

Curricular structure for Part –II (4thSem.) of the Full time Diploma Course in Mine Surveying

WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION											
TEACHING AND EXAMINATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES											
COURSE NAME-MINE SURVEYING											
DURATION OF COURSE- 6 SEMESTERS											
SEMESTER-FORTH, DURATION- SIXTEEN WEEKS											
Sl. No.	SUBJECT	CREDITS	PERIODS			EVALUATION SCHEME					
			L	TU	PR	Internal Scheme			ESE	PR	Total Marks
						TA	CT	Total			
1	MINING TECHNOLOGY	3+2=5	4		3	10	20	30	70	100	200
2.	BASIC SURVEYING-III	4+2=6	4		3	10	20	30	70	100	200
3.	ADVANCE SURVEYING-I	3+2=5	3		3	10	20	30	70	100	200
4	MINING GEOLOGY	3+2=5	4		3	10	20	30	70	100	200
5.	DEVELOPMENT OF LIFE SKILL-II	2	1		2					50	50
6	PROFESSIONAL PRACTICE-II	2			3					50	50
	Grand Total	25	16		17	40	80	120	280	500	900
STUDENT CONTACT HOURS PER WEEK:33 HOURS											
Theory and Practical period of 60 minutes each.											
L-Lecture, TU-Tutorials, PR-Practical, TA-Teacher's Assessment, CT-Class Test ,ESE-End Semester Exam											

SYLLABUS FOR MINING TECHNOLOGY

Name of the Course: Diploma in Mining Survey	
Subject: Mining Technology	
Subject Code: MNSR/S4/T1/MT	Semester: Forth
Duration: 6 months	Maximum Marks: 200
Teaching Scheme	Examination Scheme
Theory: 4 hours/week	Mid Semester Exam: 20 Marks
Tutorial: Nil	Attendance, Assignment & Interaction: 10 Marks
Practical: 3 hrs/week	End Semester Exam: 70 Marks
Credit:3+2= 5	Practical(Internal + External)= 50+50=100

Aim:

Sl. No.	
1.	To impart knowledge of mine environment and mine gases.
2.	To make students learn how to detect poisonous and inflammable gases present in mine air.
3.	To make them aware of the causes and preventive measures of spontaneous heating, mine fires, coal dust and firedamp explosion and inundation.
4.	To impart the knowledge of mine ventilation, its types and control of air current in the underground mine.

Objective:

Sl. No.	Upon successful completion of this syllabus students will be able to
1.	Develop idea about mine environment and mine gases.
2.	Learn how to detect poisonous and inflammable gases present in mine air.
3.	Understand and explain the causes and preventive measures of spontaneous heating, mine fires, coal dust and firedamp explosion and inundation.
4.	Understand and explain mine ventilation, its types and control of air current in the underground mine.
Pre-Requisite:	
Sl. No.	
1.	Basic knowledge of mining activities of a mine.
2.	Basic knowledge of physics and chemistry.

DETAIL COURSE CONTENT (THEORY)			
GROUP A		Hours/Unit	Marks
Unit 1	1. Mine gases 1.1 Different gases found in mines- their occurrences, properties physiological effects. 1.2 Detection of gases(overview)	12	
Unit 2	2. Mine explosion & Mine Fire 2.1 Firedamp explosion –causes & preventive measures. 2.2 Coal dust explosion- factors affecting coal dust explosion, causes & preventive measures 2.3 Spontaneous combustion-its causes & preventive measures. 2.4 Mine fires- Causes & methods of dealing, construction of fire stopping.	18	
GROUP B			
Unit 3	3. Inundation Causes of inundation by surface & underground water- preventive measures, construction & calculation of thickness of dam, method of approaching old water logged workings.	12	

Unit 4	4. Ventilation 4.1 Natural ventilation & motive column, laws of mine air friction. 4.2 Construction & uses of ventilation stopping, air-crossing , V-door, regulator & brattice partitions, equivalent orifice, air locks. 4.3 Homotropical & Antitropical ventilation, splitting of air current. 4.4 Numerical Problems on NVP, Ragulators & laws of mine friction.	22	
PRACTICAL Code: MNSR/S4/PI/MT			
	1. Study of Flame Safety Lamp , methanometers and CO detector. 2. Air measurement in a gallery by Anemometer. 3. Study and sketch of fire stopping with fittings 4. Model study of Bord and Pillar Method of working 5. Model study of Longwall Methods of working 6. Study of different types of hygrometer. 7. Study of Kata thermometer for measurement of cooling power.		

EXAMINATION SCHEME

GROUP	Unit	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1,2	13	ANY TWENTY	1	20 x 1 =20	FOUR	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	10	10 X 5 = 50
B	3,4	12				FOUR			

Name of Authors	Title of the Book	Name of the Publisher
D.J Deshmukh	Elements of Mining(Vol-II)	Vidyasewa Prakashan, Nagpur
D.J Deshmukh	Elements of Mining(Vol-II)	Vidyasewa Prakashan, Nagpur
R.D. Singh	Principles & Practices of Modern Coal Mining	New Age International
S. Ghatak	Winning & Working	Coal Field Publishers

SYLLABUS FOR BASIC SURVEYING-III

Name of the Course: Diploma in Mining Survey	
Subject: Basic Surveying-III	
Subject Code: MNSR/S4/T2/BS-III	Semester: Forth
Duration: 6 months	Maximum Marks: 200
Teaching Scheme	Examination Scheme
Theory: 4hours/week	Mid Semester Exam: 20 Marks
Tutorial: Nil	Attendance, Assignment & Interaction: 10 Marks
Practical: 3 hrs/week	End Semester Exam: 70 Marks
Credit: 4+2= 6	Practical(Internal + External)= 50+50=100

Aim:

Sl. No.	
1.	To impart introductory knowledge about different basic terminologies
2.	To impart knowledge of different leveling instruments and its accessories
3.	To impart ideas about different methods of leveling and profile making
4.	To impart concept of contouring
5.	To impart basic ideas of errors in surveying
6.	To impart knowledge about different types of error adjustment methods

Objective:

After successful completion of this syllabus students will be able to

1.	Describe different terminologies
2.	Explain different leveling instruments and its accessories
3.	Describe different methods of leveling , make profile
4.	Plot contour plan
5.	Describe ideas of errors in surveying
6.	Adjust error by various methods

Pre-Requisite: Elementary Mathematics, Engineering Drawing and Physics

DETAIL COURSE CONTENT (THEORY)			
GROUP A		Hours/Unit	Marks
Unit 1	<p align="center">LEVELLING</p> <p>1.1 Concept of levelling, uses of levelling, Definition of important terms used in levelling.</p> <p>1.2 Datum elevation, vertical angle, mean sea level and bench mark.</p> <p>1.3 Levelling Instruments- Different types- parts and function of dumpy level, and automatic level.</p> <p>1.4 Levelling staff- Self-reading staff and target staff, relative merits of self-reading and target staves.</p> <p>1.5 Sensitivity of spirit level- methods of determining sensitivity. Parallel plate micrometer.</p> <p>1.6 Tests and adjustments of dumpy level & tilting level.</p> <p>1.7 (i) Methods of levelling- Spirit levelling, (II)Special methods of spirit levelling- Details of differential levelling, profile levelling, cross-sectioning & reciprocal levelling and Precise levelling.</p> <p>(i) Methods of booking, calculation of reduced levels &plotting of level sections</p> <p>(ii) Recording and plotting of longitudinal section of an alignment.</p> <p>(iii) Levelling problems like taking level of an overhead point,</p> <p>(iv) Levelling in an inclined plane on surface and underground</p> <p>1.8 Sources of errors in levelling, precautions.</p>	25	

	2.1		
GROUP-B			
Unit 2	2.0 CONTOURING 2.1 Basic concept, contour interval. 2.2 Characteristics of contour. 2.3 Methods of locating contours. 2.4 Interpolation & extrapolation of contour. 2.5 Contour gradient. 2.6 Use of contour maps. 2.7 Locating the proposed route for a road on a contour map. 2.8 Establishing grade contours, stratum contour, isopachytes.	15	
GROUP-C			
Unit 3	3.0 ERROR ADJUSTMENT 3.1 Classification of errors. 3.2 Laws of accidental errors. 3.3 Most probable values of directly and indirectly observed independent quantities. 3.4 Least square. 3.5 Normal equation. 3.6 Method of co-relates.	24	
PRACTICAL Code: MNSR/S4/P2/BS-III			
1.0	Handling of dumpy level & automatic levels.		
2.0	Leveling across a roadway & plotting of the level section.		
3.0	Contouring of a given area by the method of gridding.		
4.0	Plotting the contour.		

EXAMINATION SCHEME

GROUP	Unit	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1	10	ANY TWENTY	1	20 x 1 =20	FOUR	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	10	10X5=50
B	2	7				THREE			
C	3	8				THREE			

Text/Reference Books:

Title of the Book	Name of Authors	Name of the Publisher
Surveying(Vol-I & II)	S.Duggal	Tata McGraw Hill
Surveying & Levelling	N. Basak	Tata McGraw Hill
Surveying & Levelling(Vol-I & II)	T.P Kanetkar	Pune Vidyarthi Griha Prakashan
Surveying(Vol-I & II)	Dr. K.R. Arora	Standard Book House
Surveying(Vol-I & II)	Dr. B.C. Punamia	
Plane Surveying	Alak De	S. Chand &Company

SYLLABUS FOR ADVANCE SURVEYING-I

Name of the Course: Diploma in Mining Survey	
Subject: ADVANCE SURVEYING-I	
Subject Code: MNSR/S4/T3/AS-I	Semester: Forth
Duration: 6 months	Maximum Marks: 200
Teaching Scheme	Examination Scheme
Theory: 3 hours/week	Mid Semester Exam: 20 Marks
Tutorial: Nil	Attendance, Assignment & Interaction: 10 Marks
Practical: 3 hrs/week	End Semester Exam: 70 Marks
Credit: 3+2=5	Practical(Internal + External)= 50+50=100

Aim:

Sl. No.	
1.	To impart introductory idea about Horizontal and Vertical angle measuring instrument
2.	To impart concept of different methods of angle measurement /traversing using Theodolite
3.	To impart ideas about the steps of Temporary/Permanent adjustment of theodolite
4.	To impart concept of Traverse Adjustment
5.	To impart basic ideas of the principle of tacheometric surveying
6.	To impart knowledge about finding out the horizontal distance and vertical RL difference in different terrain condition

Objective:

After successful completion of this syllabus students will be able to	
1.	Describe different parts of vernier theodolite with their use

2.	Explain different methods of angle measurement using theodolite
3.	Describe different methods of traversing using Vernier/Micro-optic Theodolite
4.	Calculate Partial and Total Co-ordinates of stations along with area using coordinates
5.	Explain different methods of traverse Adjustment
6.	Explain the principle of tacheometric surveying
7.	Describe the methods of finding out the tacheometric constants
8	Find out the horizontal/incline distance and RL of different stations using Tacheometric methods

Pre-Requisite: Mathematics, Engineering Drawing

DETAIL COURSE CONTENT (THEORY)			
GROUP A		Hours/Unit	Marks
Unit 1	Theodolite Survey: <ul style="list-style-type: none"> (a) Description of theodolite, function of its different parts. (b) Different terms when manipulating a transit theodolite. (c) Relations between fundamental lines. (d) Temporary adjustments of the theodolite. (e) Measurement of horizontal angles : - repetition method, reiteration method. (f) Measurement of vertical angles. (g) Prolonging a straight line. (h) Traversing with the theodolite by bearing and included angles. (i) Sources of error in theodolite work. (j) Traverse computation (k) Adjustment of closed traverse :- (i) Distribution of angular errors. (ii) Balancing the traverse by bowditch's rule and transit rule. (l) Computation of area of a closed traverse by DMD method only. (m) Computation of length and bearing from co-ordinates. (n) Testing and permanent adjustment of a transit theodolite. (o) Microptic Theodolite-Introduction and use 	28	

GROUP B			
Unit 2	Tacheometry	20	
	<p>Scope of tacheometric Survey.</p> <p>Principle of tacheometric Survey.</p> <p>Stadia and tangential system.</p> <p>Principle of stadia method.</p> <p>Determination of tacheometric constants.</p> <p>Anallatic lens.</p> <p>Distance and elevation formula – (i) Line of sight horizontal, (ii) Line of sight inclined.</p> <p>Relative merits of vertical and normal staff holding.</p> <p>Sources of error, accuracy of measurement.</p> <p>Problems on tacheometric survey.</p>		
PRACTICAL Code: MNSR/S4/P3/AS-I			
1.0	Handling of Vernier/Micro-optic Theodolite.		
2.0	Practical theodolite traverse survey in the field.		
3.0	Co-ordinate plotting of a closed traverse with transit theodolite.		
4.0	Determination of horizontal distances & vertical difference by tacheometric methods.		

EXAMINATION SCHEME

GROUP	Unit	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	<i>TO BE ANSWERED</i>	MARKS PER QUESTION	TOTAL MARKS
A	1	15	ANY TWENTY	1	20 x 1 = 20	FIVE	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	10	10 X 5 = 50
B	2	10				FOUR			

Text/Reference Books:

Title of the Book	Name of Authors	Name of the Publisher
Surveying(Vol-I & II)	S.Duggal	Tata McGraw Hill
Surveying & Levelling	N. Basak	Tata McGraw Hill
Surveying & Levelling(Vol-I & II)	T.P Kanetkar	Pune Vidyarthi Griha Prakashan
Surveying(Vol-I & II)	Dr. K.R. Arora	Standard Book House
Surveying(Vol-I & II)	Dr. B.C. Punamia	
Plane Surveying	Alak De	S. Chand &Company

SYLLABUS FOR MINING GEOLOGY

Name of the Course: Diploma in Mining Survey	
Subject: Mining Geology	
Subject Code: MNSR/S4/T4/MNG	Semester: Forth
Duration: 6 months	Maximum Marks: 200
Teaching Scheme	Examination Scheme
Theory: 4 hours/week	Mid Semester Exam: 20 Marks
Tutorial: Nil	Attendance, Assignment & Interaction: 10 Marks
Practical: 3 hrs/week	End Semester Exam: 70 Marks
Credit: 3+2=5	Practical(Internal + External)= 50+50=100

Aim:

Sl. No.	
1.	To impart introductory knowledge about geology and its branches
2.	To impart knowledge about general stratigraphy giving particular attention to certain Indian mineral/coal bearing zones
3.	To impart knowledge about general economic geology giving particular attention to certain Indian mineral/coal bearing zones
4.	To impart brief ideas about different geological mapping and prospecting methods

Objective:

After successful completion of this syllabus students will be able to	
1.	Describe the origin, age etc. about the earth
2.	Define terminologies used in different branches of geology

3.	Outline Geology of the Indian sub-continent in its historical perspective
4.	Identify different ore minerals and locate the occurrence of economically exploitable deposits in India with emphasis on coal
5.	Explain the principles of geological mapping and interpret them, also brief description of different methods of prospecting

Pre-Requisite: Basic knowledge of Geography, Plans and Maps.

DETAIL COURSE CONTENT (THEORY)			
GROUP A		Hours/Unit	Marks
Unit 1	<p>1. Basic Geology</p> <p>1.1 Brief idea about origin ,age & interior of the earth.</p> <p>1.2 Branches of geology</p> <p>1.3 Physical geology –definition of weathering, erosion and denudation.</p> <p>1.4 Definition of Crystal ,Rock & Mineral. Norms of crystal system, physical properties of mineral, important rock forming & economic mineral.</p> <p>1.5 Petrology-kinds of rock, their classification, forms of rock, characteristics with example.</p> <p>1.6 Structural geology-</p> <p style="padding-left: 40px;">a) Primary structure, definition of bedding, cross-bedding, current- bedding, graded bedding, ripple marks. Utility of studying primary structure.</p> <p style="padding-left: 40px;">b)Secondary structure- definition of dip, strike, fold, fault, joint & unconformity.</p>	18	
Unit 2	<p>2. Stratigraphy</p> <p>2.1 Stratigraphy; Principles of stratigraphy; Physiographic sub-divisions of India; Geological time scale –including Indian system;</p> <p>2.2 Precambrian stratigraphy(in brief) of the following regions of Indian sub-continent;</p>	12	

	<p>a) Karnatak</p> <p>b) Rajasthan</p> <p>c) Singbhum</p> <p>2.3 Stratigraphy of Gondwana system with special reference to lower Gondwana coal fields.</p>		
GROUP B			
Unit 3	<p>3. Economic Geology</p> <p>3.1 Definition of ores, Ore minerals, Gangue minerals, Tenor, Grade, Metallogenic epoch, Metallogenic province.</p> <p>3.2 Brief idea about the following processes (sedimentation, hydrothermal deposits, metasomatic replacement, cavity filling only) of formation of mineral deposits.</p> <p>3.3 Indian occurrences & ore minerals of the following mineral deposits; Iron, Manganese, Gold, Copper, Lead-Zinc, Bauxite, Petroleum.</p> <p>3.4 Brief geological idea about the following mineral deposits in India;</p> <p>a) Singbhum Copper & Iron ore deposit,</p> <p>b) Manganese deposit of Madhya Pradesh.</p> <p>c) Gold deposit of Karnataka.</p> <p>3.5 Coal : Definition- Coal, Rank and grade of coal. Origin and formation of coal. Indian occurrences of coal. Difference between Lower-Gondwana and Tertiary Coals., effects of intrusives of coal bearing horizons.</p> <p>3.6 Brief geological idea about the</p> <p>a) Jharia Coalfield.</p> <p>b) Ranigunj Coalfield.</p>	20	
Unit 4	<p>4. Geological Mapping and Prospecting.</p> <p>4.1 Definition- Contour map and Geological map. Recognition of the following structures: Horizontal, inclined and vertical beds, Folds, Faults, Unconformities, Dykes, silts on geological maps.</p>	14	

	4.2 Geological prospecting -Brief knowledge about Loaming, Huishing, Probing, Trenching, Trial pits, Diamond drilling and churn drilling. Name of the different geophysical prospecting methods only.		
PRACTICAL Code: MNSR/S4/P4/MNG			
	<p>1. Megascopic study of Minerals:</p> <p>Study of important Mineral in hand specimen in the laboratory under naked eyes with some minor aids:-</p> <p>Study of important “Rock- forming Minerals” including some ore-minerals</p> <p>2. Megascopic study of Rocks</p> <p>Study of Rocks in hand specimen under naked eyes with some minor aids</p> <p>Study of important common igneous rocks of acid-intermediate-basic & ultra basic varieties.</p> <p>Study of common varieties of sedimentary rocks particularly those occurring in the coalfields.</p> <p>3.Geological Maps</p> <p>(a) study of different codes and symbols generally shown in the geological maps of the “coalfields” and to recognize different stages thereof and some structures by their colors.</p> <p>(b) Recognize- simple folds, faults, unconformity igneous intrusions on geological maps of coalfields.</p> <p>(c) To draw section from simple geological maps having simple structures(above mentioned)</p> <p>(d) Description of simple type of geological maps.</p>		

EXAMINATION SCHEME

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A	1,2	13	ANY TWENTY	1	20 x 1 =20	FOUR	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	10	10 X 5 = 50
B	3,4	12				FOUR			

Title of the Book	Name of Authors	Name of the Publisher
A Text Book of Geology	P.K Mukherjee	The World Press Private Limited
Principle of Engineering Geology	K.M. Bangar	Standard Publication
A Text Book of Geology	G.B. Mahapatra	CBS Publishers & Distributors
Geology of India	D.N Wadia	Tata McGraw Hill

Syllabus for Professional Practice-II

Name of the Course: Diploma in Mining Survey	
Subject: Professional Practice-II	
Subject Code: MNSR/S4/P5/PP-II	Semester: Forth
Duration: 6 months	Maximum Marks: 50
Teaching Scheme	Examination Scheme
Theory: Nil	Mid Semester Exam:
Tutorial: Nil	Attendance, Assignment & Interaction: Continuous Assessment
Practical: 3 hrs/week	End Semester Exam:
Credit: 2	Internal : 25 External : 25

Aim:

Sl. No.	
1.	To assist students develop assertiveness, self confidence and good habits.
2.	Arrange counseling to generate interest and respect for the profession.
3.	Conduct seminar, group discussion and debate
4.	Motivate student for participation in Industrial training seriously

Objective:

After successful completion of this syllabus students will be able to	
1.	Enhance creativity, effectiveness and stress management skills.
2.	Set the goal for personal development.
3.	Face problems with confidence.

4.	Present given topic in seminar, group discussion and debate.
5.	Prepare report on Industrial Training and any other topic.

Pre-requisite:

1. Basic knowledge of attitude, behavior and self belief.
2. Knowledge of communicative language.
3. Basic knowledge of communication skill.

Professional Practice-II		Hours
Unit 1	<p>Industrial Visits:</p> <p>Structured industrial visits be arranged and report of the same should be submitted by the individual student to form part of the team work.</p> <p>Visits to any one of the following:</p> <ol style="list-style-type: none"> 1. Nearby underground coal mines with board and pillar method of working. 2. Nearby underground coal mines with longwall method of working. 3. Mechanized Surface mines. 	
Unit 2	<p>Lectures by Professional/Industrial Expert and Guest Faculty to be organized from any two of the following areas:</p> <ol style="list-style-type: none"> 1. Impact of mining on environment. 2. Methods of Mining. 3. Importance of surveying in mining fields. 	
Unit 3	<p>Group Discussion/Debate :</p> <p>Organizing Group Discussion and Debate in a group of five to ten students and preparing reports on the same.</p>	

	<p>Some of the suggested topics may be:</p> <ul style="list-style-type: none"> i) Current affairs ii) Any topic from the curriculum iii) Sports 	
<p>Unit 4</p>	<p>Student Activities:</p> <p>The students in a group of 3 & 4 will perform any one of the following activities:</p> <ul style="list-style-type: none"> i) Collect data about various Coal and Metal mines and their annual production in India. ii) Collect information about survey instruments and their uses. iii) Collect information about various mining machinery and their specifications. iv) Draw sketches of Board and Pillar method and Longwall method of mining. 	