

Curricular structure for Part –III (6th Sem.) 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- SIXTH, SEMESTER DURATION- 16 WEEKS											
SR. No.	SUBJECT	CREDITS	PERIODS			EVALUATION SCHEME					
			L	TU	PR	Internal Scheme			ESE	PR	Total Marks
						TA	CT	Total			
1	Advance Surveying-III	3	4			10	20	30	70		100
2	Mine Surveying-II	4	4	1		10	20	30	70		100
3	Mine Surveying-III	4+2=6	4		3	10	20	30	70	50	150
4	Estimation and Contract	3	4			10	20	30	70		100
5	Computer Application in Surveying	2			4					100	100
6	Professional Practice-IV	2			3					50	50
7	Project	3			6					200	200
8	Viva Voce	2								100	100
	Grand Total	25	16	1	16	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 ADVANCE SURVEYING-III

Name of the Course: Diploma in Mining Survey	
Subject: Advance Surveying-III	
Subject Code: MNSR/S6/T1/AS-III	Semester: SIXTH
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 4hours/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 basic knowledge of Photogrammetry and terminology used in it.
2.	To impart basic knowledge of Astronomy and terminology used in it.
3.	To get students learn classification of Photogrammetry, Steps and methods involved in Photogrammetry and scope of measurement by this method.
4.	To make students learn application of Astronomy and different methods of determination of True North.
5.	To make students able to solve problems on Photogrammetry and Astronomy.

Objective:

After successful completion of this syllabus students will be able to	
1.	Understand basics of Photogrammetry.
2.	Understand basics of Astronomy.

3.	Distinguish between different methods of Photogrammetry and Astronomy.
4.	Develop skill of applying these methods during measurement.
5.	Solve numerical problems on Photogrammetry and Astronomy.

Pre-Requisite: Basic knowledge of Mathematics, Engineering Drawing

DETAIL COURSE CONTENT (THEORY)			
GROUP A		Hours/Unit	Marks
Unit 1	1.0 Photogrammetry 1.1. Scope, importance & different type of photogrammetry surveying 1.2. Principles of terrestrial photogrammetry :- Different methods adopted: (1) Graphical method (2) Analytical method, Stereo photogrammetry & field work; Elementary idea about photogrammetry surveying. 1.3. Aerial photogrammetry, Flying photography, Ground controls & compilation or mapping. Elementary ideas of instruments used in aerial surveying such as : (a) Aeroplane (b) Aerial camera (c) Accessories required for interpretation & plotting. 1.4. Terminology used in Aerial photogrammetry like perspective centre, plumb points, principal points, Isocentres, principal plane. Horizontal Trace & plate parallels, Scales & Distortion of the vertical photograph, Distortion of the vertical photograph, Distortion due to height or relief, Scale & Distortion of the oblique photograph.	35	
GROUP B			
Unit 2	2.0 Astronomical Survey 2.1 Application, the celestial sphere, Astronomical terms- Celestial sphere, zenith ,nadir, equator, horizon, hour circle, vertical circle, latitude, altitude, declination, co-latitude, co-altitude, co-declination, vernal equinox, autumnal equinox, ecliptic, celestial poles, zenith distance, polar distance, prime vertical, astronomical triangle, spherical excess.	30	

	<p>2.2 Method of determination of True North by-</p> <p>(i) Equal Altitude Method of Stars (ii) Equal Altitude Method of Sun (iii) Extra Meridian Method</p> <p>2.3 Numerical problems on meridian calculation of azimuth from latitude, altitude and declination. Zenith distance calculation.</p>		
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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
Advanced Surveying	R.Agor	Khanna Publisher
Surveying & Levelling(Vol- II)	T.P Kanetkar	Pune Vidyarthi Griha Prakashan
Surveying(Vol- III)	Dr. K.R. Arora	Standard Book House
Higher Surveying	A M Chandra	New age International

SYLLABUS FOR MINE SURVEYING-II

Name of the Course: Diploma in Mining Survey	
Subject: Mine Surveying-II	
Subject Code: MNSR/S6/T2/MS-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: NIL	End Semester Exam: 70 Marks
Credit: 4	

Aim:

Sl. No.	
1.	To impart basic knowledge of subsidence and its magnitude.
2.	To explain methods of conducting subsidence survey.
3.	To impart introductory knowledge of stope surveying.
4.	To explain methods of conducting stope surveying under different lode conditions.
5.	To impart knowledge of survey of Box cut /trench
6.	To impart knowledge about survey of stripping ratio, haul road, contour gradient etc.

Objective:

After successful completion of this syllabus students will be able to	
1.	Understand different parameters of subsidence monitoring.
2.	Explain different types of Subsidence records, plans & sections.

3.	Explain requirement of stope survey
4.	Explain different methods of stope survey
5.	Describe steps of preparing stope plans
6.	Explain the requirement of survey in different stages of opencast working
7.	To explain the method of survey of stripping ratio, haul road, contour gradient etc.

Pre-Requisite: Basic knowledge of Mathematics, Engineering Drawing

DETAIL COURSE CONTENT (THEORY)			
GROUP A		Hours/Unit	Marks
Unit 1	1.0 Subsidence Survey 1.1 Terms relating to subsidence survey, subsidence observation within affected area, overall subsidence effects, control points, formation of pillars, periodical observations, subsidence trough, determination of angle of draw, subsidence curvature, critical area of extraction, sub-critical area of extraction & super-critical area of extraction ; method of conducting subsidence survey. 1.2 Subsidence records, plans & sections.	20	
GROUP B			
Unit 2	2.0 Stope Survey 2.1 Introduction to stope survey; necessity, requirements & purpose of stope survey; instruments required in stope survey; 2.2 Methods of stope survey-(a) Tape triangulation (b) Tying method (c) Ray method, (d) Shrinkage stope survey (e) Rill stope survey 2.3 Preparation Of stope plans, plotting the stope station, plotting the faces, transfer of stope faces to the Mine plan.	20	
GROUP C			
Unit 3	3.0 Opencast Survey 3.1 Survey to know ground profile in all directions, positioning of access Trench & maintenance of direction	25	

	& gradient of access Trench; locating Box-Cut position & Quarriable limit line. 3.2 Survey for determination of volume of overburden & mineral calculation of stripping ratio; volume & quantity survey of OB dumps & coal heaps, survey for maintenance of benches, survey for haul road, contour gradient & contour benching.		
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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	8	ANY TWENTY	1	20 x 1 =20	THREE	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	10	10 X 5 = 50
B	2	8				THREE			
C	3	9				FOUR			

Text/Reference Books:

Title of the Book	Name of Authors	Name of the Publisher
Surveying(Vol- II)	S.Duggal	Tata McGraw Hill
Mine surveying and Levelling(Vol-I)	S. Ghatak	Coalfield Publisher
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	
Plane Surveying	Alak De	S. Chand &Company
Advance Surveying	R.Agor	Khanna Publisher
Higher Surveying	A M Chandra	New age International

SYLLABUS FOR MINE SURVEYING-III

Name of the Course: Diploma in Mining Survey	
Subject: Mine Surveying-III	
Subject Code: MNSR/6/T3/MS-III	Semester: Sixth
Duration: 6 months	Maximum Marks: 150
Teaching Scheme	Examination Scheme
Theory: 4 hours/week	Mid Semester Exam: 20 Marks
Tutorial: NIL	Attendance, Assignment & Interaction: 10 Marks
Practical: 3 hours/week	End Semester Exam: 70 Marks
Credit: 6	Practical(Internal + External)= 25+25

Aim:

Sl. No.	
1.	To impart basic knowledge about curves and their importance in Route Surveying.
2.	To explain different methods of setting out simple curves.
3.	To impart knowledge of transition curve and its characteristics, vertical curve and it's characteristics.
4.	To make students able to solve problems on simple curve, transition curve and vertical curve.
5.	To make students able to solve problems on Dip, fault, borehole and coal stock measurement
6.	To impart knowledge about steps of tunnel surveying

Objective:

After successful completion of this syllabus students will be able to	
1.	Understand different types of curves.

2.	Explain different methods of setting out simple curve.
3.	Distinguish between different types of curves.
4.	Solve numerical problems on simple curve and transition curve.
5.	Solve numerical problems on Dip, fault, borehole and coal stock measurement
6.	Explain the steps involved in tunnel surveying and solve numerical problems related thereto.

Pre-Requisite: Basic knowledge of Mathematics, Engineering Drawing

DETAIL COURSE CONTENT (THEORY)			
GROUP A		Hours/Unit	Marks
Unit 1	<p style="text-align: center;">CURVE</p> <p>1.1 Definition of curve. 1.2 Classification of curve. 1.3 Elements of curve.</p> <p>1.4 Designation of curve. 1.5 Relation between radian and degree. 1.6 Methods of curve ranging :- 1.6.1 Location of tangent points 1.6.2 Setting out of curve by chain or tape. 1.6.3 Setting out of curve by ordinates or offsets from long chord, 1.6.4 Setting out of curve by offsets from tangent. 1.6.5 Setting out of curve by offsets from chords produced. 1.6.6 Setting out of curve by deflection angles(Rankine's method). 1.6.7 Setting out of curve by two theodolites method. 1.6.8 Method of calculation when curve start and end with subchords. 1.7 Elements of compound curve. 1.8 Problems on simple curve. 1.9 Transition curve :- (i) Definition of transition curve, (ii) Super elevation, (iii) Characteristic of transition curve. 1.10 Vertical curves 1.10.1 Characteristic of vertical curve.</p>	25	
GROUP B			

<p>Unit 2</p>	<p>Dip, Strike & Fault Problem:</p> <p>2.1 Dip and strike problems- Types of Dip and derivation of the formula used to connect true dip, apparent dip & included angles.</p> <p>2.2 Problems on drift, fault and percentage extraction of pillars.</p> <p>2.3 Calculation of amount and direction of dip of stratified deposits by borehole.</p> <p>2.4 Coal Stock Measurement</p>	<p>17</p>	
<p>Unit 3</p>	<p>3. Tunneling</p> <p>3.1 Definition of tunnel, types of tunnels</p> <p>3.2 Tunnel surveying and operations involved in tunnel surveying:</p> <p>3.2.1. Surface surveys or staking out the alignment of the tunnel.</p> <p>3.2.2. Underground surveys.</p> <p>3.2.3. Transferring the surface alignment through a shaft.</p> <p>3.2.4. Transferring the levels underground.</p> <p>3.3 Numerical problems on operations of tunnel surveying.</p>	<p>10</p>	
<p>PRACTICAL Code: MNSR/S6/P1/MS-III</p>			
	<ol style="list-style-type: none"> 1. Setting out of curve by ordinates or offsets from long chord, 2. Setting out of curve by offsets from chords produced. 3. Setting out of curve by deflection angles (Rankine's method). 4. Setting out of curve by two theodolites method 		

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	12	ANY TWENTY	1	20 x 1 =20	FOUR	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	10	10 X 5 = 50
B	2	6				THREE			
C	3	7				THREE			

Text/Reference Books:

Title of the Book	Name of Authors	Name of the Publisher
Surveying(Vol- II)	S.Duggal	Tata McGraw Hill
Mine surveying and Levelling(Vol-I)	S. Ghatak	Coalfield Publisher
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	
Plane Surveying	Alak De	S. Chand &Company
Advanced Surveying	R.Agor	Khanna Publisher
Higher Surveying	A M Chandra	New age International

SYLLABUS FOR ESTIMATION AND CONTRACT

Name of the Course: Diploma in Mining Survey	
Subject: Estimation and Contract	
Subject Code: MNSR/S6/T4/E&C	Semester: SIXTH
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 4hours/week	Mid Semester Exam: 20 Marks
Tutorial : Nil	Attendance, Assignment & Interaction: 10 Marks
Practical: NIL	End Semester Exam: 70 Marks
Credit: 3	

Aim:

Sl. No.	
1.	To impart basic knowledge about Estimation and Contracts and their importance.
2.	To estimate building materials for the construction of stoppings, barriers and lining of shaft and roadways.
3.	To impart knowledge about specifications and types of different building materials.
4.	To impart knowledge about concept of foundation and its objective.
5.	To explain different types of civil contracts, contract documents and tender notice etc.

Objective:

After successful completion of this syllabus students will be able to	
1.	Understand and explain Estimation and Contracts and their importance.
2.	Develop idea about Estimation and Contracts and their importance.

3.	Estimate building materials for the construction of stoppings, barriers and lining of shaft and roadways.
4.	explain different types of civil contracts, contract documents and tender notice etc.
5.	explain different types of civil contracts, contract documents and tender notice etc.

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

DETAIL COURSE CONTENT (THEORY)			
GROUP A		Hours/Unit	Marks
Unit 1	<p>Estimation:</p> <p>1.1 Different types of estimates, importance of approximate estimate.</p> <p>1.2 Estimation for Brick walls</p> <p>1.3 Building materials</p> <p>1.3.1 Bricks-Classification, quality requirement, normal clay burnt bricks, fireclay bricks, refractory bricks</p> <p>1.3.2 Sand-Classification with respect to grain size, characteristics of good quality sand, function of sand in mortar</p> <p>1.3.3 Different types of cement:Rapid Hardening cement, slag cement, pozzolona cement, sulphate resisting cement, stacking and storing of cement, field test for cement</p> <p>1.3.4 Mortar: Cement-sand mortar- usual proportion and specific use</p> <p>1.3.5 Concrete: Definition and chief ingredients of cement concrete-coarse and fine aggregates, quality and recommended size, grades of concrete and their specific use</p> <p>1.3.6 Brick Masonary - Technical terms used in brick masonry -Bonding- Different types of bonding-their use in specific location</p> <p>1.3.7 Foundation-Concept of foundation, object of foundation, determination of width and depth of foundation, causes of failure of foundation</p>	40	
GROUP B			
Unit 2	<p>CONTRACT</p> <p>2.1 Definition of tender and contract, Different types of Civil Engineering contracts.</p> <p>2.2 Contract documents</p>	25	

	2.3 Clauses of general condition of contract 2.4 Tender Notice 2.5 Comparative statement and acceptance of tender 2.6 Costing		
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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	15	ANY TWENTY	1	20 x 1 = 20	SIX	FIVE, TAKING AT LEAST ONE 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
Building Construction	Sushil Kumar	Standard Publishers Distributors

Syllabus for Professional Practice-IV

Name of the Course: Diploma in Mining Survey	
Subject: Professional Practice-IV	
Subject Code: MNSR/S6/P2/PP-IV	Semester: Sixth
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. 4. Nearby metalliferous 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. Method to combat environmental hazards due to mining activities. 2. Latest technological advancement in the field of mining survey. 3. Application of Remote sensing and GIS in the field of Mining Survey. 	

	4. Application of Computer in the area of surveying.	
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 	
Unit 4	<p>Student Activities:</p> <p>The students in a group of 3 or 4 will perform any one of the following activities:</p> <ul style="list-style-type: none"> i) Collect survey data about various Coal and Metal mines ii) Collect information about latest survey instruments along with their specifications and uses. iv) Draw simple circular curve with given data 	

Syllabus for Project

Name of the Course: Diploma in Mining Survey	
Subject: Project Work	
Subject Code: MNSR/S6/P3/PROJ	Semester: Sixth
Duration: 6 months	Maximum Marks: 200
Teaching Scheme	Examination Scheme
Theory:	Mid Semester Exam:
Tutorial	Attendance, Assignment & Interaction: Continuous evaluation.
Practical: 6hours/week	End Semester Exam:
Credit: 3	Internal + External =100+100=200

OBJECTIVE

Project Work is intended to provide opportunity for students to develop understanding of the interrelationship between different courses learnt in the entire diploma programme and to apply the knowledge gained in a way that enables them to develop & demonstrate higher order skills. The basic objective of a project class would be to ignite the potential of students' creative ability by enabling them to develop something which has social relevance, aging, it should provide a taste of real life problem that a diploma-holder may encounter as a professional. It will be appreciated if the polytechnics develop interaction with local industry and local developmental agencies viz. different *Panchayet* bodies, the municipalities etc. for choosing topics of projects and / or for case study. The course further includes preparation of a Project Report which, among other things, consists of technical description of the project. The Report should be submitted in two copies, one to be retained in the library of the institute. The Report needs to be prepared in computer using Word and CADD software wherever necessary.

. **Seminar on Project Work** is intended to provide opportunity for students to present the Project Work in front of a technical gathering with the help of different oral, aural and visual communication aids which they learnt through different courses in the Parts – I & II of the diploma course. In the Seminar, students are not only expected to present their Project Work, but also to defend the same while answering questions arising out of their presentation.

GENERAL GUIDELINE

Project Work is conceived as a group work through which the spirit of team building is expected to be developed. Students will be required to carry out their Project Works in groups under supervision of a lecturer of their core discipline who will work as a Project Guide. It is expected that most of the lecturers of the core discipline will act as project guide and each should supervise the work of at least two groups. Number of students per group will vary with the number of lecturers acting as Project Guide and student strength of that particular class.

In the **Part – III Second Semester** for the first twelve weeks, the five sessional periods allocated to ‘Project Work’ along with the one sessional period allocated to ‘Seminar on Project Work’ will be together utilised for **Project work**; whereas in the last three weeks, all these six sessional periods allocated to ‘Project Work’ and ‘Seminar on Project Work’ will be utilised for performing **Seminar**. In ‘Seminar’ classes, all the teachers who are involved with imparting knowledge and skill to the students in their “Project” classes should participate along with all the students.

VIVA- VOCE

Subject Code	Course offered in	Full Marks
MNSR /S 6 / P4 / VIVA	Part – III, Sixth Semester	100

COURSE CONTENT

The syllabi of all the theoretical and sessional subjects taught in the three years of diploma education.

EXAMINATION SCHEME

The Final Viva-Voce Examination shall take place at the end of the Part – III Second Semester. It is to be taken by one External and one Internal Examiner. The **External Examiner** is to be from Industry / Engineering College / University / Government Organisation and he / she should give credit out of **50 marks**; whereas, the **Internal Examiner** should normally be the Head of the Department and he / she should give credit of **50 marks**. In the absence of the Head of the Department the senior most lecturer will act as the Internal Examiner.