point, Mineral Processing.</p> <p><b>B. FOUR STAGES IN THE LIFE OF MINE</b></p> <p>a) Prospecting b) Exploration c) Development d) Exploitation &amp; Reclamation</p>	<b>08</b>
<b>2</b>	<p><b>CLASSIFICATION OF MINING METHOD</b> Two types of Classes A. Surface Mining Methods i) Open Pit Mining, ii) Open Cast Mining, iii) Quarrying, iv) Auger Mining, v) Hydraulic Mining, vi) Dredging Mining, vii) Borehole extraction, viii) Leaching B. Underground Mining Methods Self Supported Mining Method i) Roam &amp; Pillar Mining, ii) Stope &amp; Pillar Mining, iii) Shrinkage Stopping, iv) Sub-level Stopping. C. Supported Mining Methods i) Cut &amp; Fill Stopping, ii) Stull Stopping, iii) Square set Stopping D. Caving Mining Methods i) Long wall Mining, ii) Sub-level Caving, iii) Block Caving</p>	<b>08</b>
<b>3</b>	<p><b>MINE SUPPORTS</b> A. Types of Supports a. Timber Supports: Types, Advantages and Dis-advantages. 2) Steel Supports: Types, Advantages and Dis-advantages. i) Arches ii) Steel Props b. Roof Bolting: Types, Advantages and Dis-advantages.</p>	<b>04</b>
<b>4</b>	<p><b>DRILLING &amp; BORING</b> A. Difference between drilling &amp; boring B. Main components of drilling system i) Drilling Machine ii) Drilling Rods iii) Bits C. Types of Drilling Machines Rotary, Percussive and Churn Drilling D. Types of hammer drills = Drifter, Sinker &amp; Stopper (Short notes on each). E. Types of Boring Machines</p>	<b>08</b>



<b>5</b>	<b>EXPLOSIVES &amp; BLASTING</b>	<b>12</b>
	<b>A. Definitions.</b>	
	A. Types of Explosive	
	i) Low Explosive – Black Powder & Gun Powder	
	ii) High Explosive – Ammonium Nitrate Base Explosive, Nitro Glycerin Base Explosives: Water base explosives Slurry Explosives, Emulsions.	
	iii) Permissible Explosives Cooling Agents, Sheathed Explosive and Non-Sheathed Explosive.	
	B. Blasting	
	i) Firing Method Non-Electric Firing, Cap & fuse, Detonating Cord & Nonel and Electric Firing.	
	ii) Types of Detonators	
	iii) Surface & underground pattern with sketch.	
	iv) Controlled blasting techniques	<b>10</b>
<b>6</b>	<b>MINE VENTILATION</b>	
	A. Composition of Atmospheric Air.	
	Oxygen, Nitrogen, Carbon Di-oxide & Argon (Brief note on each)	
	B. Name of Mine Gases and properties of:	
	- Methane, -Fire Damp, Black Damp, White Damp, Stink Damp, After Damp and Nitrous fumes.	
	C. Natural Ventilation – Definition and How produced.	
	Mechanical Ventilation – Definition and How produced.	<b>12</b>
	<b>MATERIAL HANDLING (LOADING &amp; TRANSPORTATION)</b>	
<b>7</b>	A. Surface Loading & Excavation Machines	
	i) Power Shovel (Hydraulic, Electric & Backhoes)	
	ii) Draglines	
	iii) Dozer	
	iv) Scraper	
	v) Bucket Wheel Excavator	
	vi) Front End Loader	
	vii) Trucks/ Dumpers/ Tractors trolleys	
	B. Underground Transportation	
	i) Trackless Haulage	
	- Wheel Barrows	
	- Shuttle Cars	
	- Conveyors	
	ii) Track Haulage	
	- Locomotive Haulage	
	- Types: Diesel, Battery, Over head Trolley wire Locomotives.	
	iii) Rope Haulage System	
	- Types: Direct or Main Rope Haulage, Main & Tail Rope Haulage, Endless Rope Haulage and Gravity Haulage.	
	<b>MINE WATER AND DISPOSAL</b>	<b>06</b>
<b>8</b>	A. Origin and Types of Mine Water	
	B. Types of Pumps	
	i) Reciprocating Pumps, ii) Centrifugal Pumps iii) Submersible pumps, iv) Sludge pumps, v) Mono pumps	
	C. Siphon (Introduction).	<b>04</b>
	<b>VALUE AND IMPORTANCE OF MINING IN PAKISTAN</b>	
<b>9</b>	A. Mineral Potential of the Country.	
	B. Nature of Mining Industry.	
	C. Present Status of Mining Industry and Major Constraints.	
	D. Future Prospects.	

**Total Contact Hours**

Theory 36  
 Practical 216

**T P C**  
**1 6 3**

**OBJECTIVES**

The course has been designed to give the engineering technicians enough appreciation and understanding of machine drawing so as to enable them to:

- a) Read and interpret engineering drawing;
- b) Execute simple working drawings;
- c) Give a sound foundation for advance machine drawing.

**DESCRIPTION**

Fundamental of Drawing, Lettering, Lines, Geometrical Construction, Term used in circle, Introduction of simple object.

<b>Sr.No.</b>	<b>Contents</b>	<b>Hours</b>
<b>1</b>	<b>Fundamental of Drawing</b> a) Proper use and care of drawing instruments. i. Drawing Board ii. Drafting Table iii. T-Square iv. Set Square v. Scales vi. Dividers vii. Compass viii. Drawing Pencil ix. Eraser x. Instruments Box xi. Protractor xii. French Curves  b) Layout of Drawing Sheets.	<b>3</b>
<b>2</b>	<b>Lettering</b> Types of lettering:- a) Vertical or upright lettering i. Single Stroke ii. Double Stroke b) Inclined lettering i. Single Stroke ii. Double Stroke  Modern Roman Letter Titles and Labels Precaution and Practice in use of stencils.	<b>2</b>
<b>3</b>	<b>Lines</b> Types of lines, continuous thick & thin line, Centre line, Hidden line, Shot and long break line, overhead line, dimension line, construction line.	<b>2</b>
<b>4</b>	<b>Geometrical Construction</b> Construction of lines, angles, triangles, square, hexagon, pentagon, rhombus, trapezoid, ellipse, parabola.	
<b>5</b>	<b>Term used in circle</b> Diameter, Radius, Chord, Segment, Normal, Tangent, Sector Semi-circle. Practice of the following:- - To bisect a given straight line, to draw a perpendicular on a line through a point not the line - To divide a given line into a number of equal parts - To describe a circle through three given points	<b>6</b>

	- To draw a tangent to a given circle from a given point outside the circle	
	- To draw a tangent to two circles of equal size	
	- To inscribe a hexagon in a circle	
	- To construct regular pentagon straight lines of right angles	
	- To each other	
	- To draw an arc of radius, R. touching two given arcs as radius R1 and R2	
	- To draw an arc of radius R tangential to a given line and a given arc	
	- To draw two tangents to a given circle to meet at a given angle	
<b>6</b>	Making free hand proportional sketches of simple regular objects, free hand sketching of cross section of a road, railway line and canal.	<b>05</b>
<b>7</b>	Introduction and practice in drawing of simple plain scale, diagonal. Scale and Vernier scale.	<b>04</b>
<b>8</b>	Adjustment of working space, use of proper scale, marking of north line and directions, index of line.	<b>04</b>
<b>9</b>	Introduction of simple object.	
<b>10</b>	Elevation & plan of a section, Sectioning: Full section and half section, Dimensioning: Base line dimension etc, Orthographic projection, Planes of projection, selection of views, First Angle Projects, Third Angle projection, views of an object	<b>06</b>
	a) Elevation of front view	
	b) Top view	
	c) Right side view	
	d) Left side view	
	e) Rear view	
<b>11</b>	f) Bottom view	<b>02</b>
<b>12</b>	General Rules of Orthographic Projection.	
<b>13</b>	Cross Section of wall showing different parts Using pantograph, enlarging and reducing maps. Use of proportional compass.	<b>02</b>

## ELEMENTARY DRAWING (PRACTICAL)

Sr.No	Practical
1	Drawing of lines, lettering, numbers, Drawing bisection of lines, angles, construction of pentagon. Hexagon, octagon, ellipse, radius curves tangential arcs. Drawing circle, triangles, quadrilaterals, title block curved surfaces. Draw isometric views of section, channel section, isometric circles. Draw isometric block with isometric circles on its faces. Isometric views of I-section, isometric circles.
2	Drawing of different types of lines. Dimensioning method. Division of sheet orthographic view of channel, wedge, T-section, nuts bolt, Ist angles projection of V-Block.
3	Types of lines, Draw of several objects with section views. Ist angle projection of help section view of spindle gland.
4	<u>Geometrical Construction</u> Construction lines, angle, triangles, square, hexagon, pentagon, rhombus, trapezoid ellipse, parabola.
5	<u>Terms used in circle</u> Diameter, radius, chord, segment, tangent, sector, semicircle  Practical of the following - To bisect a given straight lines - To draw a perpendicular line on a point not a line - To divide a given lines in to a number of equal parts - To describe a circle through three given points. To draw a tangent to a given circle from a given point out side the circle - To draw a tangent to two circles of equal size - To inscribe a hexagon in a circle - To construct regular pentagon straight line of right angles - To draw an arc of radius R, touching two given arcs as radius $R_1$ and $R_2$ - To draw an arc of radius R. tangential to a given line and a given arc - To draw two tangents to a given circle to meet at a given angle
6	Free hand sketches of simple regular objects, free hand sketching of cross section of a road, railway line and canal.
7	Drawing of simple plain scale, diagonal scale and Vernier scale
8	Working space, marking of north line and directions index of line.
9	Elevation and planes of section orthographic projection, First angle projection and third angle projection, Top view elevation of front view, Right and left side views.
10	Cross section of wall showing different parts enlarging and reducing maps.



<b>Total Contact Hours</b>		<b>T</b>	<b>P</b>	<b>C</b>
Theory 36		1	3	2
Practical 108				

**OBJECTIVES**

To give the trainees basic concept of information technology and use of application software.

**DESCRIPTION**

Basic concepts of Information Technology, Information Networks, Data Communication, Application and use of Computers, Hardware and System Software, Computer Operations, Security Copyright and the Law, Operating System (Windows), Word Processing, Spread Sheet, Internet Browsing and using E-mail.

<b>Sr.No.</b>	<b>Contents</b>	<b>Hours</b>
<b>1</b>	<b>Basic of Information Technology</b> <b>Basic concepts of IT,</b> Hardware VS Software Input and Output Devices Operating System Vs. Computer Programs Basic Units of Data Storage, Storage and Memory	<b>03</b>
<b>2</b>	<b>Information Networks</b> The technology of workgroup computing The benefits of E-mail What is the internet and how it is useful? Lan Vs. Wan Concepts, Models, Standards, Network Topologies	<b>03</b>
<b>3</b>	<b>Data Communications</b> Introduction of Data Communication Types of Data Encoding different types of data Transmission media Modem	<b>03</b>
<b>4</b>	<b>Applications and Use of Computers</b> Computers and the Opportunities offered by their use Types of Systems Encountered in Everyday Life, Homes, Business, Industry, Education Understand how Computers can Simplify our work practices	<b>03</b>
<b>5</b>	<b>Hardware and Systems Software</b> <b>Computer Architecture</b> Block Diagram of Computer (CPU, RAM, ROM, input/output, Data Bus, Address Bus, Control Bus and Ports) Registers, Program Counter (PC), Memory Address Register (MAR), Memory Buffer Register (MBR), Instruction Register (IR) Stack.	<b>10</b>
<b>6</b>	<b>Computer Operations</b> Simple Machine Instructions Format Processing Machine Instructions (Fetch-decode-execute) Understand the Functionality of Different Types of Software.	
<b>7</b>	<b>Security Copyright and the Law</b> Viruses and Anti-Virus issues Data Protection and Privacy issues Data Protection Legislation and copyright issues	<b>04</b>

	<b>Use of Application Software</b>	
<b>8</b>	<b>Operating Systems (Windows)</b>	<b>02</b>
	Introducing GUI Operating Systems	
	OS Components and Selection Techniques	
	Starting to use GUI Operating System	
	File and Disk Management	
	Control Printing Jobs	
<b>9</b>	<b>Word Processing</b>	<b>02</b>
	Starting to use Word Processor	
	Font, Paragraph, Page Formatting	
	Introducing Tables and Columns	
	Using the Clipboard	
	Printing	
	Tables, Text Boxes, Graphics and Word art	
<b>10</b>	<b>Spread Sheet</b>	<b>03</b>
	Introduction to Spread Sheet Packages	
	Spread Sheet Layouts	
	Formatting and Customizing Data	
	Formulas, Functions and Named Ranges	
	Introducing Charts	
	Printing Worksheets and charts	
<b>11</b>	<b>Internet Browsing and Using E-Mail</b>	<b>03</b>
	Introduction to Browsing	
	Addresses, Links & Downloading	
	Searching the Internet	
	E-Mail & Newsgroups	

## COMPUTER-I (PRACTICAL)

Sr. No	Practical
<b>1</b>	<b>WINDOWS</b> 1) a) Use of Start Menu b) Manage Program Group & Document Group` c) How to access Search Group d) Customize the Desktop 2) Use of Windows Help 3) Use of Windows Accessories: a) Word Pad b) Calculator c) Paint 4) a) Managing Files and folders using My Computer b) Managing Files and folders Windows Explorer c) Managing Recycle Bin operations. 5) a) Installation of given printer driver b) Setting up different properties of printer c) Managing the ques of printing job
<b>2</b>	<b>MS Word</b> 1) a) Open and Save files in specified path or New Folder b) Selection of text by different methods and applying different operations: Copying, Moving (by Clipboard and Drag _ & _ Drop methods) Deletion. 2) Formatting text (Bold, Underline, Font, Color etc.) 3) Use of Undo and Redo 4) Use of Text Alignment, Indenting and managing space, Also use of Bullets and Numbering. 5) Use of Page Setup including Page Margin, Size, Paper Source and Layout. 6) Skill of Printer Settings. 7) Use of Tables and Columns. 8) Use of Spell Check, Grammar and Thesaurus. Use of Shortcuts. <b>MS-EXCEL</b> 1) Inserting & Deleting Cells, Rows and Columns
<b>3</b>	2) Managing Worksheets 3) Formatting and Customizing Data. 4) Use of Formulas and Functions (formatting numbers, decimal, places, column & rows setup etc.) 5) Drawing of Different Types of Charts 6) Use of Page Setup and Printing Configurations 7) Use of shortcuts.
<b>4</b>	<b>INTERNET EXPLORER</b> 1) Send/receive email to single user, multiple users 2) Attach/Detach files with mail 3) Browsing Internet 4) Use of shortcuts 5) Proper use of search engines

**Total Contact Hours**

Theory 64

Practical 0

**OBJECTIVES**

At the end of the course, the students will be equipped with cognitive skill to enable them to present facts in a systematic and logical manner to meet the language demands of dynamic field of commerce and industry for functional day-to-day use and will inculcate skills of reading, writing and comprehension.

**COURSE CONTENTS****ENGLISH PAPER "A"****1. PROSE/TEXT 16 hrs**

1.1 First eight essays of Intermediate. English Book-II

**2. CLOZE TEST 4 hrs**

1.2 A passage comprising 50-100 words will be selected from the text. Every 11<sup>th</sup> word or any word for that matter will be omitted. The number of missing word will range between 5-10. The chosen word may or may not be the one used in the text, but it should be an appropriate word.

**ENGLISH PAPER "B"****3. GRAMMAR 26 hrs**

3.1 Sentence Structure.

3.2 Tenses.

3.3 Parts of speech.

3.4 Punctuation,

3.5 Change of Narration.

3.6 One word for several

3.7 Words often confused

**4. COMPOSITION 8 hrs**

4.1 Letters/Messages

4.2 Job application letter

4.3 For character certificate/for grant of scholarship

4.4 Telegrams, Cablegrams and Radiograms, Telexes, Facsimiles

4.5 Essay writing

4.6 Technical Education, Science and Our life, Computers,

Environmental Pollution, Duties of a Student. **4 hrs****5. TRANSLATION 6 hrs**

5.1 Translation from Urdu into English.

For Foreign Students: A paragraph or a dialogue.

**RECOMMENDED BOOKS**

1. Intermediate English Book-II.

2. An English Grammar and Composition of Intermediate Level.

3. A Hand Book of English Students by Gatherer

**Eng-112ENGLISH****INSTRUCTIONAL OBJECTIVES****PAPER-A****1. DEMONSTRATE BETTER READING, COMPREHENSION AND VOCABULARY**

1.1 Manipulate, skimming and scanning of the text.

1.2 Identify new ideas.

1.3 Reproduce facts, characters in own words

1.4 Write summary of stories

**2. UNDERSTAND FACTS OF THE TEXT**

2.1 Rewrite words to fill in the blanks recalling the text.

2.2 Use own words to fill in the blanks.

**PAPER-B**

**3. APPLY THE RULES OF GRAMMAR IN WRITING AND SPEAKING**

3.1 Use rules of grammar to construct meaningful sentences containing a subject and a predicate.

3.2 State classification of time, i.e. present, past and future and use verb tense correctly in different forms to denote relevant time.

3.3 Identify function words and content words.

3.4 Use marks of punctuation to make sense clear.

3.5 ' Relate what a person says in direct and indirect forms.

3.6 Compose his writings.

3.7 Distinguish between confusing words.

**4. APPLY THE CONCEPTS OF COMPOSITION WRITING TO PRACTICALSITUATIONS**

4.1 Use concept to construct applications for employment, for character certificate, for grant of scholarship.

4.2 Define and write telegrams, cablegrams and radiograms, telexes, facsimiles

4.3 Describe steps of a good composition writing.

4.4 Describe features of a good composition.

4.5 Describe methods of composition writing.

4.6 Use these concepts to organize facts and describe them systematically in practical situation;

**5. APPLIES RULES OF TRANSLATION**

5.1 Describe confusion.

5.2 Describe rules of translation.

5.3 Use rules of translation from Urdu to English in simple paragraph and sentences.

## اسلامیات / مطالعہ پاکستان

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1 0 1  
کل وقت: 20 گھنٹے

GEN III

سہل اول

حصہ اول اسلامیات

حصہ دوم مطالعہ پاکستان

موضوعات حصہ اول اسلامیات

کتاب و سنت

(۱) قرآن مجید

1- تعارف قرآن مجید 2- نزول قرآن 3- مکی و مدنی سورتوں کی خصوصیات 4- وحی کی اقسام 5- پندرہ منتخب آیات مع ترجمہ

- 1.1 تنالوا البر حتی تنفقوا مما تحبون
- 1.2 واعتصموا بحبل اللہ جمیعاً ولا تفرقوا
- 1.3 ولا یجبر منکم شیطان قوم علی ان لا تعدلوا
- 1.4 ان اللہ ینزل الامثال علی اهلها
- 1.5 ان اللہ ینزل الامثال بالعدل والاحسان
- 1.6 ان الصلوٰۃ تنہی عن الفحشاء والمنکر
- 1.7 لقد کان لکم فی رسول اللہ سوة حسنة
- 1.8 ان اکرمکم عند اللہ اتقاکم
- 1.9 وما آتاکم الرسول فخرزو وما نہی عنہوا نتهوا
- 1.10 ولو فو بالعهد
- 1.11 وما شر وہن بالمعروف
- 1.12 یمحق اللہ الریب ویرسی الصمغقات
- 1.13 واصبر علی ما اصابک
- 1.14 وقولوا قولا سدیداً
- 1.15 ان الدین عند اللہ الاسلام

(ب) سنت

- 1- سنت کی اہمیت
- 2- دس منتخب احادیث مع ترجمہ و تخریج



- 1- اعمالاً اعمال بالنیات
  - 2- اہمیت لایم مکارم الاخلاق
  - 3- لایوم من احدثکم حق یحب الاخیرہ ما یحب لنفسہ
  - 4- المسلم من سلم المسلمون من سبہ المسمون من لسانہ ویدہ
  - 5- فی امنت باللہ سلم استقم
  - 6- حیرکم خیرکم لالہ
  - 7- سبب المسلم فسوق وقتالہ کفر
  - 8- لعم من احوالمومن
  - 9- کفی المسلم عسی المسلم حر لم یجمعہ و مالہ وفرقہ
  - 10- ایتہ المنلق ثلاث اذا حدیث کتب و قان و تمن حان و انا و فنا خلف
- دین اسلام

2.1 ہنرم کے بنیادی مقصد کی وضاحت اور انسان کی اخروی و مادی زندگی پر ان کے اثرات

- 1- توبہ
- 2- رسالت
- 3- آخرت
- 4- ملائکہ
- 5- آسمانی کتاب

2.2 عملیات

1- نماز 2- روزہ 3- حج 4- زکوٰۃ

مندرجہ بالا عملیات کی اہمیت و فضیلت، مکمل اور انسان کی اخروی و مادی زندگی پر ان کے اثرات



## مذہبی مقاصد

### ۱- قرآن مجید

- عمومی مقصد: طالب علم پر سمجھنے کے قتل ہو کہ اسلام کی تعلیمت کا اصل سرپوشہ قرآن مجید ہے  
 خصوصی مقصد: طالب علم اس قتل ہو جائے گا کہ
- ۵۱ قرآن مجید کی تریف کر سکے گا  
 ۵۲ قرآن مجید کے نزول کی صورت بیان کر سکے  
 ۵۳ قرآن مجید کی آئی دینی سورتوں کی پہچان کر سکے  
 ۵۴ منتخب آیات کا ترجمہ و تشریح کر سکے  
 عمومی مقصد: یہ سمجھنے کے قتل ہو کہ قرآنی آیات کے ذریعے اسلامی تعلیمت کا مفہوم کیا ہے  
 قرآنی آیات کا ترجمہ تشریح کر سکے  
 ۵۵ قرآنی تعلیمت کی روشنی میں اپنی اور معاشرتی اصلاح کر سکے

### ۲- سنت

- عمومی مقصد: طالب علم سنت نبوی کی اہمیت اور ضرورت کو اچھی طرح سمجھنے کے قتل ہو جائے گا  
 خصوصی مقصد:
- ۵۶ سنت کی تریف بیان کر سکے  
 ۵۷ سنت کی اہمیت و ضرورت کی وضاحت کر سکے  
 ۵۸ سنت کی روشنی میں مسوود حسنہ پر عمل کر سکے  
 ۵۹ منتخب احادیث پر عمل
- عمومی مقصد: احادیث کی روشنی میں اخلاقی اقدار سے سمجھنے حاصل کر سکے  
 خصوصی مقصد: احادیث کا ترجمہ و تشریح کر سکے  
 رسول اللہ ﷺ کے مسوود حسنہ کا، پیرا، کا مفہوم سمجھ سکے

دین اسلام  
 عمومی مقاصد: دین اسلامی کے بنیادی مقاصد اور عبادت کے بارے میں جان سکنے اور بیان کر سکنے  
 خصوصی مقاصد  
 لفظ دین اسلام کے لغوی اور اصطلاحی معنی بیان کر سکنے  
 اسلام کے بنیادی مقاصد کی اہمیت بیان کر سکنے  
 اسلام کے بنیادی مقاصد سے انسان کی اخروی و اہتمائی زندگی پر پڑنے والے اثرات بیان کر سکنے  
 عبادت کے لفظی و اصطلاحی معنی بیان کر سکنے  
 عقیدے اور عبادت کا فرق بیان کر سکنے  
 عبادت (نماز روزہ حج زکوٰۃ) کے فوری احکامات اور منسلکی زندگی پر ان کی اثرات بیان کر سکنے  
 اسلامی مقاصد و عبادت کے مطابق اپنی زندگی ڈھل کر ایک اچھا مسلمان بن سکنے

## اغیر مسلم طلباء کے لئے

GEN III

نصاب امتلاقیات سال اول  
حصہ دوم ملاحظہ پاکستان

نئی نئی نئی  
1 0 1  
کل وقت - 20 گھنٹے

### موضوعات

امتلاقیات کی تعریف اور اہمیت  
امتلاقیات کا معیار (آٹونمیکس، شکل، المی، کتب)  
سندرجہ اہل الخلق کی وضاحت

- ☆ وقت اور ارش
- ☆ وقت داری
- ☆ نظم و ضبط
- ☆ راست گوئی
- ☆ صبر و استقامت
- ☆ حوصلہ مند بننا
- ☆ وقت کی پابندی
- ☆ صفائی
- ☆ اعتدال
- ☆ باہمی احترام
- ☆ مصلحت

نصاب اخلاقیات (اسلام لورن)

### تدریسی مقاصد

- عمومی مقاصد: اعلیٰ تعلقات کی وجہ سے ہمیں ترقی میں تکل قدر مستفاد کر سکنے  
خصوصی مقاصد: طالب اس علم سے اس تہیں ہو گا کہ
- ۱۵۱ موضوعات کا مطلب بیان کر سکے
  - ۱۵۲ عملی زندگی سے مشابہت کی نشاندہی کر سکے
  - ۱۵۳ اپنی شخصیت اور معاشرے پر موضوعات کے مثبت اثرات پیدا کرنے کے طریقے بیان کر سکے
  - ۱۵۴ وراثت داری کی اہمیت بیان کر سکے
  - ۱۵۵ وفاداری کی اہمیت بیان کر سکے
  - ۱۵۶ لقم و ضبط کی افلاہیت بیان کر سکے
  - ۱۵۷ صدق بیان کی ضرورت بیان کر سکے
  - ۱۵۸ حوصلہ مندی کے فوائد بیان کر سکے
  - ۱۵۹ وقت کی پابندی کے فوائد بیان کر سکے
  - ۱۶۰ صفائی امور باہمی اختیار سے حسن کلر کی کو بیان کر سکے
  - ۱۶۱ مصلحت کے فوائد بیان کر سکے

**موضوعات**

- ۱۔ حضرت نضر: سسوں قوم میں آزادی فکر کی تاریخ مسلمانوں میں سنی آزادی کی اہمیت اور ضرورت۔ ذاتی و جسمانی غلامی کے تعلقات
- ۲۔ نظریہ پاکستان  
قیام پاکستان کی اساس (ذہن اسرار) قیام پاکستان کی غرض اہمیت نظریہ پاکستان کی وضاحت۔ نظریہ پاکستان اور صرفہ  
اقبال اور قائد اعظم کے ارشادات کی روشنی میں
- ۳۔ نظریہ پاکستان کا تاریخی پسو  
محمد بن قاسم کی آمد۔ مجدد خلف مہدی اور شاہ ابوالفتح کی تباہی عدالت سید احمد شہید کی تحریک مجاہدین
- ۴۔ قیامی تحریکیں  
علی گڑھ - عدوت اسلامیہ - (ایڈمز - ہارٹ لٹاٹام - (سندھ) اسلامیہ کانگریس (پٹنور) انجمن حمایت اسلام (الہ آباد)

مطالعہ پاکستان (حصہ دوم)

مدرسہ مقاصد

حریت فکر:

عمومی مقصد

طالب علم یہ جان لے کہ اسلام میں اور مسلمان قوم میں آزادی فکر کی کیا اہمیت ہے

خصوصی مقاصد

۱۶ حریت فکر کا معنی و مفہوم بیان کر سکے

۱۷ آزادی فکر کی اہمیت بیان کر سکے

۱۸ خصوصاً "اسلام میں آزادی اظہار رائے" کی اہمیت بیان کر سکے

۱۹ ذہنی غلامی کے قومی سطح پر نقصانات کے بیان کر سکے

۲۰ بدسلوکی غلامی قومی سطح پر نقصانات بیان کر سکے

نظریہ پاکستان

عمومی مقصد:

نظریہ پاکستان (ذہن اسلام) سے پوری طرح واقفیت ہو جائے

خصوصی مقاصد:

۲۱ نظریہ کی تعریف بیان کر سکے اور اس کی وضاحت کر سکے

۲۲ نظریہ پاکستان کی تعریف کر سکے اور اس کا مفہوم بیان کر سکے

۲۳ علامہ اقبال اور قائد اعظم کے فرمودات کی روشنی میں نظریہ پاکستان بیان کر سکے

نظریہ پاکستان کا تاریخی پہلو

عمومی مقصد

۲۴ نظریہ پاکستان کے تاریخی پس منظر سے واقفیت حاصل کر سکے

خصوصی مقاصد:

۲۵ مجاہدین قاسم کے بارے میں بیان کر سکے

- ۱۰ محمد بن قاسم کے ہندوستان پر حملہ کی وجہ بیان کرئے
- ۱۱ محمد بن قاسم کے ہندوستان پر حملہ کے اثرات بیان کرئے
- ۱۲ بیان کرئے کہ ہندوستان میں ہندو مسلم دو قومی نظریے کا نکتہ آغاز کیا ہے
- ۱۳ مہد لطف خاٹی کی علمی خدمات بیان کرئے
- ۱۴ شہد ولی اللہ کی علمی خدمات بیان کرئے
- ۱۵ مہد لطف خاٹی اور شہد ولی اللہ نے جو تبلیغ دین اور صحابوں میں سیاسی شعور پیدا کیا اسے بیان کرئے

### علمی تحریکیں

- ۱۶ علمی مقصد
- ۱۷ برصغیر کی علمی تحریکوں سے آگاہی حاصل کرئے
- ۱۸ قصور میں مقصد:
- ۱۹ ملی مگرہ - رنج ہند - خدوت العلماء مدرسہ السلام، اسلامیہ کالج - انجمن حمایت اسلام نے تعلیم کے ذریعہ سیاسی شعور مسلمانوں میں پیدا کیا اسے بیان کرئے
- ۲۰ آرزوی ہند کے فلسفہ میں تحریک مہندین کی خدمات بیان کرئے

**GENERAL OBJECTIVES:**

After going through this course the students will be able to:

- 1) Show skill in using wood working hand tools making simple joints
- 2) Show skill in safely using gas and gas welding equipment in jointing
- 3) Show skill in using metal working tools to make simple fitting jobs and articles
- 4) Show skill in working on common machine tools to make simple jobs
- 5) Show proficiency in using wood working tools to make complete wood joints and articles
- 6) Use welding equipment methodically and safely to make neat welded joints and articles
- 7) Make accurately fitting and well finished total articles with the hand tools
- 8) Show skill in safely working on machine tools to make complex articles

Sr.No		METAL WORK	Hours
<b>1</b>	Theory Practical	Introduction of the following metal working practices briefly: Measuring, marking, layout, cutting, striking, holding finishing and assembling Workshop practice	<b>12</b>
<b>2</b>	Theory Practical	Name and classify the tools use for measuring, marking and layout, briefly stating their use Workshop practice	<b>12</b>
<b>3</b>	Theory Practical	Name the tools used for holding, striking and forming briefly stating their use Workshop practice	<b>12</b>
<b>4</b>	Theory Practical	Name the tools used for metal cutting and metal removing such as snips, saws chisel, drill, taps and dics, giving their uses in brief Workshop practice	<b>12</b>
<b>5</b>	Theory Practical	Name the tools used for finishing, polishing and assembling, Briefly state their use Workshop practice	<b>12</b>
<b>6</b>	Theory Practical	Explain the construction and working of the precise measuring instruments Workshop practice	<b>12</b>
<b>7</b>	Theory Practical	Topic of week-6 continued Workshop practice	<b>12</b>
<b>8</b>	Theory Practical	State the classification and specific uses of files and their care Workshop practice	<b>12</b>
<b>9</b>	Theory Practical	State the classification and specific used of holding and assembly tools like screw drivers, vices, spanners, wrenches, clamps and their care Workshop practice	<b>12</b>
<b>10</b>	Theory Practical	Name two wood working tools used for measuring, marking, layout, holding, cutting, striking, planning and finishing Workshop practice	<b>12</b>



<b>11</b>	Theory Practical	Name the different kinds of wood explaining the structure of wood and different methods of seasoning. State the effect and diseases of wood Workshop practice	<b>12</b>
<b>12</b>	Theory Practical	Name of the various wood joints and state the use of different kind of wood and wood joints Workshop practice	<b>12</b>
<b>13</b>	Theory Practical	Classify the wood planners, Explain the construction uses, care and maintenance of Jack/Plane Workshop practice	<b>24</b>
<b>14</b>	Theory Practical	Name of the wood working saws and chisels. State their uses care and maintenance Workshop practice	<b>24</b>
<b>15</b>	Theory Practical	Explain the following tools special to wood working, Bits, ratchet brace, claw hammer, pineers and nail Workshop practice	<b>24</b>

### WELDING

<b>16</b>	Theory Practical	Name the tools, Equipments and materials commonly used in gas and arc welding, giving their uses very briefly Workshop practice	<b>12</b>
<b>17</b>	Theory Practical	State the general safety precautions to be observed in gas and arc welding practices Workshop practice	<b>12</b>
<b>18</b>	Theory Practical	Name the type of joints used in gas welding and arc welding giving their uses in brief Workshop practice	<b>36</b>
<b>19</b>	Theory Practical	Differentiate between soldering, brazing and gas welding, arc welding, the different types of flames, their methods of making and uses Workshop practice	<b>24</b>
<b>20</b>	Theory Practical	Explain the necessary preparation on the welding Workshop practice	<b>12</b>
<b>21</b>	Theory Practical	Explain the common welding defects, their common methods of testing Workshop practice	<b>12</b>

### MACHINING

22	Theory Practical	Name the common machine tools of a general purpose machine shop, giving their uses in brief Workshop practice	<b>12</b>
23	Theory Practical	Name the different types of lathes, with their uses and their parts Workshop practice	<b>24</b>
24	Theory Practical	Name the operation performed on lathes, the tools uses for them and the various angles of those tools Workshop practice	<b>12</b>
25	Theory Practical	Name the operations performed on shaper and planners and explain their mechanisms Workshop practice	<b>24</b>
26	Theory Practical	Name the operation performed on tool grinders, drill press and brazing and slating machines Workshop practice	<b>36</b>

<b>Total Contact Hours</b>	<b>T</b>	<b>P</b>	<b>C</b>
Theory 72	<b>2</b>	<b>0</b>	<b>2</b>
Practical 0			

**OBJECTIVES**

To impart knowledge of the subject with special emphasis on the practical aspect of it. To enable the students to apply their skill and maths on various technical and technological problems.

**DESCRIPTION**

Function & Limits, Differentiation, Differentiation of Algebraic Functions, Differentiation of Trigonometric Functions, Differentiation of Logarithmic & Exponential Functions, Rate of change of Variable, Integration, Methods of Integration, Definite Integrals, Plane Analytic Geometry & Straight Line, Equations of the Straight Line, Equations of the Circle, Statistics.

<b>Sr.No</b>	<b>Contents</b>	<b>Hours</b>
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<b>1</b>	<b>Functions &amp; Limits</b>	<b>04</b>
	1.1 Constant & Variable Quantities	
	1.2 Functions & their classification	
	1.3 The concept of limit	
	1.4 Limit of a function	
	1.5 Fundamental Theorems on limit	
	1.6 Some important limits	
	Problems	
<b>2</b>	<b>Differentiation</b>	<b>04</b>
	2.1 Increments	
	2.2 Differential Coefficient or Derivative	
	2.3 Differentiation ab-initio or by first Principle	
	2.4 Geometrical Interpretation of Differential Coefficient	
	2.5 Differential Coefficient of $X^n$ , $(ax + b)^n$	
	2.6 Three important rules	
	2.7 Problems	
<b>3</b>	<b>Differentiation of Algebraic Functions</b>	<b>04</b>
	3.1 Explicit Functions	
	3.2 Implicit Functions	
	3.3 Parametric forms	
	3.4 Problems	
<b>4</b>	<b>Differentiation of Trigonometric Functions</b>	<b>04</b>
	4.1 Differential Coefficient of Sin x, Cos x, Tan x from first principle	
	4.2 Differential Coefficient of Cosec x, Sec x, Cot x	
	4.3 Differentiation of inverse Trigonometric functions	
	4.4 Problems	
<b>5</b>	<b>Differentiation of Logarithmic &amp; Exponential Functions</b>	<b>06</b>
	5.1 Differentiation of In x	
	5.2 Differentiation of Log $a^x$	
	5.3 Differentiation of $a^x$	
	5.4 Differentiation of $e^x$	
	5.5 Problems	
<b>6</b>	<b>Rate of Change of Variable</b>	<b>04</b>
	6.1 Increasing and decreasing functions	
	6.2 Maxima and Minima values	
	6.3 Criteria for maximum & minimum values	
	6.4 Methods of finding maxima & minima	
	6.5 Problems	
<b>7</b>	<b>Integration</b>	<b>04</b>
	7.1 Concept	
	7.2 Fundamental Formulas	
	7.3 Important Rules	
	7.4 Problems	

<b>1</b>	<b>Functions &amp; Limits</b>	<b>04</b>
	1.7 Constant & Variable Quantities	
	1.8 Functions & their classification	
	1.9 The concept of limit	
	1.10 Limit of a function	
	1.11 Fundamental Theorems on limit	
	1.12 Some important limits	
	Problems	
<b>2</b>	<b>Differentiation</b>	<b>04</b>
	2.8 Increments	
	2.9 Differential Coefficient or Derivative	
	2.10 Differentiation ab-initio or by first Principle	
	2.11 Geometrical Interpretation of Differential Coefficient	
	2.12 Differential Coefficient of $X^n$ , $(ax + b)^n$	
	2.13 Three important rules	
	2.14 Problems	
<b>3</b>	<b>Differentiation of Algebraic Functions</b>	<b>04</b>
	3.5 Explicit Functions	
	3.6 Implicit Functions	
	3.7 Parametric forms	
	3.8 Problems	
<b>4</b>	<b>Differentiation of Trigonometric Functions</b>	<b>04</b>
	4.5 Differential Coefficient of Sin x, Cos x, Tan x from first principle	
	4.6 Differential Coefficient of Cosec x, Sec x, Cot x	
	4.7 Differentiation of inverse Trigonometric functions	
	4.8 Problems	
<b>5</b>	<b>Differentiation of Logarithmic &amp; Exponential Functions</b>	<b>06</b>
	5.6 Differentiation of In x	
	5.7 Differentiation of Log $a^x$	
	5.8 Differentiation of $a^x$	
	5.9 Differentiation of $e^x$	
	5.10 Problems	
<b>6</b>	<b>Rate of Change of Variable</b>	<b>04</b>
	6.6 Increasing and decreasing functions	
	6.7 Maxima and Minima values	
	6.8 Criteria for maximum & minimum values	
	6.9 Methods of finding maxima & minima	
	6.10 Problems	
<b>7</b>	<b>Integration</b>	<b>04</b>
	7.5 Concept	
	7.6 Fundamental Formulas	
	7.7 Important Rules	
	7.8 Problems	

<b>8</b>	<b>Methods of Integration</b> 8.1 Integration by substitution 8.2 Integration by parts 8.3 Problems	<b>06</b>
<b>9</b>	<b>Definite Integrals</b> 9.1 Properties 9.2 Application to area 9.3 Problems	<b>06</b>
<b>10</b>	<b>Plane Analytic Geometry &amp; Straight Line</b> 10.1 Coordinate System 10.2 Distance Formula 10.3 The Ratio Formulas 10.4 Inclination and slope of a line 10.5 The slope Formula 10.6 Problems	<b>06</b>
<b>11</b>	<b>Equations of the Straight Line</b> 11.1 Some important Forms 11.2 General Form 11.3 Angle Formula 11.4 Parallelism & Perpendicularity 11.5 Problems	<b>06</b>
<b>12</b>	<b>Equations of the Circle</b> 12.1 Standard form of Equation 12.2 Central form of Equation 12.3 General form of Equation 12.4 Radius & Coordinates of the Centre 12.5 Problems	<b>08</b>
<b>13</b>	<b>Statistics</b> 13.1 Concept of mean, median and mode. 13.2 Standard deviation. 13.3 Laws of probability. 13.4 Problems.	<b>10</b>

**Total Contact Hours**

Theory 72	<b>T</b>	<b>P</b>	<b>C</b>
Practical 108	<b>2</b>	<b>3</b>	<b>3</b>

**OBJECTIVES**

To give the trainees knowledge of Mine Ventilation and Working principles, methods and operation in the mine.

**DESCRIPTION**

Atmosphere, Detection of Mine Gases, Spontaneous Combustion, Ventilation, Natural Ventilation, Mechanical Ventilation, Laws of Flow Resistance, Mine Ventilation Survey, Distribution of Air.

Sr.No	Contents	Hours
<b>1</b>	<b>The Atmosphere</b>	<b>12</b>
	1. Definition.	
	2. Composition of Atmospheric Air	
	3. Natural Balance of Oxygen, Essential.	
<b>2</b>	<b>Mine Gases</b>	
	a) Their properties.	
	b) Detection.	
	c) Permissible limits (noxious and inflammable)	
	d) Physiological effects	
	Oxygen, Nitrogen, Carbon dioxide, Firedamp, Black Damp, White Damp, Stink Damp, After Damp, Oxides of Nitrogen, Sulpher Dioxide, Hydrogen, etc.	
	<b>Mine Gases Detectors/ Monitors</b>	<b>04</b>
	1. Oil Safety Lamp.	
	2. Digital Gas Detectors/ Monitors.	
	Their Principle of work and limitations of their application.	
	Mine Gas Sampling.	<b>06</b>
<b>3</b>	<b>Spontaneous Combustion of Coal</b>	
	1. Definition.	
	2. General conditions favoring oxidation of coal.	
	3. Situations where spontaneous combustion is most likely to occur.	
<b>4</b>	<b>Factors of Pollution of Mine Atmosphere</b>	
	i) Strata.	
	ii) Humidity and temperature.	
	iii) Geothermal gradient.	
	iv) Oxidation of certain minerals and materials.	
	v) Exhalation; exhaust from machinery.	
	vi) Dusts and their classification	
<b>5</b>	<b>Flow of Air</b>	<b>06</b>
	1. Definition.	
	2. Purpose.	
	3. Atmospheric Pressure.	
	4. Barometer, Principle	
	5. Thermometer, Types, Conversion of temperature units.	
	6. Hygrometer, Relative Humidity and its measurement.	
	7. Gas Laws, Boyle's Law, Charle's Law, Combination.	
	8. Measurement of Ventilating Pressure.	
<b>6</b>	<b>Natural Ventilation</b>	<b>06</b>
	1. How it is produced.	
	2. Calculation of Natural Ventilation Pressure	

	3. Factors affecting the Natural Ventilation Pressure	
	4. Numericals	
<b>7</b>	<b>Mechanical Ventilation</b>	<b>10</b>
	1. Types of Fans (Centrifugal and Axial Flow)	
	2. Principle of Centrifugal Fan, Purpose of Spiral Casing	
	3. Principle of Axial Flow Fan and Explanation	
	4. Fan Laws	
	5. Numericals.	
<b>8</b>	<b>Laws of Flow Resistance</b>	<b>06</b>
	1. Law of Flow Resistance.	
	2. Coefficient of Friction	
	3. Resistance factors	
	4. Atkinson equation	
	5. Numericals.	
<b>9</b>	<b>Ventillation Networks</b>	<b>06</b>
	1. Simple Networks	
	2. Natural and Controlled Splitting	
<b>10</b>	<b>Mine Ventilation Survey</b>	<b>10</b>
	1. Types of ventilation surveying.	
	a) Qualitative Surveying.	
	b) Quantitative Surveying.	
	c) Pressure Surveying.	
	2. Measurement / Calculation of air quantity:-	
	a) Smoke or Dust Cloud	
	b) Anemometer.	
	c) Velometer.	
	d) Pitot Static tube.	
	e) Various formulae to measure areas of cross-section of airways	
	3. Basis of Ventilation Requirements:-	
	i) Labour employed.	
	ii) Production requirements.	
	iii) Presence of Methane Gas.	
	iv) Special prevalent conditions. (Loco, Dusts, Gases).	
	v) Numericals.	
<b>11</b>	<b>Distribution of Air</b>	<b>06</b>
	1. Brattice Cloth.	
	2. Stoppings.	
	3. Doors	
	4. Air Crossings.	
	5. Regulators.	
	6. Booster Fans.	
	7. Auxiliary Fans.	
	8. Advantages and Disadvantages of Forcing Fans and Exhausting Fans	
	9. Ascensional and Descensional Ventilation.	



## MINE VENTILATION (PRACTICAL)

Sr.No	Practicals
1	Detection of Mine Gases by Oil Safety Lamp
2	Detection of Mine Gases by Digital Gas Detectors/ Monitors
3	Measurement of Ventilating Pressure
4	Calculation of Natural Ventilation Pressure
5	Study of construction of Ventilation Fans (Centrifugal & Axial flow)
6	Measurement of air current
	a) Smoke or Dust cloud
	b) Anemometer
	c) Velometer
	d) Pilot Static tube
7	Construction of Air Regulators, Door, Stopping

<b>Total Contact Hours</b>	<b>T</b>	<b>P</b>	<b>C</b>
Theory 72	2	3	3
Practical 108			

**OBJECTIVES**

The course has been designed to familiarize the students with the basic knowledge of earth science and materials, so that they can recognize different types of earth material.

**DESCRIPTION**

The Earth, Physical Geology, Rock-Forming Minerals, Rocks, Igneous Rocks, Sedimentary Rocks, Metamorphic Rocks, Geological Structures, Introduction to Stratigraphy of Pakistan, Dip and Strike determination, Origin of Oil and Gas deposits and their Geology.

Sr.No	Contents	Hours
1	<b>The Earth</b> Origin and age of Earth Concept of Geological Time  <b>Physical Geology</b> Brief introduction of weathering, erosion and deposition i.e. Rock Forming Cycle.  <b>Rock forming Minerals</b> Definitions, Physical properties, Identification.	16
2	<b>Rocks</b> <b>Igneous Rocks</b> Brief introduction to Igneous Rocks, Classification. Examples of common Igneous rocks.  <b>Sedimentary Rocks</b> Brief introduction to Sedimentary Rocks, Classification. Examples of common Sedimentary Rocks  <b>Metamorphic Rocks</b> Brief introduction to Metamorphic Rocks, Classification. Process of formation. Examples of common Metamorphic Rocks	10
3	<b>Geological Structures (Folds, Faults &amp; Joints)</b> Orientation (Dip, Dip direction & Strike). Types of Structures Terminology, Classification.	10
4	<b>Introduction to Stratigraphy of Pakistan.</b> Brief description of Salt Range. List of Major Minerals of Pakistan with their locations.	16
5	<b>Geological Maps &amp; Sections, their Reading and Interpretation.</b> <b>Geology Practicals</b> Identification of Rocks and Minerals. Geological field visits of Khewra, Katas, Kalabagh, Khushab, Kallar Kahar.	06
6	<b>Coal, its rank, types and Formation.</b>	06
7	<b>Origin of Oil and Gas Deposits and their Geology</b>	08

## GEOLOGY – I (PRACTICAL)

Sr.No.	Practical
1	Study of model (Solar system) Study of Geological maps of Pakistan Collection & Study of rock samples of Punjab (Salt Range) Study of geological models (Faults, Folds, Joints) Preparation of sketches
2	Study tour of Salt Range Study tour of geological sites
3	Study of geological models exercise aided by videos, films & transparencies after study tour
4	Study tour to observe weathering and erosion and collection of weathered and eroded rock samples
5	Exercise in laboratory to study rock samples Exercise in laboratory to study mineral samples
6	Study tour of geological sites Dip and strike measurement of strata in the field
7	Study of minerals in laboratory Study of physical properties of minerals and rock samples
8	Identification of igneous, sedimentary & metamorphic rocks and coal samples

**Total Contact Hours**

Theory 72

Practical 108

<b>T</b>	<b>P</b>	<b>C</b>
2	3	3

**OBJECTIVES**

To impart thorough understanding and familiarize the students with the fundamental sources of power, material handling techniques and drainage systems in surface and underground mining.

Sr.No	Contents	Hours
<b>1</b>	<b>Hydraulic Principles</b>	<b>08</b>
	i. Introduction	
	ii. Pressure and flow	
	iii. Absolute and gauge pressure	
	iv. Hydraulic lever	
	v. Pressure and force relationship	
	vi. Velocity and flow rate	
	vii. Laminar and turbulent flow	
	viii. Numerical problems	
<b>2</b>	<b>Power</b>	<b>16</b>
	i. various source of power available at mine	
	ii. Compressed air theory	
	iii. Compressed air systems	
	iv. Types of compressors: reciprocating, sliding vane, helical or spiral lobe, dynamic	
	v. Electric Power	
	vi. Power Cables	
<b>3</b>	vii. Power-factors	
	viii. Power cost	
	ix. Hydraulic power systems	
<b>4</b>	x. Numerical problems	
<b>4</b>	<b>Belt Conveyors:</b>	<b>10</b>
	i. Belt conveyor	
	ii. General applications of belt conveyors	
	iii. Belt capacity, width, speed and idler	
	iv. Types of belt conveyors	
<b>5</b>	<b>Haulage:</b>	<b>14</b>
	i. Application of different surface and underground methods of haulage	
<b>6</b>	ii. Trucks	
	iii. Tractor and trolleys	
	iv. Locomotives	
	v. Shuttle cars	
	vi. Wheel barrows	
	<b>Hoisting:</b>	<b>10</b>
	i. Hoisting equipment	
	ii. Basic hoisting systems	
	iii. Application to different mine conditions	
	iv. Steel ropes and cables	
		<b>14</b>

**Drainage:**

- i. Introduction
- ii. Principles and definitions
- iii. Different types of pumps
- iv. Pumps characteristics and applications
- v. Pumping systems
- vi. Speed control

**Lab Outline:**

1. Compressed air System Design
2. Electrical system design
3. Belt conveyor system design
4. Rail haulage and power system design
5. Rope system Design
6. Hoisting system design

**MINE POWER, DRAINAGE AND MATERIAL HANDLING (PRACTICAL)**

<b>Sr.No</b>	<b>Practical</b>
<b>1</b>	Study the system and parts of the compressor in the laboratory and take measurement concerning its operation.
<b>2</b>	Study the parts of an industrial type air compressor on a field trip/training and write a brief report on it.
<b>3</b>	Study the compressed air distribution system of a nearby mine, make a layout and write a report on it.
<b>4</b>	Study the components of hydraulic power system provided in the laboratory and write a brief description of each.
<b>5</b>	Study the hydraulic motor operation and conduct tests and calculations on it.
<b>6</b>	Study the hydraulic cylinder operation and carry out tests on it. Also draw the hydraulic circuits using proper symbols.
<b>7</b>	Study the components of pumping system provided in the laboratory.
<b>8</b>	Draw the pumping circuit diagram for the water pumping test set up including electric motors, pumps, valves, gauges, meters, pipes and reservoirs. Also record the name plate information from motors and pumps.
<b>9</b>	Carry out an experiment on internal gear pump and calculate the output horsepower, input electric power (hp) and overall efficiency (motor and pump).
<b>10</b>	Carry out an experiment on centrifugal pump by isolating the other pump and calculate hydraulic hp, input electric power (hp) and overall efficiency (motor and pump)
<b>11</b>	On a field visit/practical training, study the drainage system of a nearby mine, make a layout and write a short report that includes suggestions in the improvement of the pumping system.
<b>12</b>	During the practical training, study the electric distribution system of an underground mine, draw layout and write a short report on it.
<b>13</b>	During field trip/practical training, study the material handling system for haulage purposes, identify various components of that system and determine cycle time for it.

**Total Contact Hours**

Theory 72

Practical 108

**T****2****P****3****C****3****OBJECTIVES**

- i) To familiarize the students about the basic units, circuits, alternating currents, generation etc.
- ii) To acquaint students about the application of electricity used in domestic, industrial & mining installation.

Sr.No	Contents	Hours
<b>1</b>	<ol style="list-style-type: none"> <li>i) Introduction to the course its objectives, and standard definition.</li> <li>ii) Safety precautions and treatment against electric shock</li> <li>iii) Electricity Rules.</li> </ol>	<b>02</b>
<b>2</b>	<ol style="list-style-type: none"> <li>i) Electric Theory, Neutron, Proton, Electron and their charges.</li> <li>ii) Electrostatic charges, Law of Electrostatic and Electrostatic Induction.</li> </ol>	<b>02</b>
<b>3</b>	<ol style="list-style-type: none"> <li>i) Capacitor, Capacitance, Construction of parallel plate capacitors</li> <li>ii) Capacitor in series and parallel; and problems.</li> </ol>	<b>02</b>
<b>4</b>	<ol style="list-style-type: none"> <li>i) Types of electricity, unit of current, voltage and resistance and their symbols;</li> <li>ii) Ohms laws.</li> <li>iii) Verification of Ohms laws by solving problems.</li> </ol>	<b>02</b>
<b>5</b>	<ol style="list-style-type: none"> <li>i) Electric Power, unit for power and problems.</li> <li>ii) Measurement of power by volt meter &amp; AM-meter methods.</li> </ol>	<b>02</b>
<b>6</b>	<ol style="list-style-type: none"> <li>i) Power measurement by watt meter method.</li> <li>ii) Electrical energy measurement calculations.</li> </ol>	<b>02</b>
<b>7</b>	<ol style="list-style-type: none"> <li>i) Electric circuits, series circuit, laws of series circuits.</li> <li>ii) Problems on series circuits.</li> </ol>	<b>02</b>
<b>8</b>	<ol style="list-style-type: none"> <li>i) Parallel circuit, laws of parallel circuits.</li> <li>ii) Problems on parallel circuits.</li> </ol>	<b>02</b>
<b>9</b>	<ol style="list-style-type: none"> <li>i) Series parallel circuits.</li> <li>ii) Problems.</li> </ol>	<b>02</b>
<b>10</b>	<ol style="list-style-type: none"> <li>i) Compound circuits, problems.</li> <li>ii) Kirchoff Laws of voltage and current, Problems.</li> </ol>	<b>02</b>
<b>11</b>	<ol style="list-style-type: none"> <li>i) Properties of Copper, Aluminum, as a Conductor, their advantages and disadvantages.</li> <li>ii) Properties of air, paper rubber, Mica Cotton as Insulator, their advantages and disadvantages.</li> <li>iv) Electric wires, their types and sizes used for Industrial and Domestic purposes.</li> </ol>	<b>02</b>
<b>12</b>	<ol style="list-style-type: none"> <li>i) Electric Cables, types and sizes.</li> <li>ii) (armoured and non armoured)</li> <li>iii) Single, two, three and multi core cables, their formation and colour coding.</li> <li>vi)</li> </ol>	<b>02</b>
<b>13</b>	<ol style="list-style-type: none"> <li>i) Types of cables used in mining:</li> </ol>	<b>02</b>
<b>14</b>	<ol style="list-style-type: none"> <li>a) Permanent cables in shaft and road-ways;</li> <li>b) Flexible cables for coal cutters, drills and other portable machinery;</li> <li>c) Semi flexible cables for conveyer, loaders and other semi permanent machinery.</li> </ol>	<b>02</b>

	vii)		
15	i) Calculation of load current of an installation. ii) Determination of proper size of wire/cables. viii)		02
	<u>Joints in Cables.</u>		
16	Their types methods of jointing and cables soldering.		02
	ix)		
	i) Fuses their, importance types of fuses and types of wires used circuit breakers.		
17	Rating and calculation of size of fuse wires.		
18	i) Domestic wiring methods. Wiring practice batton wiring P.V.C. conduit. Steel conduit wiring their fitting e.g. sockets. Bands, saddles, elbows, "tee" inspection boxes, concealed and open wiring practice, dust trench wiring. Systems used in coal, salt and metal mines. Protection against mechanical damage, ambient temperature, explosions etc.		04
19	ii) Wiring circuits used in mines, earthling system, its importance, method of testing of installation. E.g. continuity test, polarity test, insulation earthling resistible test.		02
	<u>Batteries &amp; Cells.</u>		
	i) Types of cells, primary, secondary.		
	ii) Lead acid battery – and M.S. Lamp.		
	iii) Electrolyte specific gravity, battery charging		
	iv) Precautions in handling batteries.		
20	Batteries, rating.		02
21	Magnetic flux, properties and magnetic induction.		04
	i) Difference between D.C and A.C. current		
	ii) R.M.S. value, inductance and its application.		
22	Differentiate between impedance, Resistance and Reactance.		
	i) Inductance its unit, inductive circuit, effect of current in an inductive circuit, induction reactance, problems.		02
23	A.C. circuit containing resistance and inductance connected in series problems.		
	i) A.C. circuit containing resistance, inductance and capacitance connected in series.		02
24	Power factor measurements effects of low and high power factor.		02
	i) Three phase circuit, 3 wires system i.e. Delta connection, 3 phase 4 wire system i.e. star connection.		
	ii) Comparison of star and delta connection and problems.		
	iii) Measurement of power by 3 ammeter method and problem.		
25	<u>Protective Devices.</u>		04
	i) Flame proof enclosures.		
	ii) Intrinsically safe apparatus.		
26	Earthling.		04
	<u>D. C. Generator</u>		
	Study of its main parts, field poles, field windings, working principle of D.C. Generator. Types of D.C. Generator. Shunt, series and compound. e.m.f. equation. External and Internal characteristics of shunt, series and compound generator.		
27	<u>D.C. MOTOR</u>		02
	Working principle of D.C. Motor. Characteristics of shunt, series & compound motors. Load characteristics of D. C. Motors.		
28	<u>Transformers</u>		02
	Working principle of transformer, study of its parts and types. Step up & step down transformer. e.m.f. equation.		
29	<u>Alternator</u>		02
	Study of its parts, construction and working principle of alternator. Synchronizing or parallel operation of alternators.		
30	<u>A.C. Single Phase Motor</u>		02
	Types of A.C. Single Phase Motors, its parts and characteristics. Centrifugal switch, starting and running windings.		
	<u>Three Phase Motor</u>		



**31** Types of AC three phase motors. Their parts and construction and characteristics.  
Synchronous motor. Synchronous speed and its characteristics. Starting and  
running torque of synchronous motor.

**04**

## APPLIED ELECTRICITY

Sr.No	Practical
1	Study of simple electrical instruments. Am meter voltmeter, multimeter etc. i) Determination of resistance of wire by micrometer and scale method. ii) Determination of resistance of wire by voltmeter am meter method.
2	Practical of plotting lines of force of a bar magnet in different positions.
3	To make an electromagnet, permanent magnet temporary magnet.
4	Study of force on current carrying conductor in a magnetic field.
5	Verification of Faraday's Law of electromagnetism.
6	Study of induction of emf in coupled coils by changing current in one coil.
7	i) Study of primary coil. ii) Study of secondary coil. iii)
8	Study of capacitor and its working.
9	Power measurement by voltmeter ammeter and wattmeter.
10	Study of voltage drop in parallel and series circuit.
11	Study and verification of kirch off's law of voltage and current.
12	i) Study of insulating materials used in electricity ii) Study of electric cables and wires
13	iii)
14	Making of different cable joints Tee joint Britannia joint, straight joint cross joint.
15	Soldering of electric cables
16	Study of protective devices i) Flame proof enclosures ii) Intrinsically safe apparatus
17	Earthing
18	Study of DC generator and its parts, winding and its working principle
19	Types of DC generator. Shunt generator, compound generator and series generator
20	Study of DC motor and its parts Working principle of DC motor
21	Working principle of transformer, study of its parts step up and step down Transformer
22	<u>Alternator</u> Study of its parts and working principle
23	AC single phase motor its parts. Study of starting and running windings
24	Study of 3 phase motors, their parts and construction and current, voltage characteristics
25	Study of synchronous motor and its speed.

- |           |                                                                                  |
|-----------|----------------------------------------------------------------------------------|
| <b>26</b> | Wiring and its types, study of tools used in electric wiring.                    |
| <b>27</b> | Study of magnetic contactor and its parts                                        |
| <b>28</b> | Study of a thermal relay (over load relay) and its parts                         |
| <b>29</b> | Operation of 3 $\phi$ motor with push button starter (control and power circuit) |
| <b>30</b> | Operation of 3 $\phi$ motor with push button starter reversing                   |
| <b>31</b> | Operation of 3 $\phi$ motor with push button in starter connection               |
| <b>32</b> | Study of circuit breaker                                                         |
| <b>33</b> | Study of dry battery                                                             |
| <b>34</b> | Study of lead acid battery                                                       |

<b>Total Contact Hours</b>	<b>T</b>	<b>P</b>	<b>C</b>
Theory 72	2	3	3
Practical 108			

**OBJECTIVES**

To give the trainees instruction in the use of surveying instruments and to explain the working principles, methods and operations of surveying.

**DESCRIPTION**

Measurement of Distances, Leveling, Angles and Meridians, Compass Surveying, Latitude and Departure, Plane Table Surveying, Areas and Volumes.

Sr.No	Contents	Hours
1	<b><u>Measurement of Distance.</u></b> Surveying Introduction; definition and purpose; Different methods of measurement of distances; Errors in measurement and their correction. Instruments used e.g. Chain, tapes, cross staff, optical square. Ranging lines, making perpendicular with cross staff and optical squares and chains. Ranging by avoiding obstacles.	14
	<b><u>Angles and Meridians</u></b> Definition, Angle – Interior and Exterior, Circle, bearing, Quadrant bearing and whole circle bearing; meridians – geographical, magnetic, and assumed meridians. Magnetic declinations and its changes. To find true north in the field.	10
2	<b><u>Latitude and Departure.</u></b> Calculations of coordinates from known; bearing and distances. Calculations of Bearing and Distance from known coordinates; Problems on conversion of reduced bearing to whole circle bearing and Numerical vice versa.	10
3	<b><u>Compass Surveying.</u></b> Different types of compasses and method of their using, centering, levelling, closed traverse, open traverse, methods of traversing by chain angles, free or loose needle, fast needle, measurement of angles between successive lines.	10
4	<b><u>Numerical Problems.</u></b> <b><u>Plane Table Surveying.</u></b> Instruments used in carrying out plane table surveying, advantages and disadvantages of plane table, setting and orienting the plane table; Method of plane table, radiation, inter-section, traversing and re-section, errors in plane tabling. Two-point problem and three point problem in plane table survey.	10
5	<b><u>LEVELLING</u></b> 1. Definitions (level line, horizontal line, vertical line, B.S; I.S; F.S, line of Collimation, Datum line, reduce level, Bench Mark. 2. Equipments used in levelling. 3. Methods of levelling. 4. Levelling with straight edge and spirit level; a. Types of levels (Dumpy, wye), tilting and automatic; b. Levelling staff; c. Adjustments of levels (Temporary and permanent); d. Methods of booking and reading by collimation or instrument height system and the rise and fall system; e. Classification of levelling Differential, profile, reciprocal, barometric, trigonometrical; Numerical examples in levelling and plotting cross-section;	10

Areas of Regular Figures Square, triangle, Trapezoid, Trapezium, Circle, Sector of a circle, flat ring a Annular, Ellipse, curve surface of a cylinder and cone;  
Volume of regular solids, rectangular, cylinder, a prism and cone or pyramid  
Use of Planimeter; pantograph , Measurements of areas of irregular figures;  
Numerical – calculating area and volume of figure mentioned above

## SURVEY I (PRACTICAL)

Sr.No	Practical
<b>1</b>	<p>Introduction to survey instruments i.e. Tapes, Chains, Cross Staff – Optical Square, Use of survey instruments – Field measurements and their record on surveyor’s book.</p> <ul style="list-style-type: none"> <li>- Measurement of distances by paces, Chains – Tapes – Errors adjustments.</li> <li>- Exercise on ranging of lines and avoiding obstacles</li> </ul>
<b>2</b>	<ul style="list-style-type: none"> <li>- Introduction to compass – Types of compass and their applications</li> <li>- Temporary adjustment of compass - Centering, Levelling and orientation</li> <li>- Measurement of angles around a central station – Measurement of angles in open and closed interconnected survey lines</li> <li>- Observation of magnetic bearings – whole circle bearings – quadrantal bearings</li> <li>- Conversion of quadrantal bearings into whole circle bearing and v/s</li> <li>- Observation on local attraction and magnetic declination</li> <li>- Finding out true north to the field</li> <li>-</li> <li>- Running of open traverse with compass – running of closed traverse with compass</li> </ul>
<b>3</b>	<ul style="list-style-type: none"> <li>- Taking detail of off-sets. Preparation of survey sheets</li> <li>- Exercise on traversing by: Chain angles – free and loose needle methods – fast needle methods. Measurement of angles and bearings in traversing.</li> <li>-</li> </ul>
<b>4</b>	<ul style="list-style-type: none"> <li>- Establishment and location of survey stations – Exercise on demarcation of an area using co-ordinates, bearings and distances</li> <li>- Calculation on latitudes and departures with reference to measurements in the field</li> <li>- Preparation of Survey sheets</li> <li>-</li> </ul>
<b>5</b>	<ul style="list-style-type: none"> <li>- Introduction to levels – Types of levels</li> <li>- Exercise and methods of levelling like differential levelling</li> <li>- Reciprocal levelling</li> <li>- Trigonometrical levelling – Barometric levelling</li> <li>- Profile levelling</li> <li>- Hyposmetry</li> <li>- Preparation of survey sheets on profile levelling</li> <li>-</li> </ul>
<b>6</b>	<ul style="list-style-type: none"> <li>- Study of plane table surveying instruments, simple alidad, telescopic alidad</li> <li>- Temporary adjustment of plane table</li> <li>- Methods of working with plane table i.e. reduction, intersection, traversing and re-section</li> <li>- Solution of two point problem and three point problem</li> <li>- Exercise and plane table survey – preparation of survey sheets and maps</li> <li>-</li> <li>- Use of planimeter, Pentagraph – area calculation by planimeter – area by triangles</li> <li>- Calculation of area by co-ordinates</li> </ul>
<b>7</b>	<ul style="list-style-type: none"> <li>- Exercise on calculation of volume of deposit with given data notes of field survey.</li> </ul>

**Total Contact Hours**

Theory 36

Practical 108

<b>T</b>	<b>P</b>	<b>C</b>
<b>1</b>	<b>3</b>	<b>2</b>

**OBJECTIVES**

To give the trainees basic concept of information technology and use of application software.

**DESCRIPTION**

Data base Basics and Programming Using C.

<b>Sr.No</b>	<b>Contents</b>	<b>Hours</b>
<b>1</b>	<b>DATABASE BASICS</b>	<b>16</b>
	<ul style="list-style-type: none"> <li>- Introduction to Database Concepts</li> <li>- Database Concepts, Terminology and Usage</li> <li>- Database Design and Table Creation</li> <li>- Formatting A Table</li> <li>- Relationships</li> <li>- Locating and Replacing information</li> <li>- Creating Simple Queries</li> <li>- Creating Calculated Fields</li> <li>- Introducing Forms</li> <li>- Formatting and Creating Forms</li> <li>- Formatting and Creating Reports</li> </ul>	
<b>2</b>	<b>PROGRAMMING USING C</b>	<b>20</b>
	<ul style="list-style-type: none"> <li>- Characteristics of High Level Programming Language</li> <li>- Basic Structure of Program</li> <li>- Creating, Editing and Saving a Source Program</li> <li>- Compiling, Linking and Executing a Program</li> <li>- Variables: character, integer, long integer, floating point, double precision</li> <li>- Input/Output, printf, scanf, format Specifier, Field Width Specifier</li> <li>- Operators: Arithmetic, Relational, Logical Operators</li> <li>- Comments</li> <li>- Loops: for loop, while loop, do-while</li> <li>- Decision: if Statement, if-else Statement, else-if, switch Statement, Conditional Operator</li> <li>- Importance of Functions</li> <li>- Simple Functions</li> <li>- Function Passing Arguments and Returning Values</li> <li>- Open File, Read, Write, Append and Close File.</li> <li>-</li> </ul>	

**COMPUTER-II PRACTICAL**

Sr.No	Practical
<b>1</b>	MS-ACCESS 1) Creation different tables and assign primary key
<b>2</b>	2) Create simple queries using wizard and design view
<b>3</b>	3) Create relationship between tables
<b>4</b>	4) Create simple forms using wizard and design view
<b>5</b>	5) Create reports using wizard and design view
<b>6</b>	6) Use of summary and calculated fields
<b>7</b>	VISUAL BASIC 1) Create a simple form to add two number using text boxes and buttons
<b>8</b>	2) Create a simple form to perform other arithmetic computations (multiply, divide, subtract).
<b>9</b>	3) Create a form to display table of a given integer
<b>10</b>	4) Create a form which generates series of numbers within given limits using FOR loop
<b>11</b>	5) Create a form which generate series of numbers with in given limits using DO WHILE loop
<b>12</b>	6) Find factorial of N using any loop statement, read value from a text box and write it in another text box
<b>13</b>	7) Define a program to read use salary from a text box and calculate its tax depending upon the bracket in which it falls (using if else if else)
<b>14</b>	8) Create a function which return area of circle of given radius
<b>15</b>	9) Use of form to save/retrieve data from user in text boxes and save it to a MS ACCESS table
<b>16</b>	10) Use text boxes, combo boxes, tree list to save / retrieve data to / from MS ACCESS table
<b>17</b>	11) Use different property sheets to change appearance and format of text item
<b>18</b>	12) Use property sheet modify form background properties



**19** C-LANGUAGE

- 1) Write a program which prints a text of 4 lines consisting of characters, integer values and floating point values using “printf” statement
- 2) Writing a program that reads and prints the data using escape sequence (Asking the name, age, height and gender of the student using scanf and printf statement)
- 3)
- 4) Writing a program which uses operators (Calculate the area of triangle, volume of sphere and arrange the resultant values in ascending order)
- 5)
- 6) Writing a program which uses “for” loop statement (generate the multiplication table from 2 to 20)
- 7)
- 8) Writing a program which uses “While” loop and nested “While” loop (use “for” loop and continue the process in “while” loop satisfy this condition)
- 9)
- 10) Finding the factorial of N using “While” loop, read value of N using scan and print the factorial of various N
- 11)
- 12) Draw a check board and print it using if else statement and extend the program using nested if else
- 13)
- 14) Write a program which uses a “switch” statement and breaks the program if certain condition is observed. Repeat the program with “case” statement
- 15)
- 16) Writing a function which generates factorial of N and calls this function in the “main” program
- 17)
- 18) Writing a program which uses multiple arguments in a function (Develop a user defined function to generate a rectangle. Use the function for passing arguments to draw different sizes of rectangles and squares).

اسلامیات / مسالحوہ پاکستان

GEN 211

مضب (سہل دوئم)

حصہ اول اسلامیات

حصہ دوم مسالحوہ پاکستان

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کل وقت: 20 گھنٹے

موضوعات

- 1- سورة المؤمنین آیت تا آیہ آیات کا معنی ترجمہ
- 2- دن پنجاب مطبوعہ مع زمرہ تشریح
- 3- خیار کم من تعسیم القرآن و علمہ
- 4- لا ایمان لمن لا فرائضہ لہ ولا دین لمن لا عملہ نہ
- 5- و یا کم و العظن ان العظن اکرب الحدیث
- 6- من احدث فی امرنا بنا ما لیس متہ فہم ورد
- 7- من حمل علیہ السلاح فلیس منا
- 8- لای کفیل البتیم فی الجنۃ
- 9- لا ضرر ولا ضرار فی السلام
- 10- کلکم راع و کلکم راع و کلکم مسؤل عن رعیتہ
- 11- 3- میرا طیبہ
- 12- مکی زندگی - والرتبہ - بخت - اجرت
- 13- مکی زندگی - مہافتہ - مشق - مدرسہ - حج - کد (اسباب و نتائج)
- 14- حضور ﷺ بحیثیت
- 15- خطبہ حجۃ الوداع
- 16- محرم کابل، سرحد نو خاندان
- 17- اسلامی معاشرہ
- 18- حکم تعلیم اور ان کے مقصد - عدل و انصاف - امر بالمعروف - نہی عن المنکر
- 19- جملہ - کسب طائل - سچو الیت (تفصیلات)
- 20- انسانی ریاست کی تعریف - انسانی ریاست کی خصوصیات - انسانی حکومت کے فرائض - اسلامی طرز حکومت

## اسلامیات

### تدریس مقاصد

عمومی مقاصد بطالعلم یہ جان سکے کہ آیات قرآنی کی روشنی میں مومن کے اوصاف کیا ہیں

قرآن مجید

مخصوصی مقاصد:

☆ قرآنی آیات کا ترجمہ بیان کر سکے

☆ قرآنی آیات کی تشریح کر سکے

☆ قرآنی آیات کی روشنی میں ایک مومن کے اوصاف بیان کر سکے

☆ قرآنی آیات میں بیان کردہ مومن کے اوصاف اپنے اندر پیدا کر سکے

احادیث نبویہ

☆ عمومی مقصد احادیث کی روشنی میں اسلامی اخلاقی اقدار (انفرادی و اجتماعی) سے آگاہ ہو سکے

مخصوصی مقاصد:

☆ احادیث کا ترجمہ بیان کر سکے

☆ احادیث کی تشریح کر سکے

☆ احادیث کی روشنی میں اسلام کی اخلاقی اقدار کی وضاحت کر سکے

☆ ان احادیث کی دی گئی تعلیمات کے مطابق اپنی زندگی گزار سکے

سیرت طیبہ

☆ عمومی مقصد: حضور ﷺ کی سیرت طیبہ کے بارے میں جان سکے

مخصوصی مقاصد:

☆ حضور ﷺ کی ابتدائی زندگی انحصار کے ساتھ بیان کر سکے

☆ حضور ﷺ کی ہجرت کا واقعہ بیان کر سکے

☆ حضور ﷺ کی مدنی زندگی انحصار سے بیان کر سکے

☆ حضور ﷺ کی بطور معلم خصوصیات بیان کر سکے

- ☆ حضور ﷺ کی بطور سربراہ خاتم ان بیان کر سکے
- ☆ اسلامی معاشرہ
- ☆ عمومی مقصد: اسلامی معاشرہ کی خصوصیات سے آگاہی حاصل کر سکے
- ☆ خصوصی مقاصد:
- ☆ اسلامی معاشرہ کا معنی و مفہوم بیان کر سکے
- ☆ اسلامی معاشرہ کی امتیازی خصوصیات بیان کر سکے
- ☆ اسلامی معاشرہ میں عدل و احسان کی اہمیت بیان کر سکے
- ☆ تبلیغ کے لغوی معنی بیان کر سکے
- ☆ تبلیغ کی اہمیت و ضرورت بیان کر سکے
- ☆ جہد کے لغوی و اصطلاحی معنی بیان کر سکے
- ☆ جہد کی اہمیت بیان کر سکے
- ☆ جہد اور قتل میں فرق بیان کر سکے
- ☆ جہد کی مختلف اقسام بیان کر سکے
- ☆ اقتضایہ کی تعریف کر سکے
- ☆ مسجد کی سابقہ حیثیت کو بحال کرنے کے بارہ میں اقدامات کو بیان کر سکے

### اسلامی ریاست

- ☆ عمومی مقاصد: اسلامی ریاست کی خصوصیات بیان کر سکے
- ☆ خصوصی مقاصد:
- ☆ ریاست کی تعریف بیان کر سکے
- ☆ اسلامی ریاست میں طرز حکومت سے آگاہی حاصل کر سکے
- ☆ اسلامی ریاست کی خصوصیات بیان کر سکے
- ☆ اسلامی ریاست کے اغراض و مقاصد بیان کر سکے
- ☆ اسلامی ریاست کے قیام کیلئے جدوجہد کر سکے

## نصاب مطالعہ پاکستان

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کل وقت: 12 گھنٹے

سہ ماہی  
حصہ دوم

### موضوعات

- ☆ ۱۰ قرون نظریہ
- ☆ تحریک پاکستان
- ☆ انڈین کانگریس
- ☆ مسلم لیگ
- ☆ تفسیر بنگلہ
- ☆ مینشن کمنٹری
- ☆ تحریک خلافت
- ☆ سندھ تحریک
- ☆ پنجاب راجسی
- ☆ نسو رپورٹ
- ☆ قائد اعظم کے ۱۰۰ سال
- ☆ فلسفہ آلہ آباد
- ☆ انقلاب 1938 اور اشعل مجتہد
- ☆ قور ولو پاکستان

## (غیر مسلم طلباء کے لئے)

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کل وقت: 20 منٹ

نصاب اختلاقیات  
سال دوم

### موضوعات

معاشرتی، قدر اور اخلاق، مسلمانوں کی قوم، قومی سطح، شہری سطح، صنعتی اور لوہوں کی سطح، ضروریات، درجہ

- ☆ حقوق و فرائض
- ☆ قوت و برداشت
- ☆ قوت ارادی
- ☆ نکلن و جذبہ
- ☆ وسیع انگیزی
- ☆ بے غرضی
- ☆ مسائل دوستی
- ☆ حفاظتی شعور
- ☆ پاس آزادی
- ☆ کمال اچھی
- ☆ تعمیرات کو قبول کرنا
- ☆ خود شناسی

حصہ دوم  
سجاد پاکستان  
تدریس مقاصد

تحریک پاکستان

عمومی مقصد: قیام پاکستان کے اسباب و محرکات کو بیان کر سکتے  
خصوصی مقاصد:

- ☆ قومیت کے مفہوم کو بیان کر سکے
- ☆ دو قومی نظریہ کی تعریف و توضیح کر سکے
- ☆ دو قومی نظریہ اہمیت بیان کر سکے
- ☆ ہندوستانی مسلمانوں کی عمر میں کو بیان کر سکے
- ☆ قومی تشخص کو عمل رکھنے کے لئے مسلمان ہند کی مساعی بیان کر سکے
- ☆ آزادی ہند اور قیام پاکستان علامہ اقبال اور قائد اعظم کی مساعی بیان کر سکے
- ☆ قیام پاکستان سے مستقبل اسلامی مملکت کے قیام کے لئے مسلم عوام کی کوششوں کو بیان کر سکے
- ☆ مسلم لیگ کے قیام پاکستان کے لئے جدوجہد بیان کر سکے

(غیر مسلم طلباء کے لئے)

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کل وقت: 20 منٹ

نصاب اختلاقیات  
سال: دوم

### موضوعات

معاشرتی، قدرات کا تعلق ہے۔ قوم۔ قوی سطح۔ شہری سطح۔ صنعتی اور لائیو سطح۔ ضروریات۔ درجہ

- ۶۶ حقوق و فرائض
- ۶۷ قوت پرورش
- ۶۸ قوت ارادی
- ۶۹ نکلن و جذبہ
- ۷۰ وسیع انگیزی
- ۷۱ بے غرضی
- ۷۲ مسئلہ دوستی
- ۷۳ حفاظتی شعور
- ۷۴ پاس آزادی
- ۷۵ کمال اچھی
- ۷۶ تعمیرات کو قبول کرنا
- ۷۷ خود شناسی



## نسب اخلاقیات

سہ ماہ

## تدریس مقاصد

عمومی مقاصد:

طالب علم: اخلاقیات کی اہمیت اور ضرورت سے سمجھ ہو سکے اور بیان کر سکے

خصوصی مقاصد: طالب علم اس جملہ کو کہ

موضوعات کا مطلب بیان کر سکے

عملی زندگی سے مثالوں کی نشاندہی کر سکے

اپنی شخصیت اور حاشیے پر موضوعات کے متعلق مثبت اثرات پیدا کرنے کے طریقے بیان کر سکے

اعلیٰ اخلاقی قدما میں سے

توبت برداشت۔ قوت ارادی۔ مکتبہ جذبہ۔ وسیع انگری۔ بے غرض۔ انسانی دوستی خالص۔ شہور۔ پس تراوی۔

کمال اگلی اور نوا شہاسی کی اہمیت بیان کر سکے

اخلاقیات سے منصف اور قومی خدمت بہتر طور پر انجام دے سکے

**Total Contact Hours**Theory 0  
Practical 270

<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>9</b>	<b>3</b>

**GENERAL OBJECTIVES**

After going through this course the students will be able to

- i) Apply knowledge of wood work and metal shrinkages to make patterns of correct dimensions.
- ii) Understand complete milling operations.
- iii) Make projects involving milling operations.

**NOTE**

The order of the Practicals and theory topics is listed in logical order but may be varied pending on institute's facilities. The topics are therefore listed as units and not weeks.

**(A) WOOD WORK**

Sr.No	Contents & Practicals		Hours
1	Unit-1	<b>TH.</b> State the principles of pattern making and the materials used for it. <b>PRT.</b> Workshop practice.	18
2	Unit-2	<b>TH.</b> State the types of patterns and their specific uses. <b>PRT.</b> Workshop practice.	18
3	Unit-3	<b>TH.</b> State the various allowance made on the pattern, the materials for which they are made and their amounts of allowances and size of pattern. <b>PRT.</b> Workshop practice.	09
4.	Unit-4	<b>TH.</b> State the various types or core prints core boxes, their method of preparation and uses. <b>PRT.</b> Workshop practice.	09
5	Unit-5	<b>TH.</b> Explain the method of preparation and uses of varnishes and spirit polish. <b>PRT.</b> Workshop practice.	18
6	Unit-6	<b>TH.</b> Explain different types of timber supports. <b>PRT.</b> Types of joints used in mine props. Chocks and laggings. Workshop practice to cut different wood joints used in timber supports of mines and to fix them.	18

**(B) MACHINE SHOP - III**

7	Unit-1	<b>TH.</b> Explain coolants and lubricants used in machine cutting. Describe lathes, capstan and turret lathes, the operation performed on them. <b>PRT.</b> Workshop practice.	18
8	Unit-2	<b>TH.</b> Practice for selecting cutting tools, cutting feed and speed for various materials at a lathe. <b>PRT.</b> Workshop practice.	09

**(C) FORGING & FOUNDRY****SPECIFIC OBJECTIVES**

This course is intended to enable the students to:-

- i) Know the forging operations, tools, materials and safety rules.
- ii) Understand and foundry tools.
- iii) Make jobs by forging.

**SPECIFIC OBJECTIVES**

9	Unit-1	<b>TH.</b> Explain forging, name the forging tools and equipments giving their uses. Describe a forging furnace.	09
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		<b>PRT.</b>	As per list.	
<b>10</b>	Unit-2	<b>TH.</b>	Explain following forging processes giving their applications and tools used in them, (a) Drawing DPW (b) Upsetting (c) Heading.	<b>18</b>
		<b>PRT.</b>	As per list.	
<b>11</b>		<b>TH.</b>	Explain foundry, its functions and importance. Name the processes involved in casting in sequence.	<b>18</b>
		<b>PRT.</b>	As per list.	
<b>12</b>		<b>TH.</b>	Describe the foundry tools giving their uses.	<b>09</b>
		<b>PRT.</b>	As per list.	

### (D) BASIC WIRING

#### AIMS & OBJECTIVES

The students shall be able to:-

- i) Under take independent house wiring jobs.
- ii) Carryout different tests for installation.
- iii) Appreciate the need and importance of installation earthing and over current.
- iv) Select proper size of cable.
- v) Perform essential wood work related with mine electrical technology works.
- vi) Perform essential metal work related with mine electrical technology works.
- vii) Carryout wiring of power circuits (motors, starter, underground workings, gas mines).
- viii) Carryout trouble shooting in wiring installations.
- ix) Calculate size of earthing and supply cables for surface and underground power installations and wirings in gassy mines.

#### THEORY

Types and size of wiring cables (according to installation cores and voltage grades).  
Wiring systems (cleat, batton and wood cutting).  
Protection of house wiring through re-useable fuses and selection of fuse wiring sizes.

Types & construction of distribution boards.  
Importance of earthing, components of material system methods of earthing.  
Use of meggar and electrician's test lamp.  
House wiring testing (polarity test, installation resistance test, open & short-circuit tests).

Concept of voltage drop in cables, current carrying capacities of cables.  
Calculation of size of main and sub main cable for house wiring. Number of cable to be installed.

Pakistan Electricity rules about installation, wiring earth.

Sr.No	Practicals	Hours
<b>13</b>	Study of wiring accessories and cables.	<b>09</b>
<b>14</b>	Making of straights, tee, duplex and multiplex joints.	<b>09</b>
<b>15</b>	Soldering and taping of cable joints.	<b>09</b>
<b>16</b>	Practical of loose wiring on the following circuits.	<b>27</b>
	a) Simple lamp circuits.	
	b) Stair case circuit.	
	c) Two lamps in parallel installed by two individual switches.	
<b>17</b>	Determination of cable and fuse sizes on motor ratings.	<b>09</b>
<b>18</b>	Practice of "Godown" wiring in PVC conduit.	<b>09</b>
<b>19</b>	Practice of steel conduit wiring on the following circuits.	<b>36</b>
	a) Godown wiring.	
	b) Connecting a 3 phase motor to the main through a direct on	

	starter.	
	c) Connecting a 3 phase motor to a three points push button station (stop, forward reverse) and supply.	
	d) Commercial installations and distribution circuits for light and power.	
<b>20</b>	Making a motor foundation and its fittings.	<b>09</b>
<b>21</b>	Installation of a motor with starter.	<b>09</b>
<b>22</b>	Control of a 3 phase motor from main at site (on PVC conduit).	<b>09</b>
<b>23</b>	Dismantling and assembly of single phase A.C motor.	<b>09</b>

## WORKSHOP PRACTICE

<b>LIST OF PRACTICALS</b>	
<b>WOOD WORK (PATTERN MAKING)</b>	
<b>1</b>	Making finish and polish patterns of the following types.
<b>2</b>	A pattern of a decoration items.
<b>3</b>	A pattern of name plate (to be cast in aluminum).
<b>4</b>	A split pattern of miniature avil.
<b>5</b>	A pattern of a miniature fork and of a connecting rod.
<b>6</b>	A pattern of a cross head or similar complex machine part.
<b>MACHINE SHOP</b>	
<b>1</b>	Make project of the following types:-
<b>2</b>	Pocket screw driver straight turning, facing, champering, knurling, drilling, boring, threading, hardening of blade.
<b>3</b>	Die-handle (adjustable), (Turning drilling boring, threading internal & external).

<b>FORGING</b>	
<b>1</b>	Make the following objects by forging <ol style="list-style-type: none"><li>a. A hexagonal head nut.</li><li>b. A chisel.</li><li>c. A long from M.S round stock.</li></ol>
<b>2</b>	<ol style="list-style-type: none"><li>a. Practice bending of pipes with sand and other filler materials.</li><li>b. Practical: Bending M.S Bar into sharp curves and sharp corner angles.</li></ol>

**COAL MINING****Total Contact Hours**

Theory 72

Practical 108

<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>3</b>	<b>3</b>

**OBJECTIVES**

The course has been designed to provide understanding to mine technicians to apply coal mining methods in different geological environments of coal seams and to take responsibilities of coal excavation.

**DESCRIPTION**

Coal, Coal Mining Methods, Development of Coal Seam, Longwall Mining Methods, Room & Pillar Mining Methods, Surface Coal Mining Methods, Stripping, Oxidation of Coal and Spontaneous combustion, Mine Lighting in Mine Field, Road Ways, Working Face Visibility and Lighting, URLs and Combustion including combustion of peat, Fuel introduction, classification of fuels and properties of each type of coal and caking index, Carbonization, Proximate and Ultimate Analysis of Coal, Mine Water Introduction, Source, Water Table, Means of de-watering.

<b>Sr.No</b>	<b>Contents</b>	<b>Hours</b>
<b>1</b>	<b>Coal</b> i) Definition. ii) Mode of Formation. iii) Classification of Coal by Rank. iv) Selection of Coal for Commercial use. v) Impurities associated with Coal and their effects.	<b>06</b>
<b>2</b>	<b>Coal Mining Methods</b> i) Types of underground Coal Mining Methods. ii) Factors to be considered in selecting underground vs surface mining method. iii) Room and Pillar Method – Introduction & Fields of application. iv) Longwall Method of Mining - Introduction & Fields of applications.	<b>06</b>
<b>3</b>	<b>Development of Coal Seam</b> i) Introduction. ii) Conditions governing the Development of Coal Seams. iii) Development of Coal Seam Based on Entry-System. iv) Factors Effecting Size, Direction & Location of entries.	<b>08</b>
<b>4</b>	<b>Longwall Mining Method</b> i) Mechanized Longwall Advancing Mining Method and its applications. ii) Development of Flat & Inclined Seams. iii) Mechanized Longwall Retreating Mining Methods and its applications. iv) Manually Worked Longwall Mining Method. Application & Development	<b>08</b>
<b>5</b>	<b>Room &amp; Pillar Mining Methods.</b> i) Room and Pillar Mining Method. ii) Development of Rooms & Pillars by different Methods. iii) Advantages and dis-advantages of Room & Pillar System. iv) De-pillaring Methods and precaution to be adopted..	<b>08</b>
<b>6</b>	<b>Surface Mining Methods for Coal.</b> i) Open Cast and Open Pit Mining Methods. Application, Cycle of operation with shovel, Drag-Line, Bucket-Excavators.	<b>08</b>
<b>7</b>	<b>Oxidation of Coal and spontaneous Combustion.</b> i) Definitions of Oxidation and Spontaneous Combustion. ii) Situation Liable for Spontaneous Combustion.	<b>06</b>

	iii) Detection of Spontaneous Combustion.	
	iv) Prevention & precautions.	
	v) How to built an Air Tight Packing.	
<b>8</b>	<b>Mine Lighting.</b>	<b>06</b>
	i) Definitions of Relative Terms.	
	ii) Lamps used for Lighting.	
	iii) Lamp Rooms, Sketch, purpose. Advantage & Disadvantages.	
	iv) Maintenance of Safety Lamps.	
	v) Mine Lighting underground roadways and coal faces.	
<b>9</b>	<b>Fuel</b>	<b>04</b>
	i) Definitions, Classification (Solid, Liquids and Gases).	
	ii) Characteristics of an Ideal Fuel.	
	iii) Definition & Combustion of peat.	
<b>10</b>	<b>Carbonization</b>	<b>02</b>
	i) Definition.	
	ii) Types of Carbonization.	
	<b>Analysis of Coal.</b>	<b>02</b>
<b>11</b>	i) Introduction.	
	ii) Proximate Analysis.	
	iii) Ultimate Analysis.	
<b>12</b>	<b>Mine Water</b>	<b>08</b>
	i) Sources of Mine Water in the mine.	
	ii) Water Table - Definition.	
	iii) Means of De-watering.	
	a) Drain Tunnels.	
	b) Pumping.	

**COAL MINING PRACTICAL)**

Sr.No	Practicals
<b>1</b>	i) <b>To study coal samples.</b> ii) To study impurities of coal in laboratory.
<b>2</b>	i) Visit of coal mine. ii) To study mining methods used in mines and to make their sketches.
<b>3</b>	i) To study Room and Pillar mining method laboratory model. ii) To study various parts of machinery used in Room and Pillar Mining method.
<b>4</b>	i) To study model of longwall advancing / retreating mining methods.
<b>5</b>	i) To study lighting system in coal mines and to study different types of safety lamps. ii) Requirement of illumination of light
<b>6</b>	i) Study of properties of coal in laboratory, Ash content, Volatile matters, sulphur contents, moisture contents, GCV.
<b>7</b>	i) Study tour to water bearing coal mines and preventive measures against mine water.
<b>8</b>	i) Study of pumps used in mines for water drainage.



**MIN 333**  
**MINING**

**UNDERGROUND**

<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>3</b>	<b>3</b>

**Total Contact Hours**

Theory 72  
Practical 108

**OBJECTIVES**

The aim is to get familiarize with various underground hardrock mining methods, equipments and the hoisting systems. The students would also develop skill in determining rock properties, and the installation of supports and rock bolts.

<b>Sr.No</b>	<b>Contents</b>	<b>Hours</b>
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<b>1</b>	<b>Development of a Mineral Deposit for Mining</b>	<b>7</b>
	<ul style="list-style-type: none"> <li>i. Introduction</li> <li>ii. Drift, incline, shaft, cross cuts to vein, and vertical shaft mining</li> <li>iii. Opening a mineral deposit with varying conditions</li> <li>iv. Position of horizontal development openings</li> <li>v. Subsidence and its prevention</li> </ul>	
<b>2</b>	<b>Development</b>	<b>6</b>
	<ul style="list-style-type: none"> <li>i. Introduction</li> <li>ii. Shaft sinking practices</li> <li>iii. Drift cycle</li> <li>iv. Raise cycle</li> <li>v. Types of raises</li> <li>vi. Raises and raise machines</li> <li>vii. Drilling or boring development headings</li> </ul>	
<b>3</b>	<b>Underground Mining Methods</b>	<b>18</b>
	<ul style="list-style-type: none"> <li>i. Introduction</li> <li>ii. Shrinkage stopping</li> <li>iii. Sublevel stopping</li> <li>iv. Vertical crater retreat mining</li> <li>v. Cut and fill mining</li> <li>vi. Sublevel caving</li> <li>vii. Block mining</li> <li>viii. Method selection criteria</li> </ul>	
<b>4</b>	<b>Common underground equipment</b>	<b>7</b>
	<ul style="list-style-type: none"> <li>i. Mine face equipment</li> <li>ii. Excavators</li> <li>iii. Haulage systems</li> <li>iv. TBM and Road Headers</li> <li>v. Underground drilling machines</li> </ul>	
<b>5</b>	<b>Hoisting systems</b>	<b>12</b>
	<ul style="list-style-type: none"> <li>i. Introduction</li> <li>ii. Single drum &amp; multiple drum hoists</li> <li>iii. Friction (Koepe) hoists</li> <li>iv. Types of skips</li> <li>v. Types of ropes, their selection, maintenance and operating practices.</li> </ul>	
<b>6</b>	<b>Mechanical properties of rock</b>	<b>12</b>
	<ul style="list-style-type: none"> <li>i. Introduction</li> <li>ii. Definitions and concepts</li> <li>iii. Uniaxial compressive strength</li> <li>iv. Tensile strength</li> <li>v. Flexural strength</li> <li>vi. Unconfined shear strength</li> <li>vii. Triaxial compression and shear strength</li> </ul>	
<b>7</b>	<b>Ground support systems</b>	<b>10</b>
	<ul style="list-style-type: none"> <li>i. Introduction</li> <li>ii. Square-set timber</li> <li>iii. Timber, concrete and steel</li> <li>iv. Arch girders</li> <li>v. Types of rock bolts</li> <li>vi. Purpose of roof bolting</li> <li>vii. Shot-crete</li> </ul>	

Sr.No	Practicals
1	Determining the uniaxial compressive strength of a given specimen.
2	Determine Brazilian Tensile strength of a given specimen.
3	Determine the flexural strength (modulus of rupture) of a given specimen.
4	Determine the unconfined shear strength of a given sample.
5	Determine the triaxial compressive strength of a given specimen.
6	Study the various components of a slotted-type rock bolt, draw sketches and write a brief report on them.
7	Study various components expansion type rock bolt, draw sketches and write a short note on them.
8	Study the ground/resin bolts, draw sketches and write a short.
9	Draw sketches of different views of shrinkage stope and label them.
10	Draw sketches of sublevel stopping and label the various regions of it.
11	Draw sketches of various types of cut and fill stopping and label them.
12	Draw sketches of 'sublevel caving' and 'Block Caving' and label them.
13	Study the round strand, flattened strand, and full lock coil type of ropes and make sketches of such ropes.
14	During a study tour/practical training of an underground mine, study its hoisting system, its operation, and maintenance of equipment used. Also write a short report on it.
15	Study and operate stopper, air leg, and jumbo drills.
16	During practical training, study the support system and have an hands on experience on installing them.

MIN 332

**GEOLOGY - II**

**Total Contact Hours**

Theory 72

Practical 0

<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>0</b>	<b>2</b>

**OBJECTIVES**

The course has been designed to impart knowledge of earth science to the students, especially in ground water, rock mechanics and economic geology.

**DESCRIPTION**

Ground Water: Hydrological Cycle, Ground Treatment: Ground Water Control, Methods of Mineral, Prospecting and Sampling: Surface exploration methods, Sub surface exploration methods, Sampling Techniques, Ore Reserves Calculation, Non-metallic minerals and coal deposits of Pakistan.

<b>Sr.No</b>	<b>Contents</b>	<b>Hours.</b>
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<b>1</b>	<b>Ground water</b> <b>Hydrological cycle.</b> i) Infiltration. ii) Percolation. i) Water table. ii) Ground water.	<b>8</b>
<b>2</b>	<b>Ground Treatment.</b> a) Ground water control. i) Dewatering Techniques for ground water control. ii) Drainage of water through : i) Sediments. ii) Fractured Rocks. b) Grouting. i) Basic methods of grouting of rocks and unconsolidated sediments. ii) Factors influencing grouting methods. c) Consolidation. The consolidation of sediments and its response to unloading.	<b>12</b>
<b>3</b>	<b>METHODS OF MINERAL. PROSPECTING AND SAMPLING.</b> a) Surface exploration methods. i) Introduction to Geological mapping. ii) Test pitting and trenching. iii) Augering and wash boring. b) Sub Surface exploration methods. i) Gravity method. ii) Magnetic method. iii) Electric resistivity method. iv) Seismic method.	<b>26</b>
<b>4</b>	<b>Sampling Techniques.</b> i) Core drilling. ii) Churn drilling iii) Channel sampling.	<b>10</b>
<b>5</b>	<b>ORE RESERVES CALCULATION.</b>	<b>10</b>
<b>6</b>	Location of important metallic and non-metallic minerals and Coal Deposits of Pakistan	<b>6</b>

MIN 353.

**SURFACE MINING AND ENVIRONMENTAL CONTROL**

**Total Contact Hours**

Theory 72

Practical 108

<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>3</b>	<b>3</b>

**OBJECTIVES**

At the end of this course students would be able to know various surface mining methods and equipments involved in surface mining. They would also be able to understand the effects of mining on environment and their prevention, treatment and control.

<b>Sr.No.</b>	<b>Contents</b>	<b>Hours</b>
<b>1</b>	<b>Surface Mining Methods</b>	<b>6</b>
	<ul style="list-style-type: none"> <li>i. Introduction</li> <li>ii. Surface vs underground mining</li> <li>iii. Open-pit mining</li> <li>iv. Quarrying</li> <li>v. Sledging and placer mining</li> <li>vi. Open cast mining</li> <li>vii. In-situ leaching</li> <li>viii. Solution mining</li> </ul>	
<b>2</b>	<b>Unit Operations</b>	<b>5</b>
	<ul style="list-style-type: none"> <li>i. Drilling</li> <li>ii. Blasting</li> <li>iii. Loading</li> <li>iv. Hauling</li> <li>v. Auxiliary services</li> </ul>	
<b>3</b>	<b>Open-pit Mining</b>	<b>6</b>
	<ul style="list-style-type: none"> <li>i. Terminologies: Open-pit shapes, overall pit slopes, bench, bench height, bench slopes, ore access</li> <li>ii. Applicability and advantages,</li> <li>iii. Factors affecting the selection of open-pit mining</li> <li>iv. Stripping: definition, pre-stripping, in-house stripping, contract stripping</li> <li>v. Stripping ratios: decreasing stripping ratio, increasing stripping ratio, constant stripping, break-even stripping ratio</li> </ul>	
<b>4</b>	<b>Quarrying</b>	<b>8</b>
	<ul style="list-style-type: none"> <li>i. Introduction</li> <li>ii. Size and shape of quarry</li> <li>iii. Marketing concepts</li> <li>iv. Unit operations: overburden removal, cutting, splitting, stone handling</li> <li>v. Equipments: pneumatic hammers, flame jets, water jets, wedges, saws etc.</li> </ul>	
<b>5</b>	<b>In-situ Leaching (ISL)</b>	<b>5</b>
	<ul style="list-style-type: none"> <li>i. Introduction</li> <li>ii. General mechanism of ISL</li> <li>iii. Principal processes for ISL</li> <li>iv. Characteristic features of solution flow in ISL</li> <li>v. Physical properties of solutions affecting migration in the aquifer</li> <li>vi. Geologic and hydro-geologic conditions for in situ-leaching (ISL)</li> </ul>	
<b>6</b>	<b>Equipments</b>	<b>7</b>
	<p>Introduction, types, advantages and disadvantages, lubrication and maintenance of:</p> <ul style="list-style-type: none"> <li>i. Power shovels</li> <li>ii. Front end loaders</li> <li>iii. Trucks</li> <li>iv. Scrappers</li> <li>v. Graders</li> </ul>	

	vi.	Dozers	
<b>7</b>	<b>Drilling</b>		<b>8</b>
	i.	Introduction	
	ii.	Mechanical actions involved in drilling: percussion and rotation	
	iii.	Percussive drilling: introduction, components, working, advantages and disadvantages	
	iv.	Rotary drilling: introduction, components, working, advantages and disadvantages	
	v.	Lubrication and maintenance	
<b>8</b>	<b>Environmental Pollution</b>		<b>9</b>
	i.	Introduction to ecosystem and environment	
	ii.	Environmental impacts of mining on food web	
	iii.	Environmental impacts of mining on other ecosystems, variables and features such as biospheric dispersion processes, population and biochemical cycling	
	iv.	Types of Pollution	
	v.	Pollution sampling and measuring techniques	
<b>9</b>	<b>Solid and Hazardous waste management</b>		<b>9</b>
	i.	Types and nature of waste and hazardous material	
	ii.	Hazardous waste handling and cautions	
	iii.	Waste dumps	
	iv.	Tailings dams	
	v.	Underground disposal	
	vi.	Underwater disposal	
<b>10</b>	<b>Acid Mine Draining</b>		<b>5</b>
	i.	Formation	
	ii.	Chemistry	
	iii.	Preventive measures	
	iv.	Treatment of AMD	
	v.	Active treatments	
	vi.	Passive treatments	
<b>11</b>	<b>Reclamation</b>		<b>4</b>
	i.	Reclamation procedures	
	ii.	Re-vegetation	
	iii.	Rehabilitation	

**SURFACE MINING AND ENVIRONMENTAL CONTROL (PRACTICAL)**

Sr.No	Practical
	<p><b>Note:</b></p> <ol style="list-style-type: none"><li>a. Field tour must be arranged to acquaint the student with the surface mining practices in Pakistan.</li><li>b. The student must undergo practical training of atleast one month in summer vacation in one or more surface mines during their studies.</li></ol>
1	Draw a line diagram of an electric power shovel and identify the various components of it. Also write a short description of each components by searching through the literature.
2	Draw a line diagram of a hydraulic shovel showing the various powered functions of it. Prepare a report by writing a short note on each of the powered functions.
3	During field tour/practical training, identify the various components of shovel, their functions and also note the cycle time of power shovel.
4	Draw a line diagram of a front end loader and identify the various components of it. Also write a short description of each component by searching through the literature.
5	Draw a line diagram of a front end loader and show the various powered functions of it. Prepare a report by writing a short note on each of the powered function.
6	During field visit/practical training, identify the various components of a front end loader. Also note the cycle time of a front end loader and compare it with the cycle time of a power shovel.
7	Draw a line diagram of a truck and identify the various components of it. Also write a brief description of each component by searching through literature.
8	Draw a line diagram of a truck identifying the various powered functions. Prepare a report by writing a short note on each of the powered functions.
9	During field visit/practical training, identify the various components of a truck and note the cycle time of that truck.
10	Draw a line diagram of a dozer and identify the various components of it. Also write a short description of each component by searching through the literature.
11	Draw sketches of different blade types of a dozer and prepare a short report on the functioning of each.
12	Draw a line diagram of a dozer showing its various powered functions. Write a short report on each of the powered function.
13	During field visit/practical training, try to identify the various applications of a dozer and write a shore report.





<b>Total Contact Hours</b>	<b>T</b>	<b>P</b>	<b>C</b>
Theory 72	2	6	4
Practical 216			

**OBJECTIVES**

To determine the relative position of points on the surface of earth in order that the shape and extent of any portion of earth surface may be ascertained on map.

To determine the relative heights or elevation of different points on surface of earth.

To prepare a map or plan of surface of earth showing surface features and lines of different elevation (i.e. contours).

**DESCRIPTION**

Theodolite Traversing, Triangulation Survey, Tachometric Surveying, Contouring, Curves, Dip and Fault.

Sr.no	Contents	Hours
<b>1</b>	<b>Theodolite Traversing</b> Types of theodolite, its parts and use for horizontal and vertical measurements Definition – Terms used e.g. Turning in azimuth, Turning in altitude, transiting the telescope face left and face right line of sight or line of collimation Temporary and Permanent Adjustments; Traversing with Theodolite in the continuous Azimuth method and double fore sight method.	<b>16</b>
<b>2</b>	<b>Triangulation Survey.</b> Purpose, Principal and Classification; Methods of measuring angles; Station Adjustment, Figure adjustment (Geometrical and trigonometrically) Base line measurement and correction. Three points problems;	<b>10</b>
<b>3</b>	<b>Tachometric Surveying.</b> Introduction of tachometric surveying, Instruments used – tachometric and levelling or Stadia rod; Tachometric methods – Stadia and Substance Bar method; Principal of Stadia Surveying Method, Measurement of horizontal and vertical distance, Errors in Stadia Survey; Numerical Problems on Stadia Surveying.	<b>12</b>
<b>4</b>	<b>Contouring;</b> Definition, contour lines and their characteristics, contour interval method of contouring; Radial line, Direct and Indirect, Interpretation method and interpretation of topographic maps profiles.	<b>10</b>
<b>5</b>	<b>Curves.</b> Elements of a simple circular curve; Geometry of a simple circular curve; Laying off horizontal and vertical circular curves; Numerical on curves and super elevation.	<b>12</b>
<b>6</b>	<b>Dip and Fault.</b> Definitions – strike line, dip, full dip. apparent dip, rise, gradient slope and inclination fault, normal fault, down fault, upthrow fault, vertical displacement, lateral shift or heave and reversed faults. Numerical problems on dip and fault. Introduction to EDM and total station.	<b>12</b>

## SURVEY II

Sr.No	Practicals
1	<p><b>To familiarize</b> with theodolite – types of theodolite – function of different parts of theodolite</p> <ul style="list-style-type: none"><li>- Temporary adjustment of theodolite</li><li>- Measurement of horizontal and vertical angles – transiting the theodolite</li><li>- Traversing with theodolite – permanent adjustment of theodolite</li></ul>
2	<p><b>Use of theodolite as</b> tachometer – Stadia – Staff measurements – different stadia staffs introduction and their use</p> <ul style="list-style-type: none"><li>- Use of substance bar – Measurement of horizontal angles – Vertical angles – Horizontal distances and vertical distance with Tachometer</li><li>- Exercise on Tachometric leveling</li></ul>
3	<p><b>Division of area</b> into Triangles – measurement of angles of the vertex of the triangles – solution of triangles – calculation of distances between the stations, Base-line measurement Adjustment of stations and figures – calculation of area of the figure</p>
4	<p><b>Mapping</b>– Selections of contour interval – contouring with spot levels – square methods of contouring – interpolation of contours</p>
5	<p><b>Laying off horizontal curve</b> – circular curves – laying off vertical curves – Exercise on transition and compound curve</p>
6	<p><b>Exercise on mine survey</b> – calculation of strike and dip of the seams and deposits of minerals</p> <p>Introduction to EDMs, Total Station GPS Survey instruments</p>

**Total Contact Hours**

Theory 72

Practical 0

**T**     **P**     **C**  
**2**     **0**     **2****OBJECTIVES**

To acquaint students with basic principles of Mine Economics and Mine Management. To develop leadership abilities for effective supervision. To develop their understanding of Mine organization. To develop and understanding of human factors in industry. To develop social skills and understanding of psychology in dealing with industrial and labour problems.

<b>Sr.No</b>	<b>Contents</b>	<b>Hours</b>
1	Industrial psychology, leadership and motivation	5
2	Industrial accidents, fatigues and boredom	4
3	Scientific management	5
4	Quality and quantity of control	4
5	Fundamentals of economics	4
6	Marketing dynamics	5
7	Factors of production	4
8	Ore reserves	4
9	Economic system, economy of Pakistan	4
10	Financial Transaction	4
11	Definitions related to Mine Act used in Mining Technology	5
12	Mine Inspectors' powers, functions	4
13	Mining Boards, Committees, powers, functions	4
14	Mining operations and Mining Officials	4
15	Rules, regulations and bye-laws	4
16	Certificates of competency, permits and authorizations	4
17	Coal mining rules and regulations, metalliferous mining rules and regulations, bye-laws and compensations act	4

<b>Total Contact Hours</b>	<b>T</b>	<b>P</b>	<b>C</b>
Theory 36	1	3	2
Practical 108			

**OBJECTIVES**

To give the introduction to the students about safety measure and safety equipment. How to take rescue operation, What are the diseases in coal mines and their preventions, Tips for first aid.

**DESCRIPTION**

Rescue & Recovery, Mine Explosions: Fire Damp Explosions, Coal Dust Explosions, Mine Fires, Resuscitation & First Aid, Mine Accidents, Occupational Diseases, their causes and prevention.

<b>Sr.No</b>	<b>Contents</b>	<b>Hours</b>
<b>1</b>	<b>Mine Fires</b>	<b>4</b>
	<ol style="list-style-type: none"> <li>1. The Fire Triangle (Fuel, Heat and Oxygen)</li> <li>2. Categories of Fuels (Solid, Liquid and Gas)</li> <li>3. Principles of Fire extinguishing (Removal of Fuel, Heat &amp; Oxygen)</li> <li>4. Classes of Fires (Classes A, B, C, D and Electric Hazards)</li> <li>5. Methods of extinguishing fires Water, Sand, Foam, Carbon dioxide, Vaporization of Liquids, Dry Chemical Powders.</li> <li>6. Stopping. Temporary and Permanent Stopping.</li> <li>7. Precautions to re-open a sealed area.</li> </ol>	
<b>2</b>	<b>Mine Explosions</b>	<b>9</b>
	<ol style="list-style-type: none"> <li>1. Fire Damp Explosions. <ol style="list-style-type: none"> <li>i) Factors essentials to cause a fire damp explosion</li> <li>ii) Limits of inflammability.</li> <li>iii) Causes of ignition of fire damp in mines.</li> <li>iv) Precautions against a fire damp explosion.</li> </ol> </li> <li>2. Coal Dust Explosions. <ol style="list-style-type: none"> <li>i) Factors essentials to cause a coal dust explosion.</li> <li>ii) Limits of inflammability.</li> <li>iii) Causes of ignition of coal dust explosion.</li> <li>iv) Precautions against a coal dust explosion.</li> <li>v) Mine Dust Sampling</li> </ol> </li> <li>3. Explosions in Compressed Air Pipes.</li> </ol>	
<b>3.</b>	<b>Mine Accidents</b>	<b>3</b>
	<ol style="list-style-type: none"> <li>1. Classification of Accidents. <ol style="list-style-type: none"> <li>a) Falls of roof and sides</li> <li>b) Haulage and winding.</li> <li>c) Explosive and shot firing.</li> <li>d) Electrical Hazards</li> <li>e) Inundation in Mines.</li> <li>f) Suffocation.</li> <li>g) Methods of working.</li> </ol> </li> </ol>	

2.	Causes, Prevention and Control.	
<b>4.</b>	<b>Rescue &amp; Recovery</b>	<b>7</b>
1.	Definition.	
2.	The Mine Rescue Organization.	
3.	The Mine Rescue Team – Rules & Procedure for pre and after entering an irrespirable atmosphere.	
4.	Types of Breathing Apparatus – Factors to be considered	
5.	Short-Distance Tube apparatus- The Spirelmo, Smoke Helmet.	
6.	Escape Apparatuses:	
	Open circuit type	
	Close circuit type	
7.	Self contained breathing apparatus.	
	a) Compressed air types.	
	b) Compressed oxygen type.	
<b>5.</b>	<b>First Aid to the Injured</b>	<b>10</b>
1.	Definition	
2.	First Aid Equipments	
3.	General Principles of First Aid.	
4.	Cardio-Pulmonary resuscitation.	
5.	Physiological aspect of Resuscitation	
6.	ABC of Resuscitation	
7.	Expired air Resuscitation	
8.	Manual Resuscitation	
9.	Basic life flow chart	
10.	Hemorrhage, Fracture, Burns	
11.	How to recover an unconscious person from an irrespirable atmosphere.	
12.	Reviving apparatus (Pulmotor)	
<b>6.</b>	<b>Occupational diseases, their causes and prevention.</b>	<b>3</b>
	1. Pneumoconiosis.	
	2. Nystagmus.	
	3. Dermatitis.	
	4. Heat Strokes.	
	5. Gas Poisoning.	
	6. Loss of Hearing Acuity.	
	7. Tuberculosis Verucosa, and	
	8. Tunnel Workers Anemia.	

**RESCUE AND SAFETY (PRACTICAL)**

<b>Sr.No</b>	<b>Practical</b>
<b>1</b>	Construction of dust sampler
<b>2</b>	Measurement of quantity of dust particles with dust sampler
<b>3</b>	Introduction and layout of Rescue Station
<b>4</b>	Introduction to Rescue Apparatuses
<b>5</b>	Mine Safety Lamps and charging station
<b>6</b>	Construction of self contained breathing apparatus BG-174, principle
<b>7</b>	Exercise with BG-174
<b>8</b>	Construction of smoke helmet
<b>9</b>	Construction of gas mask
<b>10</b>	Construction of CO self rescuer and exercise with CO-self rescuer
<b>11</b>	Construction and operation of pulmator
<b>12</b>	Rescue operation with different types of Equipments
<b>13</b>	Artificial resuscitation
<b>14</b>	First aid to :- a) Gas effected person b) Burnt person c) Electric shock effected person d) Limb fractured person e) Drowned person
<b>15</b>	Environment sampling behind the fire stopping and calculation of garaham's ratio

**Total Contact Hours**

	<b>T</b>	<b>P</b>	<b>C</b>
Theory 72	2	0	2
Practical 0			

**OBJECTIVES**

At the end of the course the student would be able to know different types of explosives, their properties and applications. The student would also acquire the skill in fostering the safe blasting practices with the desired end result being accident free, productive blasting.

<b>Sr.No</b>	<b>Contents</b>	<b>Hours</b>
<b>1</b>	<b>Explosive Products</b>	<b>16</b>
	<ul style="list-style-type: none"> <li>i. History of explosives</li> <li>ii. Explosive and blasting agent</li> <li>iii. Low and high explosive</li> <li>iv. Oxygen balance</li> <li>v. Various explosives and blasting agents               <ul style="list-style-type: none"> <li>a. Nitroglycerine based explosives: dynamites</li> <li>b. ANFO/Dry blasting agents</li> <li>c. Agricultural grade prills</li> <li>d. Blasting grade prills</li> <li>e. Slurries</li> <li>f. Watergels</li> <li>g. Emulsions</li> </ul> </li> <li>vi. Permissible explosives</li> </ul>	
<b>2</b>	<b>Explosive properties</b>	<b>14</b>
	<ul style="list-style-type: none"> <li>i. Strength/energy output</li> <li>ii. Velocity of detonation (VOD)</li> <li>iii. Density</li> <li>iv. Water resistance</li> <li>v. Post blast fumes</li> <li>vi. Detonation pressure &amp; blasthole pressure</li> <li>vii. Sensitivity and sensitiveness</li> </ul>	
<b>3</b>	<b>Initiation system</b>	<b>14</b>
	<ul style="list-style-type: none"> <li>i. Introduction</li> <li>ii. Non-electric initiation systems</li> <li>iii. Cap and fuse</li> <li>iv. Nonel</li> <li>v. Detonating cord</li> <li>vi. Electric initiation system</li> <li>vii. Field application</li> </ul>	
<b>4</b>	<b>Environmental effects of blasting</b>	<b>14</b>
	<ul style="list-style-type: none"> <li>i. Various environmental effects</li> <li>ii. Air blasts</li> <li>iii. Flyrock</li> <li>iv. Ground vibrations</li> <li>v. Prescribed vibration levels &amp; measurement techniques</li> <li>vi. Scaled distance equation</li> <li>vii. Remedial measures for ground vibrations and air blasts</li> </ul>	
<b>5</b>	<b>Blasting safety</b>	<b>14</b>
	<ul style="list-style-type: none"> <li>i. Explosive storage</li> <li>ii. Handling of explosive material</li> <li>iii. Postshot safety</li> <li>iv. Disposing of misfires</li> <li>v. Disposal of explosive material</li> </ul>	



1- سورۃ الفاتحہ۔ آیتہ الکرسی۔ سورۃ البقرۃ کی سترہ آیات از اسم الرسول سے آغاز اور سورۃ سحرا کی تفسیر

2- بنی منتخب احادیث اور تفسیر

☆ بنی اسلام علی خمس شہادت لآلہ الاموال قلم انصرونہ ویشاءنہ زکوٰۃ و حج

☆ لیلین و صوم رمضان

☆ لہذین انصبحتہ

☆ لمنشاء موتہن

☆ للمومن علی المومن سنت خصالی یعود مراد امراض و تشہدہ لذمانت و بحیبہ لنا دعا

☆ لیسیم علیہ انقلبہ و لیسعہ انا عظمس و فصیحطہ لانغاب او شہد

☆ لا تخن من خنک

☆ لا یفخر الحنثہ قاطع

☆ ان اللہ حرم علیکم عقوق لمہات و اضاعتہ اعمال

☆ لیسر اولاتعسر اولاتنفرا

☆ دلق طعم الایمان من مرضی باللہ و بالاسلام بیت بمعبدالنبیا

☆ لوصی الذکر لآلہ الاموال

3- حقوق و فرائض

☆ حصن تعلیم بطور فرس۔ والدین اور کولار کے حقوق و فرائض۔ ہمدیہ کے حقوق

☆ اسلام کی اخلاقی اقدار

☆ عبرت استغاب۔ غمخورد گزر۔ ایمانت عمد۔ ہنوت۔ ایثار و قربانی

### تدریس مقاصد

قرآن حکیم

عمومی مقصد: منتخب سورتوں اور آیات کی روشنی میں اسلام کے بنیادی مقاصد اور عبادت جان سکے  
خصوصی مقاصد: طالب علم اس قتل ہو جائے گا کہ  
سورۃ الفاتحہ: آیتہ الکرسی۔ سورۃ بقرۃ کی آخری آیات از امن الرسول سے اور سورۃ اخلاق کا ترجمہ و تشریح کر سکے  
طالب علم درج ذیل کا مفہوم بیان کر سکے

☆ رب العالمین صرف اللہ تعالیٰ ہے

☆ اللہ رحم کرنے والا ہے

☆ قیامت کے دن ہر شہابی اللہ کی ہوگی

☆ عبادت اور استعانت کا حقدار صرف اللہ ہے

☆ طالب علم درج ذیل کا مفہوم بیان کر سکے

☆ اللہ پاک ہر عیب سے پاک ہے

☆ اللہ کے اسمائے حسنہ حق اور قیوم ہیں

☆ تعلیم انبیاء پر ایمان لانا ضروری ہے

☆ رسول ملا کہ کتب سلویہ پر ایمان لانا فرض ہے

☆ اطاعت حقیقی صرف اللہ کے لیے ہے

☆ اسلامی احکامات پر عمل کرنا انسانی رسالہ میں ہے

☆ کفر کو اللہ کی مدد کے بغیر کھست نہیں دی جاسکتی

☆ اللہ ایک ہے

☆ اللہ کسی کا محتاج نہیں نہ اس کا کوئی شریک ہے

☆ منتخب احادیث

عمومی مقصد: احادیث کی روشنی میں اسلامی تعلیمات پر عمل پیرا ہو سکے

☆ خصوصی مقصد:

☆ احادیث کا ترجمہ بیان کر سکے

### تدریس مقاصد

قرآن حکیم

عمومی مقصد: منتخب سورتوں اور آیات کی روشنی میں اسلام کے بنیادی مقاصد اور عبادت جان سکے  
خصوصی مقاصد: طالب علم اس قتل ہو جائے گا کہ  
سورۃ الفاتحہ: آیتہ الکرسی۔ سورۃ بقرۃ کی آخری آیات از امن الرسول سے اور سورۃ اخلاق کا ترجمہ و تشریح کر سکے  
طالب علم درج ذیل کا مفہوم بیان کر سکے

☆ رب العالمین صرف اللہ تعالیٰ ہے

☆ اللہ رحم کرنے والا ہے

☆ قیامت کے دن ہر شہابی اللہ کی ہوگی

☆ عبادت اور استعانت کا حقدار صرف اللہ ہے

☆ طالب علم درج ذیل کا مفہوم بیان کر سکے

☆ اللہ پاک ہر عیب سے پاک ہے

☆ اللہ کے اسمائے حسنہ حق اور قیوم ہیں

☆ تعلیم انبیاء پر ایمان لانا ضروری ہے

☆ رسول ملا کہ کتب سلوید پر ایمان لانا فرض ہے

☆ اطاعت حقیقی صرف اللہ کے لیے ہے

☆ اسلامی احکامات پر عمل کرنا انسانی رسالہ میں ہے

☆ کفر کو اللہ کی مدد کے بغیر کھست نہیں دی جاسکتی

☆ اللہ ایک ہے

☆ اللہ کسی کا محتاج نہیں نہ اس کا کوئی شریک ہے

☆ منتخب احادیث

عمومی مقصد: احادیث کی روشنی میں اسلامی تعلیمات پر عمل پیرا ہو سکے

☆ خصوصی مقصد:

☆ احادیث کا ترجمہ بیان کر سکے

- ۱۶۰ اعلیٰ بیٹ کی تشریح کر سکے
- ۱۶۱ معاشرتی اور انفرادی زندگی میں اعلیٰ بیٹ سے راہنمائی حاصل کر سکے
- حقوق و فرائض**
- عمومی مقصد: اسلامی معاشرے کا ایک اچھا فرد بن سکے
- خصوصی مقاصد:
- ۱۶۲ والدین کے حقوق و فرائض بیان کر سکے
- ۱۶۳ بھائیوں کے حقوق بیان کر سکے
- ۱۶۴ اسلام میں حقوق و فرائض کی صورت میں اپنے اندر خدمتِ مطلق کا جذبہ پیدا کر سکے
- اسلامی اقدار
- عمومی مقصد: طالب علم بہتر بن سکے گا کہ تعلیم کا مقصد حسنِ اخلاق سے متصف ہوگا ہے
- خصوصی مقاصد
- ۱۶۵ اخلاق کے معنی و مفہوم کو بیان کر سکے
- ۱۶۶ اسلام میں حسنِ اخلاق کی اہمیت بیان کر سکے
- ۱۶۷ قرآن و سنت کی روشنی میں صبر و استقامت کی اہمیت بیان کر سکے
- ۱۶۸ اسلام میں غفور و رحیم کی اہمیت بیان کر سکے
- ۱۶۹ ایقانے عہد کی اہمیت بیان کر سکے
- ۱۷۰ اشدت کے معنی و مفہوم کو بیان کر سکے
- ۱۷۱ اشدتِ اسلامی کی اہمیت بیان کر سکے
- ۱۷۲ اسلام کی اعلیٰ اقدار کو اپنا کر مثالی معاشرہ پیدا کر سکے

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کل وقت: 20 گھنٹے

QEN 311

نصاب (سہل سوئم)  
مطالعہ پاکستان  
حصہ دوم

### موضوعات

- ☆ قیام پاکستان
- ☆ پونڈری کمیشن
- ☆ ریڈ کلف ایوارڈ
- ☆ تقسیم بنگلہ و گلگت
- ☆ تقسیم پنجاب
- ☆ مسئلہ مہاجرین
- ☆ ریاست کالہاں
- ☆ ریاست جموں و کشمیر
- ☆ نسری پانی کا تنازعہ
- ☆ قرار دہا مقاصد
- ☆ علماء کے بائیس نکات
- ☆ 1956-1962 اور 1973 کے دستاویز کی اسلامی دفعات
- ☆ پاکستان کا محل وقوع اور اس کی جغرافیائی اہمیت
- ☆ قدرتی وسائل (تیل، گیس، کوئلہ)

مطالعہ پاکستان (حصہ دوم)  
قیام پاکستان

تدریس مقاصد

عمومی مقاصد: قیام پاکستان کے بعد درپیش مسائل سے آگاہی حاصل کرے اور بیان کرے

☆ خصوصی مقصد:

- ☆ باؤنڈری کمیشن تشکیل اور اس کے فرائض بیان کر سکے
- ☆ ریڈ کلف اور اس کے ایوارڈ کے بارے میں بیان کر سکے
- ☆ بنگلہ اور گلگت کی تقسیم کی وجوہات بیان کر سکے
- ☆ پنجاب کی تقسیم کی تفصیل بیان کر سکے
- ☆ مہاجرین کی آمد سے جو مسائل پیدا ہوئے انہیں بیان کر سکے
- ☆ ریاستوں کے الحاق کے بارے میں تفصیل بیان کر سکے
- ☆ ریاست جموں کشمیر کے بارے میں بیان کر سکے
- ☆ سری پانی کے تنازعہ کو بیان کر سکے
- ☆ قرار دلو مقاصد کی تفصیلات بیان کر سکے
- ☆ 22 علماء کے متفقہ اسلامی نکتہ بیان کر سکے
- ☆ قیام پاکستان کے بعد نفاذ اسلام کی کوششوں کو بیان کر سکے
- ☆ پاکستان کے محل وقوع اور اس کی جغرافیائی اہمیت بیان کر سکے
- ☆ پاکستان میں قدرتی وسائل (تیل-گیس-کونکر) کے بارے میں بیان کر سکے

(غیر مسلم طلباء کے لئے)

ٹی پی سی  
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کل وقت: 20

Gen 311

نصاب اختلاقیات

سال سوئم

موضوعات

☆ احساس ذمہ داری

☆ مثبت ذہن

☆ عدل و انصاف

☆ قومی خدمت کا جذبہ

☆ ذکر و نظر کی پاکیزگی

☆ احترام آدمیت

☆ شائستگی

☆ عضو و درگزر

☆ بردباری

☆ خود انحصاری

☆ اثر و نفوذ

☆ جامعیت

☆ اپنی ذات کی معرفت (پذیرید ہم عمر طلباء۔ اساتذہ۔ اہم شخصیات کو ارہ)

**PRACTICAL TRAINING**

`Hours 216

<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>6</b>	<b>2</b>

**OBJECTIVE:**

- To acquaint the students with different mining practices and the equipment use for the extraction of the minerals.
- This will be accomplished by working in surrounding coal and salt mines and lime stones quarries

Sr.No	Practical	Hours
1	UNIT-1 Loading <b>TH:</b> i) The study of the construction & working of rock shovel loader ii) Study of grab bucket for loading of blasted rock <b>PR:</b> Working with the grab bucket in the Training Mine	6
2	UNIT-2 Transport <b>TH:</b> To explain tract layout in a mine with the help of sleepers <b>PR:</b> Laying of a track with the help of sleepers with a gauge of 80 cm.	6
3	<b>TH:</b> To explain the various components of a track switch <b>PR:</b> Study of a track switch at Training Mine	6
4	<b>TH:</b> To explain the construction, working and use of a chain conveyor <b>PR:</b> Study of various parts and working of chain conveyor by assembling & dismantling	6
5	<b>TH:</b> To explain the construction, working and use of a belt conveyor <b>PR:</b> Study of various parts and working of belt conveyor	6
6	<b>TH:</b> To explain the construction & different parts of mine cars <b>PR:</b> Study of construction of (a) rocker dump mine car (b) box type mine car	6
7	<b>TH:</b> To explain the construction & Working of a rotary tippler <b>PR:</b> Study the construction & different parts of tippler to be used for unloading a box type mine car at Training Mine.	6
8	<b>TH:</b> To explain the construction and the working of a scraper <b>PR:</b> Study of construction & the working of a Hoe type scraper at Training Mine	6
9	<b>TH:</b> To explain the construction and working of a diesel locomotive <b>PR:</b> Study the construction and the working of a diesel locomotive at Training Mine	6
10	<b>TH:</b> To explain construction and working of different types of mine winches <b>PR:</b> Study the construction and working of a) Worm gear mine winch b) Reduction gear mine winch	6
11	UNIT-3 HOISTING <b>TH:</b> To explain the construction and working of various types of hoisting machines used in mining <b>PR:</b> Study the construction of various components of the mine hoist and their working at the Training Mine Shaft	6
12	UNIT-4 PUMPS <b>TH:</b> To explain the working and construction of different types of mine pumps <b>PR:</b> Study the construction of various parts and the working of the following mine pumps a) Volute type centrifugal pumps b) Turbine type multi-stage centrifugal pumps c) Vertical turbine type pumps d) Reciprocating Pump	24



<b>13</b>	<b>UNIT-5</b>	<b>FANS</b>	<b>12</b>
	<b>TH:</b>	Explain the construction and characteristics of different types of mine fans	
	<b>PR:</b>	Study the construction of various parts and characteristics of a) axial flow mine fan, b) Centrifugal/blower fan	
<b>14</b>	<b>UNIT-6</b>	<b>SIGNALING SYSTEM</b>	<b>6</b>
	<b>TH:</b>	To explain the signaling system used at mines required under the mines act	
	<b>PR:</b>	Practice of (a) bell and light signals in the incline and shaft of Training Mine according to mines act (b) use of an intercom for communication purpose in the shaft of Training Mine	
<b>15</b>	<b>UNIT-7</b>	<b>GROUTING &amp; ROCK BOLTING</b>	<b>12</b>
	<b>TH:</b>	To explain the chemical and cement grouting used for sealing shaft & incline and seepage of water underground	
	<b>PR:</b>	Practice of a) Chemical grouting b) Cement grouting	
<b>16</b>	<b>UNIT-8</b>	<b>EXPLOSIVES AND BLASTING</b>	
<b>PRACTICALS:</b>		<ol style="list-style-type: none"> <li>i. Study various inert (dummy) explosives by Wah-Noble Industries. Write a brief report on them indicating specifications, their uses etc.</li> <li>ii. Study various explosive accessories (inert) manufactured by Wah-Noble and write a brief report stating their specification, uses etc.</li> <li>iii. Study the various inert explosives and inert accessories manufactured by Biafo Industries and write a brief report stating their specifications, uses etc.</li> <li>iv. Draw the diagram of blasting cap used in conjunction with safety fuse showing the explosive train. Also practice the assemblage of blasting cap (inert) and safety fuse making the proper seating of fuse in the cap and crimp it with the help of crimper at the proper place. This is also to be studied and practiced on a field trip as an when arranged.</li> <li>v. Practice the recommended knots for detonating cord on inert detonating cord or nylon strings. This is to be studied and practiced on a field trip as well.</li> <li>vi. Study a Nonel detonator (inert) and various associated accessories and delays (inert) and practice its connection in class and also in the field.</li> <li>vii. Start a nonel shock tube (actual) with the help of nonel starter/initiator in the class and do the same with a remote nonel initiator as well.</li> <li>viii. Study the various instrumentation involved in electric initiation system and also practice the recommended wire slices</li> <li>ix. Using inert electric detonators, determine the continuity and resistance of series, parallel and series-parallel circuits (use the firing line, connecting wire and bus wire in the circuit.</li> <li>x. Practice with the help of detonators (inert) and primer (inert) the various proper techniques in making primer. Study them on field trips as well.</li> <li>xi. On a field trip, watch and practice general blasthole loading procedures.</li> <li>xii. Create mock ground vibrations and airblast in the class and monitor and take readings with the help of seismographs. Also monitor them in actual field conditions on a study tour.</li> <li>xiii. Study the various components of a sequential blasting machine in the class and use it in the field where electric initiation is practiced and get familiar with its use.</li> <li>xiv. Study the various components, and get familiar with the use of lightning detector when storm is approaching.</li> </ol>	
<b>17</b>	<b>Unit-1</b>	Surface and underground layout	<b>18</b>
	<b>PRT:</b>	<ol style="list-style-type: none"> <li>1. Make a surface layout of Training Mine</li> <li>2. Make an underground layout of Training Mines</li> </ol>	
<b>18</b>	<b>UNIT-2</b>	<ol style="list-style-type: none"> <li>1. Explain openings</li> <li>2. Explain choice of opening</li> </ol>	<b>18</b>
<b>19</b>	<b>PRT:</b>	<ol style="list-style-type: none"> <li>1. Study of shaft hoist, its parts, working principle and its function</li> <li>2. Study of which haulage at Training Mine incline. Its parts working principle and function</li> <li>3. Study of shaft sinking method at Training Mine</li> </ol>	<b>18</b> <b>18</b> <b>18</b>

		<b>Drilling and blasting</b>	
<b>20</b>	<b>TH:</b>	State the working principle of drill hammers, drills and auger machines Explain drilling patterns and their use in underground surface mining Explain explosive and their uses	
<b>21</b>	<b>PRT:</b>	Drill a hole and blast it with safety fuse Drill a pattern of holes and blast them with a- Elect. Detonator                      b- Detonating cord	<b>18</b>
<b>22</b>		Underground supports Explain different types of supports with different materials and cross-sections. Explain their use and fixing of different support in different x-sections, rock bolts	
<b>23</b>	<b>PRT:</b>	i) Cut joints and fix single piece timber supports ii) Cut joints and fix two piece, timber support iii) Cut joints and fix three piece timber support iv) Cut joints and fix 4&5 piece timber support v) Fix 3 piece steel support vi) Fix steel arch in                      a- Shaft                      b- incline vii) Installation of Rock Bolt	<b>18</b> <b>18</b> <b>18</b> <b>18</b> <b>18</b> <b>18</b> <b>18</b>
<b>24</b>	UNIT-5	Underground stowing i) Explain stowing and its types ii) Explain procedure to stow an excavated area	
<b>25</b>	UNIT-6	<b>PRT:</b> With the help of scraper stow a given area Ventilation survey 1- Explain ventilation survey equipment, their working principal & use 2- Explain accessories required for distribution of air in different districts of underground	<b>18</b>
<b>26</b>		<b>PRT:</b> 1- Carryout Ventilation survey in the Training Mine tunnel (Level No.1) 2- Fix a door with regulator on exit or entrance and conduct the ventilation survey by change the size of the regulator	<b>18</b> <b>18</b>
		In a selected coal mine conduct ventilation survey from low level to high level	<b>18</b>

**PRACTICAL TRAINING**  
**3<sup>RD</sup> YEAR CLASS**

**SALT MINING**  
**WORKING DAYS**

**ACTIVITY**

Ist day		Shifting of compressor, pipes, augers, drill machines, tools etc. to the site (preparation of road + site if any for working)
2 <sup>nd</sup> day	<b>TH:</b> <b>PR:</b>	Explanation of salt mining, safety & security of working and explosive handling Installation of compressor, steel pipes and hose pipes.
3 <sup>rd</sup> day		Installation of pipes and electric lines Preparation of drilling, charging and blasting
4 <sup>th</sup> day to 11 <sup>th</sup> day		Practice of drilling, charging, blasting and loading of salt in to tubs by each student)
12 <sup>th</sup> day		Shifting of machinery back to Katas. Study of electric & Diesel loco

**SURFACE MINING**  
**LIME STONE QUARRYING**  
**WORKING DAYS**

**ACTIVITY**

Ist day		Shifting of compressor, pipes, wagon drill, jack hammers, picks, tools etc. to Lime Stone quarry site
2 <sup>nd</sup> day	<b>TH:</b> <b>PR:</b>	Explain surface Mining and Quarrying development of benches of Lime Stone, Safety, Security and explosive handling Explain angle of repose slope stability Preparation of drilling place. Installation of wagon drill and hose pipes
3 <sup>rd</sup> day	<b>TH:</b> <b>PR:</b>	Explain working and function of wagon drill compressor and their parts Practice study operation of compressor and wagon drill Start drilling practice with jack hammer
4 <sup>th</sup> day	<b>PR:</b>	Drilling practice with jack hammer & picking practice with pick hammer.
5 <sup>th</sup> to 11 <sup>th</sup> day	<b>PR:</b>	Drilling with wagon drill and jack hammer. Charging holes with high explosive (gelatinous and Anfo etc). Blasting I) single holes (ii) rows of holes together with a) Wabocord (b) Electric detonator Picking with pick hammer
12 <sup>th</sup> day		Cleaning faces for next working Shifting of machinery back to Katas

**VISIT TO THE MINES**  
**WORKING DAYS**

**ACTIVITY**

1st day to 7 <sup>th</sup> day	<b>TH:</b> <b>PR:</b>	Explain purpose and prevailing methods of working in coal mines Visit to nearby coal mines carrying out the exercise of coal cutting at face, loading into bags or tubes, transportation by haulage or conveyor etc. Conducting a ventilation survey of a small circuit: measuring quantity of air at in let and out let. At the end of every day trainees would present a report of their visit conducted.
8 <sup>th</sup> day to 12 <sup>th</sup> day	<b>TH:</b> <b>PR:</b>	Explain purpose and prevailing methods of working in the mines to be visited Explain report writing Visit to any of the following mines : i) Silica sand quarries ii) Dolomite/lime stone quarries iii) Visit of open pit mining iv) Fire clay quarries and mines

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|--|------------------------------------------------------------------------------------------------------------------------------------------|
|  | v) Gypsum quarries<br>vi) Marble / phosphate / china clay / gem stone or any other mine<br>vii) Dam / Rail / Road / Power supply tunnels |
|--|------------------------------------------------------------------------------------------------------------------------------------------|