

Curriculum structure for Part –III (3rd year) 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- Fifth, DURATION-NINE WEEKS											
SR. No.	SUBJECT	CREDITS	PERIODS			EVALUATION SCHEME					
			L	TU	PR	Internal Scheme			ESE	PR	Total Marks
						TA	CT	Total			
1	Advance Surveying-II	4+2=6	4	1	4	10	20	30	70	100	200
2	Modern Surveying	5+2=7	4	1	4	10	20	30	70	100	200
3	Mine Surveying-I	4+2=6	4		4	10	20	30	70	100	200
4	Land Laws and Mine Legislation	4	4			10	20	30	70		100
5	Professional Practice-III	2			3					100	100
	Grand Total	25	16	02	15	40	80	120	280	400	800

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

Note:

1. As per statutory provision of Directorate General of Mines Safety (DGMS) students have to undergo two months of Industrial Training after the completion of Part-II (Sem-IV) examination. Therefore, Industrial Training has been kept under the subject- **Professional Practice-III** and its syllabus has been framed accordingly.
2. Due to the two months of continuous Industrial Training, length of the session of Part-III (Semester-v) is reduced to **eight to nine weeks**. Therefore, weekly no. of periods for some important subjects has been increased to cover the syllabus properly.
3. **Total Marks-100** has been allotted to **Professional Practice-III** keeping in view the DGMS approval and importance of the Industrial Training for students of Mining Survey Dept.

SYLLABUS FOR ADVANCE SURVEYING-II

Name of the Course: Diploma in Mining Survey	
Subject: Advance Surveying-II	
Subject Code: MNSR/S5/T1/AS-II	Semester: Fifth
Duration: 6 months	Maximum Marks: 200
Teaching Scheme	Examination Scheme
Theory: 4 hours/week	Mid Semester Exam: 20 Marks
Tutorial: 1 hour/week	Attendance, Assignment & Interaction: 10 Marks
Practical: 4 hrs/week	End Semester Exam: 70 Marks
Credit: 4+2= 6	Practical(Internal + External)= 50+50=100

Aim:

Sl. No.	
1.	To impart basic knowledge of Triangulation, Trilateration and their Classification.
2.	To impart concept of triangulation figures and their strength.
3.	To develop skills of handling precise instruments and measuring baseline and angles.
4.	To make student able to differentiate between triangulation and trilateration.
5.	To make student able to solve numerical problems on triangulation and trilateration

Objective:

After successful completion of this syllabus students will be able to	
1.	Understand triangulation and trilateration methods.
2.	Explain different triangulation figures and their strength.
3.	handle precise instruments and measure baseline and angles

4.	differentiate between triangulation and trilateration.
5.	solve numerical problems on triangulation and trilateration.

Pre-Requisite: Mathematics, Engineering Drawing

DETAIL COURSE CONTENT (THEORY)			
GROUP A		Hours/Unit	Marks
Unit 1	Module 1 TRIANGULATION 2.1 Classification of triangulation system. 2.2 Triangulation figures. 2.3 Triangulation system adopted in India. 2.4 Strength of figure. 2.5 Selection of station. 2.6 Observation of horizontal angles. 2.7 Base line extension. 2.8 Stations. 2.9 Base line measurement. 2.10 Different types of application of triangulation survey. 2.11 Adjustment of different types of triangulation figure by equal shift method only. 2.12 Numerical problems.	25	
GROUP B			
Unit 2	TRILATERATION 2.1 Introduction 2.2 Use of Trilateration 2.3 Advantage and Disadvantage of Trilateration 2.4 Comparison of Trilateration with Triangulation 2.5 Geometrical figures used in Trilateration 2.6 Reconnaissance in Trilateration 2.7 Precision in Trilateration 2.8 Reduction of slope distance from vertical angles 2.9 Reduction of slope distance from elevations 2.10 Adjustment in Trilateration (Adjustment of a Braced Quadrilateral).	20	
PRACTICAL Code: MNSR/S5/P1/AS-II			

	<ol style="list-style-type: none"> 1 Triangulation survey over a suitable ground. 2 Base-line measurement. 3 Plotting of the area with necessary correction. 		
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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	13	ANY TWENTY	1	20 x 1 = 20	FIVE	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	10	10 X 5 = 50
B	2	12				FOUR			

Text/Reference Books:

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

SYLLABUS FOR MODERN SURVEYING

Name of the Course: Diploma in Mining Survey	
Subject: Modern Surveying	
Subject Code: MNSR/S5/T2/MDS	Semester: Fifth
Duration: 6 months	Maximum Marks: 200
Teaching Scheme	Examination Scheme
Theory: 4 hours/week	Mid Semester Exam: 20 Marks
Tutorial: 1hour/week	Attendance, Assignment & Interaction: 10 Marks
Practical: 4 hrs/week	End Semester Exam: 70 Marks
Credit: 4+2=6	Practical(Internal + External)= 50+50=100

Aim:

Sl. No.	
1.	To describe constructional features of EDM, Digital Level, Total Station and Global Positioning System.
2.	To explain the procedures and steps involved in measurement with these instruments.
3.	To impart knowledge about the uses of these instruments.
4.	To give elementary idea about Remote sensing, Electromagnetic radiation and Interaction mechanism.
5.	To impart knowledge of different types and requirements of sensors.
6.	To give idea about Application of Remote sensing.

Objective:

After successful completion of this syllabus students will be able to	
1.	Understand and describe constructional features of EDM, Digital Level, Total Station and Global Positioning System.
2.	Explain the procedures and steps involved in measurement with these instruments.
3.	Handle these instruments and take measurement.
4.	Understand the concept of Remote sensing, Electromagnetic radiation and Interaction mechanism.
5.	Explain different types and requirements of sensors.
6.	Apply the concept of Remote sensing in the field of 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: Basic Knowledge of Optics, Electronics and Electrical.

DETAIL COURSE CONTENT (THEORY)			
GROUP A		Hours/Unit	Marks
Unit 1	<p style="text-align: center;">MODERN SURVEY INSTRUMENTS</p> <p>1.1. Electronic distance measurer</p> <p style="padding-left: 20px;">1.1.1. Introduction</p> <p style="padding-left: 20px;">1.1.2. Basic definition</p> <p style="padding-left: 20px;">1.1.3. Measurement of Distance from of transit time</p> <p style="padding-left: 20px;">1.1.4. Measurement of Distance from of phase difference</p> <p style="padding-left: 20px;">1.1.5. Electro-Optical E.D.M. instruments</p> <p style="padding-left: 20px;">1.1.6. Infrared E.D.M. instruments</p> <p style="padding-left: 20px;">1.1.7. Effect of atmospheric condition</p> <p style="padding-left: 20px;">1.1.8. Atmospheric calibration of instruments</p> <p style="padding-left: 20px;">1.1.9. Slope and height correction</p> <p style="padding-left: 20px;">1.1.10. Use of E.D.M.</p> <p>1.2. Digital Level – introduction and use.</p>	25	

	1.3. Total station - introduction and use 1.4. Global positioning system - introduction and use		
GROUP B			
Unit 2	2.0 REMOTE SENSING 2.1 Introduction, Platforms for remote sensing, Electromagnetic radiation & Interaction mechanism, Wave theory and particle theory of electromagnetic radiation, Stefan –Boltzman law, Wein’s displacement law, Black body radiation. 2.2 Study of Electro- Optical sensors and optical infra-red sensors, Requirements of remote sensors, Photographic Camera, television Camera. 2.3 Spectral reflectance of vegetation, soil and water 2.4 Spectral reflectance of deciduous and coniferous trees .	20	
PRACTICAL Code: MNSR/S5/P2/MDS			
	1. Handling of Total Station 2. Handling of GPS		

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

Text/Reference Books:

Title of the Book	Name of Authors	Name of the Publisher
Advance Surveying-Total Station, GIS & Remote Sensing)	Satheesh Gopi	Pearson

Surveying(Vol-III)	Dr. K.R. Arora	Standard Book House
Remote Sensing and Image Interpretation	Thomas N Lillesand	John Wiley & Sons
Higher Surveying	Subramanyam	

SYLLABUS FOR MINE SURVEYING-I

Name of the Course: Diploma in Mining Survey	
Subject: Mine Surveying-I	
Subject Code: MNSR/S5/T3/MS-I	Semester: Fifth
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: 4 hrs/week	End Semester Exam: 70 Marks
Credit: 4+2=6	Practical(Internal + External)= 50+50=100

Aim:

Sl. No.	
1.	To give introductory idea about use of Mine Correlation.
2.	To explain different methods of Mine correlation in different geo-mining conditions.
3.	To impart ideas about the steps of Joint survey between two mines in different geo-mining conditions
4.	To impart concept of statutory provisions regarding joint survey between two mines
5.	To impart basic ideas of the principle of shaft surveying
6.	To impart knowledge about finding out the RL difference between shaft top and shaft bottom

Objective:

After successful completion of this syllabus students will be able to	
1.	Develop idea about Mine correlation and uses of correlation.

2.	Understand different methods of Mine correlation in different geo-mining conditions.
3.	Describe and apply steps of Joint survey between two mines in different geo-mining conditions .
4.	Understand statutory provisions regarding joint survey between two mines.
5.	Develop idea about types and technique of measurement in shaft surveying.

Pre-Requisite: Basic knowledge of Mathematics, Physics and Engineering Drawing.

DETAIL COURSE CONTENT (THEORY)			
GROUP A		Hours/Unit	Marks
Unit 1	<p>1.0 Mine Correlation</p> <p>1.1. Definition & purpose of mine correlation.</p> <p>1.2 Different methods of correlation- Direct traversing through incline, Direct orientation by Optical methods, Orientation by wires in two shafts, correlation by wires in a single vertical shaft, co-planning or approximate alignment, weisbach method & weiss quadrilateral method, magnetic method.</p> <p>1.3 Gyroscopic method of correlation..</p> <p>1.4 Laser –Gyro method of shaft Correlation</p> <p>1.5 Sources of errors in correlation & permissible errors</p> <p>1.6 Numerical problems</p>	20	
GROUP B			
Unit 2	<p>2.0 Joint Survey</p> <p>2.1 Definition of Joint Survey</p> <p>2.2 Main features shown/Contents of joint survey plan</p> <p>2.3 Utility of joint survey</p> <p>2.4 Instruments required& Procedure of Joint Surveying when (a) both the mines have shafts (b) both the mines have inclines (c) one having shaft and other having incline mode of</p>	14	

	entry 2.5 Execution of joint survey work 2.6 Precautions to be taken during joint survey work 2.7 Permissible limit of error in surface and underground correlation survey 2.8 Statutory Provisions		
GROUP C			
Unit 3	1.0 Shaft Survey Choice of plumb wires and plumb- bob ; determination of mean position of swing, Keeping a sinking shaft (down ward and upward) vertical; Inclined shafts- making and position of stations, setting up of instruments in the incline shaft.	12	
PRACTICAL			
	1. Correlation of surface & underground survey. 2. Plotting of the correlation survey.		

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	10 X 5 = 50
B	2	8				THREE			
C	3	7				THREE			

Text/Reference Books:

Title of the Book	Name of Authors	Name of the Publisher
Surveying(Vol- II)	Dr. K.R. Arora	Standard Book House
Plane Surveying	Alak De	S. Chand &Company
Coal Mining Practice	I.C.F Statham	Caxton
Coal Mining	Mason Series	

Mine Surveying and Leveling	S.Ghatak	Coal field Publication
Coal Mines Regulation-1957	DGMS	

SYLLABUS FOR LAND LAWS AND MINE LEGISLATION

Name of the Course: Diploma in Mining Survey	
Subject: Land Laws and Mine Legislation	
Subject Code: MNSR/S5/T4/LLML	Semester: Fifth
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 4 hours/week	Mid Semester Exam: 20 Marks
Tutorial: Nil	Attendance, Assignment & Interaction: 10 Marks
Practical: NIL	End Semester Exam: 70 Marks
Credit: 4	

Aim:

Sl. No.	
1.	To impart introductory idea about Provisions of Land Acquisition Act 1894
2.	To impart introductory idea about Provisions of MINES & MINERALS (REGULATION & DEVELOPMENT) ACT, 1957
3.	To impart introductory idea about Provisions of Mines Act 1952
4.	To impart introductory idea about Provisions of Mines Rules 1955
5.	To impart introductory idea about Provisions of Coal Mines Regulations 1957
6.	To impart introductory idea about Provisions of Metaliferous Mines Regulations 1962

Objective:

After successful completion of this syllabus students will be able to	
1.	Explain the provisions as laid down under Land Acquisition Act 1894
2.	Explain the provisions as laid down under MINES & MINERALS (REGULATION & DEVELOPMENT) ACT, 1957

3.	Explain the provisions as laid down under MINES ACT, 1952
4.	Explain the provisions as laid down under MINES Rules, 1955
5.	Explain the provisions as laid down under COAL MINES REGULATION, 1957
6.	Explain the Provisions of Metaliferous Mines Regulations 1962

Pre-Requisite: NIL

DETAIL COURSE CONTENT (THEORY)			
GROUP A		Hours/Unit	Marks
Unit 1	<p>1.1. LAND ACQUISITION ACT 1894 Land Acquisition Act, 1894. Section – 1,4,5,6,7,8,9(1), 16, 17(1), 35</p> <p>1.2. MINES & MINERALS (REGULATION & DEVELOPMENT) ACT, 1957 Sec-3 – Definition. Sec-4 to 11 – Salient Provisions.</p>	16	
GROUP B Mine Legislation			
Unit 2	<p>2.1 Mines Act -1952 & Mines Rules-1955: Definitions: Adult, Mine, Minerals, Open cast working, Reportable injury, Serious bodily injury, Week etc. Main provisions like hours and limitations of employment, leave with wages.</p> <p>2.2 Coal Mines Regulations 1957 & Metaliferous Mines Regulations 1961 (a) Definitions: Coal, Committee, explosive, face, fiery seam, flame proof apparatus, goaf , inset, misfire, competent person, incline, shaft, winze or raise</p> <p>Provisions regarding (a)notice of abandonment or discontinuance (b) Notice of Reopening ©Appointment of surveyors (d) Duties and responsibilities of surveyor (e) general requirement about mine plans (f)Types of plan (g) Copies of plans and sections to be submitted (h) Copies of plans and sections to be submitted after abandonment or discontinuance (i)Survey instruments and materials</p>	20	

	(j) List of plans, sections and instruments and their storage (k) Preparation of plans by surveyors (l) Plans to be checked on change of ownership or on reopening etc.		
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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 TWO FROM EACH GROUP	10	10 X 5 = 50
B	2	15				FIVE			

Text/Reference Books:

Title of the Book	Name of Authors	Name of the Publisher
Land Acquisition Act-1894		
Mines and Minerals(Regulation and Development) Act-1957		
Coal Mines Regulation-1957		
Metaliferous Mines Regulation-1961		
Mines Act-1952		
Mines Rules-1955		

Syllabus for Professional Practice-III

Name of the Course: Diploma in Mining Survey	
Subject: Professional Practice-III	
Subject Code: MNSR/S5/P4/PP-III	Semester: Fifth
Duration: 6 months	Maximum Marks: 100
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 + External = 50+50 =100

Objective:

This subject contains two months continuous training in different coal and metal mines. Students will be able to develop concept about mines and their different activities. The following topics will guide them to understand different types of surveying and related measuring instruments. After completion of field training, through theoretical and practical classes, they will be guided to prepare the training report and present seminar.

SL.NO.	Topics to be covered
1	Curves in the underground haulage track, their position, designations with dimension. Methods adopted to set out levels in underground mines(in details), difficulties faced in underground curve setting, how the problems were overcome.
2	Whether any survey work done in the shaft/ incline during your training period in that mine. If yes, then details of it. How the direction and gradient is maintained in the roadways and drivages. Centre line making and extension, volume calculation from face.
3	Whether triangulation done in the mine or not. If yes, then collect data

	regarding base line measurement. Get information about method of tringulation adopted, type of measurement of horizontal angles etc.
4	Combined surface plan, ventilation plan, water dam, working plan, dust plan, sampling plan, joint survey plan, and sectional view of prospecting borehole, study and collection of hand plan, super imposition of surface and underground plan.
5	Types of curves set in the mine, methods adopted, angle of deflection radius, super elevation.
6	Overview of correlation survey and joint survey. In case subsidence survey station fixing, interval of station , machine used and data collection and monitoring.
7	Organisational structure, various departments, incentive scheme(if any), Wages structures(nominal, real, living, minimum, fair, fall back).
8	Different statistical data of the mine related to depth, seam thickness, dip, geological disturbances, grade of coal, a brief history of the mine- related to opening, method of work etc. or any special feature exist in the mine.
9	Details of safety management(safety committee, internal safety organisation, workmen inspector, safety campaign etc.), Accident statistics of mine, details of an accident.