

**Programme** : **Diploma in CE**  
**Programme Code** : **01 /15**  
**Name of Course** : **Design of Steel Structures**  
**Course Code** : **AM 764**

**Teaching Scheme:**

	<b>Hours /Week</b>	<b>Total Hours</b>
<b>Theory</b>	<b>04</b>	<b>64</b>
<b>Practical</b>	<b>02</b>	<b>32</b>

**Evaluation Scheme:**

	<b>Progressive Assessment</b>	<b>Semester End Examination</b>			
		<b>Theory</b>	<b>Practical</b>	<b>Oral</b>	<b>Term work</b>
<b>Duration</b>	Two class tests, each of 60 minutes	<b>03Hrs.</b>	--	--	--
<b>Marks</b>	<b>20</b>	<b>80</b>	--	<b>25</b>	<b>25</b>

**Course Rationale:**

In the previous course, the students studied analysis and design of RCC structures. In this course, the students will study elements of steel structures. They will be introduced to basic structural steel elements – structural connections, tension members, compression members, column bases, and roof trusses along with the concepts of their designs.

**Course Objectives:**

After studying this course, student will be able to :-

- Know different rolled steel section, their properties and use
- Understand different geometries of roof trusses suitable for different spans.
- Estimate different loads coming on members and design them along with their connections

**Course Content:**

Chapter No.	Name of Topic/Sub topic	Hrs	Weightage
<b>SECTION-I</b>			
<b>1</b>	<b>Introduction</b>		
	1.1	Different Rolled steel sections, their use and designation.	<b>02</b>
	1.2	Sectional properties of rolled steel sections, use of steel table.	
	1.3	Types of loads on the structures. Relevant IS codes.	
<b>2</b>	<b>Welded Joints</b>		
	2.1	Introduction to riveted joints, welded joints.	<b>06</b>
	2.2	Types of welded joints and their symbols.	
	2.3	Strength of fillet weld, standard specifications.	
	2.4	Design of a fillet welded joint for connecting tie plates, single and double angle sections to the gusset plate. (No questions on riveted joints and welded connection subjected to moments to be asked in the examination.)	
<b>3</b>	<b>Tension Members</b>		
	3.1	Tie member, permissible stress in axial tension, net effective area, capacity calculations.	<b>12</b>
	3.2	Design of a tension member using single, double equal and unequal angles, T-sections and channel sections connected by riveting and welding.	
	3.3	Tack rivets and welds for tie and their pitch.	
<b>4</b>	<b>Compression Members</b>		
	4.1	Forms of compression members,	<b>12</b>
	4.2	Buckling, end conditions, effective length, radius of gyration, slenderness ratio, permissible stress in axial compression and load carrying capacities of columns and struts of roof trusses.	
	4.3	Design of columns using I, channel sections. Built up columns, introduction to lacing and battening.	
	4.4	Design of struts in a roof truss using single & double equal angles. Relevant IS clauses.	

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<b>SECTION-II</b>				
<b>5.</b>	<b>Column bases</b>			
	5.1	Types of bases, permissible bearing pressure on concrete	<b>05</b>	<b>06</b>
	5.2	SBC of soil, upward soil reaction		
	5.3	Design of slab base, design of concrete pedestal. Introduction to gusseted base. (No problems on design of gusseted base to be asked in the examination.)		
<b>6.</b>	<b>Analysis of Roof truss</b>			
	6.1	Types of roof trusses, components of trusses & suitability of trusses for different spans.	<b>12</b>	<b>16</b>
	6.2	Different loads acting on a roof truss.		
	6.3	Calculation of panel point load on a roof truss under dead load, live load and wind load as per provisions made in IS- 875.		
	6.4	Analysis of a simple roof truss for given panel point loads and load combinations.		
	6.5	Design of angle iron purlin for a roof truss as per IS-800. Details of rafter purlin joint.		
<b>7.</b>	<b>Beams</b>			
	7.1	Permissible stresses in steel in bending tension & bending compression, concept of laterally restrained beams.	<b>07</b>	<b>08</b>
	7.2	Design of laterally restrained beams for given loading.		
	7.3	Checks for bending stresses, shearing stresses & deflection as per IS-800.		
<b>8.</b>	<b>Simple framed connections</b>			
	8.1	Design of framed connection using fillet welds for Secondary beam to main beam, beam to column for end reaction. Check for shear.	<b>05</b>	<b>06</b>
<b>9.</b>	<b>Introduction to Plate girders</b>			
	9.1	Components of riveted and welded plate girder,	<b>03</b>	<b>04</b>
	9.2	Necessity of stiffeners and their functions.		
	9.3	Advantages of welded plate girder over riveted plate girder.		
<b>Total</b>			<b>64</b>	<b>80</b>

**List of Practicals/Experiments/Assignments:**

Sr. No.	Name of Experiment/Assignment	Hrs
6.	Plate No. 1- Geometrical properties of R. S. sections.	02
7.	Plate No. 2- Types of welds and welding symbols.	02
8.	Plate No. 3- Net effective areas.	02
9.	Assignment No.1- Prob. on L. C. C. and design of tension members.	04
10.	Plate No.4- Eff. Lengths for diff. end conditions.	02
11.	Plate No.5- Lacing and battening.	02
12.	Assignment No.2- Prob. on L. C. C. and design of compression members.	04
13.	Plate No. 6- Slab base details.	02
14.	Plate No. 7- Details of gusseted base.	02
15.	Plate No. 8- Types of trusses for diff. spans.	02
16.	Assignment No.3- Prob. on panel point DL, LL & WL.Prob. on design of angle iron purlins .	02
17.	Assignment No.4- Prob. on load carrying capacity and design of beams.	02
18.	Plate No. 9- Beam to beam or beam to column connections.	02
19.	Plate No.10- Components of plate girder.	02
Total		<b>32</b>

**Instructional Strategy:**

Sr. No.	Topic	Instructional Strategy
<b>SECTION-I</b>		
1.	Introduction	Lecture, discussion
2.	Welded Joints	Lecture
3.	Tension Member	Lecture
4.	Compression Member	Lecture
<b>SECTION-II</b>		
5.	Column Bases	Lecture, Model
6.	Analysis of roof Truss	Lecture – Visit
7.	Design of beams	Lecture, discussion
8.	Simple framed connections	Lecture, Visit
9.	Introduction to plate girders	Lecture

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**Text Books:**

Sr. No	Author	Title	Publication
1.	L.S. Negi	Steel Structures	TMH
2.	S. K. Duggal	Design of steel structures	TMH

**Reference Books:**

Sr. No	Author	Title	Publication
1.	S. Ramammrutham	Design of steel structures	Khanna.
2.	Ram Chandra	Design of Steel Structure	Standard

**Learning Resources:** Books, I.S. Code.

**Specification Table:**

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
<b>SECTION-I</b>					
1.	Introduction	02	--	--	02
2.	Welded Joints	--	02	06	08
3.	Tension Member	02	02	10	14
4.	Compression Member	02	04	10	16
<b>Total</b>		<b>06</b>	<b>08</b>	<b>26</b>	<b>40</b>
<b>SECTION-II</b>					
5.	Column Bases	--	02	04	06
6.	Analysis of Roof Truss	02	04	10	16
7.	Design of beams	02	--	06	08
8.	Simple framed connections	--	02	04	06
9.	Introduction to Plate girders	--	04	--	04
<b>Total</b>		<b>04</b>	<b>12</b>	<b>24</b>	<b>40</b>

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(Prof. C.C. Dandvatimath)  
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**Programme** : **Diploma in CE**  
**Programme Code** : **01 /15**  
**Name of Course** : **Foundation Engineering**  
**Course Code** : **CE 761**

**Teaching Scheme:**

	<b>Hours /Week</b>	<b>Total Hours</b>
<b>Theory</b>	<b>04</b>	<b>64</b>
<b>Practical</b>	<b>02</b>	<b>32</b>

**Evaluation Scheme:**

	<b>Progressive Assessment</b>	<b>Semester End Examination</b>			
		<b>Theory</b>	<b>Practical</b>	<b>Oral</b>	<b>Term work</b>
<b>Duration</b>	Two class tests, each of 60 minutes	3Hrs.	--	--	--
<b>Marks</b>	<b>20</b>	<b>80</b>	--	<b>25</b>	<b>25</b>

**Course Rationale:**

Foundation Engineering is the Science of selecting, designing and constructing the elements that transfer the weight of a structure to the underlying Soil or Rock. The course introduces the students to the field of Foundation Engineering and provides them with the ability to select the most suitable type of Foundation for a given site and design the structural elements for the type finally selected.

**Course Objectives:**

After undergoing this course the student will be able to

- Calculate bearing capacity and settlement.
- Suggest most suitable type of foundation and its design.
- Calculate Vertical and lateral pressures.
- Appreciate foundation problems in Black Cotton Soil.

**Course Content:**

Chapter No.	Name of Topic/Sub topic	Hrs	Weightage	
<b>SECTION – I</b>				
<b>1</b>	<b>Bearing Capacity</b>			
	1.1	Bearing Capacity	<b>08</b>	<b>12</b>
	1.2	Basic Definitions		
	1.3	Rankine's Analysis, Terzaghi's Theory and Meyerhof's theory.		
	1.4	Plate Load Test, Bearing capacity from Standard Penetration Test, Effect of water table on bearing capacity.		
	1.5	Settlement of Foundation-Types of settlement, correction for eccentric load, tilt, sloping ground, layered soil, size & shape, causes of settlement, Allowable settlement.		
<b>2</b>	<b>Vertical and Lateral Pressure</b>			
	2.1	(For cohesive & non cohesive soil) Stress strain parameters	<b>10</b>	<b>12</b>
	2.2	Geostatic stress-Vertical and horizontal stresses due to concentrated load		
	2.3	Boussinesq's solution, Isobar diagram.		
	2.4	Lateral pressure theories-Different types of lateral earth pressure, Variation of pressure		
	2.5	Rankine's earth pressure theory,		
	2.6	Coulomb's Wedge theory		
	2.7	Seepage pressure, Surcharge load.		
<b>3</b>	<b>Shallow Foundation</b>			
	3.1	Types of shallow foundations, Foundation loading,	<b>14</b>	<b>16</b>
	3.2	Classification Spread footing-common types		
	3.3	Principles of design of footing, conventional procedure of proportioning footing for equal settlement		
	3.4	Strap footing – uses, types, arrangement and design		
	3.5	Combined footing – uses, types and arrangement-Rectangular and Trapezoidal footings		

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	3.6	Mat foundation-Definition, use, suitability, common types, construction of mat foundation.		
<b>SECTION-II</b>				
<b>4.</b>	<b>Pile foundation</b>			
	4.1	Construction of bored piles, Pile driving,	<b>10</b>	<b>14</b>
	4.2	Ultimate load of piles, factor of safety, Pile load analysis (No derivation and problems),		
	4.3	Pile load test-Routine and cyclic load test, Negative skin friction,		
	4.4	Grouping of piles, Group capacity of piles compass different methods of plotting traverse, closing error, graphical adjustment by Bowditch's Rule.		
<b>5</b>	<b>Well foundation</b>			
	5.1	Shapes of wells and component parts of wells- Well curb, cutting edge, seining and bottom plug.	<b>12</b>	<b>14</b>
	5.2	Depth pf well Foundation and Bearing capacity,		
	5.3	Forces acting on a well foundation,		
	5.4	Well sinking procedure, Difficulties during well sinking,		
	5.5	Pneumatic caissons.		
<b>6</b>	<b>Foundation on Black Cotton Soil</b>			
	6.1	Characteristics pf B.C. soil, .	<b>10</b>	<b>12</b>
	6.2	Cracking in structures supported on B.C. soil, Engineering problems, Design principles,		
	6.3	Foundation techniques in B.C. Soil,		
	6.4	Modern methods of construction- Short bored piles, Under reamed piles- design, construction and application of under reamed piles.		
		<b>Total</b>	<b>64</b>	<b>80</b>



**List of Practicals/Experiments/Assignments:**

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Assignment on Bearing capacity.	04
2.	Assignment on vertical and lateral pressure	06
3.	Assignment on shallow foundation. Site visit should be arranged to show shallow foundation	06
4.	Assignment on pile foundation	06
5.	Assignment on well foundation	04
6.	Assignment on foundation on Black cotton Soil	06
	<b>Total</b>	<b>32</b>

**Instructional Strategy:**

Sr. No.	Topic	Instructional Strategy
1.	General principals	Class room teaching
2.	Lateral pressure	Class room teaching
3.	Shallow foundation	Class room teaching, transparencies field visit
4.	Pile foundations	Class room teaching
5.	Well foundation	Class room teaching
6.	Foundation on Black Cotton Soil	Class room teaching

**Text Books:**

Sr. No	Author	Title	Publication
1.	Foundation Engineering	By Dr. B.J. Kasmalkar	Pune Vidyarthi Griha Parakashan, Pune
2.	Soil Mechanics and foundations engineering	By Dr. B.C. Punmia	Standard book house, Delhi
3.	Soil Mechanics and foundations engineering	By R.R. Arora	Standard Publishers Distributors
4.	Foundation design	By Teng	
5.	Foundation engineering	By Peck	
6.	Foundation engineering	By D. R. Phatak	Everest Prakashan, Pune

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**Reference Books:**

Sr. No	Author	Title	Publication
1.	Foundation design	By Teng	
2.	Foundation engineering	By Peck	
3.	Foundation engineering	By D. R. Phatak	Everest Prakashan, Pune

**Learning Resources:**

**Specification Table:**

<b>SECTION-I</b>					
Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	General Principal	04	04	04	12
2.	Vertical & Lateral pressure	04	04	04	12
3.	Shallow foundation	06	06	04	16
<b>Total</b>		<b>14</b>	<b>14</b>	<b>12</b>	<b>40</b>
<b>SECTION-II</b>					
4.	Pile foundation	04	06	06	16
5.	Well foundation	08	04	02	14
1	Foundation on Black Cotton Soil	04	04	02	10
<b>Total</b>		<b>16</b>	<b>14</b>	<b>10</b>	<b>40</b>

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**Programme** : **Diploma in CE**  
**Programme Code** : **01 /15**  
**Name of Course** : **Advanced Construction Techniques**  
**Course Code** : **CE762**

**Teaching Scheme:**

	<b>Hours /Week</b>	<b>Total Hours</b>
<b>Theory</b>	<b>04</b>	<b>64</b>
<b>Practical</b>	<b>02</b>	<b>32</b>

**Evaluation Scheme:**

	<b>Progressive Assessment</b>	<b>Semester End Examination</b>			
		<b>Theory</b>	<b>Practical</b>	<b>Oral</b>	<b>Term work</b>
<b>Duration</b>	Two class tests, each of 60 minutes	3Hrs.	--	--	--
<b>Marks</b>	<b>20</b>	<b>80</b>	--	<b>25</b>	<b>25</b>

**Course Rationale:**

Civil Engineering Diploma holder technician has to work not only in house building industry but also in other construction fields such as Irrigation Structures, Bridges, Industrial Constructions. By studying this course the student will be aware of advanced construction procedures & techniques required for above construction structures with special reference to various operations related with concrete.

**Course Objectives:**

After studying this course the student will be able to :

- Understand advanced Construction Techniques
- Supervise concreting operations used for advanced construction processes.
- Acquaint with special types of concrete.
- Know special types of formworks.
- Supervise activities carried out by using various construction equipment & machinery
- Know aspects of Quality of concrete.
- Know different causes of deterioration of concrete & necessary remedies to set right the same.

**Course Content:**

Chapter No.	Name of Topic/Sub topic	Hrs	Weightage
<b>SECTION-I</b>			
<b>1</b>	<b>Concreting in Extreme Environmental Conditions</b>		
	1.1 Placing of concrete in hot weather- Special problems encountered.	<b>09</b>	<b>10</b>
	1.2 Precautions to be taken during placing of concrete in cold weather , general points to be observed		
	1.3 Recommended minimum time limits for stripping of form work		
	1.4 Placing of concrete under water- Tremie method, Bucket placing in bags, prepacked concrete.		
<b>2</b>	<b>Grouting and Shotcreting</b>		
	2.1 Definition, Necessity of grouting, applications, Materials used for grouting.	<b>09</b>	<b>10</b>
	2.2 Grouting procedures-Drilling pattern, preparation for grouting, methods of working, Types of grouting- Cement grouting-Chemical grouting -Clay grouting		
	2.3 Shotcreting-Definition, procedures, applications.		
<b>3</b>	<b>Joints in Concrete</b>		
	3.1 Types-Expansion joints, Construction joints, Necessity,	<b>06</b>	<b>10</b>
	3.2 Materials used and construction details of above joints.		
<b>4.</b>	<b>Special Formworks</b>		
	4.1 Slip forms-definitions, applications, construction and working,	<b>08</b>	<b>10</b>
	4.2 Climbing shutters-definition applications, methods of raising forms.		
	4.3 Formwork for silos & chimneys. Formwork for retaining wall. Form work for circular tanks.		

<b>SECTION-II</b>				
<b>5</b>	<b>Concreting Equipment</b>			
	5.1	Weigh batcher- portable,	<b>07</b>	<b>08</b>
	5.2	Types of concrete mixers, Tittling, Non-tittling type, Drum- type, Double drum type, split drum type,		
	5.3	Ready mixed concrete plant transit mixer.		
	5.4	Machinery for compaction of concrete-Internal vibrators External Vibrators, Surface vibrators, Shutter Vibrators, Vibrating tables – Working and suitability of each vibrator.		
<b>6</b>	<b>Machinery for execution of concrete work</b>			
	6.1	Concrete work. Plant for handling cement and aggregates – Belt conveyors, Elevators, Tower cranes, Wagons, Lorries, Barrows, Dumpers, Chutes, Cable ways, Concrete pumps, Constructions working and applications of each equipment.	<b>06</b>	<b>08</b>
<b>7.</b>	<b>Quality Control of Concrete</b>			
	7.1	Necessity of quality control, Field control, Minimum concrete strength.	<b>06</b>	<b>08</b>
	7.2	Non-destructive testing of concrete – Surface hardness method and Ultrasonic pulse velocity method		
<b>8.</b>	<b>Deterioration &amp; Repairs of concrete</b>			
	8.1	Deterioration of concrete – Internal and External causes of deterioration. Corrosion of concrete and steel, cracking-corrosion interaction,	<b>07</b>	<b>08</b>
	8.2	Prevention of concrete deterioration.		
	8.3	Repairs of concrete structures- Defects occurring during construction – causes, prevention, remedy		

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	8.4	Selection of repair procedure, preparation of surface, repair by concrete replacement, prepacked concrete repair of a retaining wall		
	8.5	Polymer-based repairs, Polymer concrete, Polymer impregnation, Drilling and plugging.		
<b>9.</b>	<b>Design of Building for comfort in hot climates</b>			
	9.1	Introduction: Comfort – Tropical summer index – climatic zones of India, Ventilation requirements, wind rose diagram,	<b>06</b>	<b>08</b>
	9.2	Factors to be considered for comfort conditioning of buildings in hot regions.		
	9.3	Design of building in hot regions. Natural ventilation of buildings, comfort conditioning by mechanical methods. Heat insulation of roofs, Green buildings.		
	<b>Total</b>		<b>64</b>	<b>80</b>

**List of Practicals/Experiments/Assignments:**

<b>Sr. No.</b>	<b>Name of Practical/Experiment/Assignment</b>	<b>Hrs</b>
1.	Assignment on Concreting in Extreme Environmental conditions.	04
2.	An assignment on Grouting	04
3.	An assignment on joints in concrete (Any two joints)	04
4.	An assignment on special formworks. (Any Three)	04
5.	A visit to Ready mix concrete plant and preparing report of the visit.	08
6.	Assignment on machinery for execution of concrete work.	04
7.	An assignment on Deterioration and repairs of concrete	04
	<b>Total</b>	<b>32</b>

**Instructional Strategy:**

<b>Sr. No.</b>	<b>Topic</b>	<b>Instructional Strategy</b>
1.	Concreting in Extreme Environmental Conditions	Class room teaching
2.	Grouting and Shotcreting	Class room teaching
3.	Joints in Concrete	Class room teaching
4.	Special Formworks	Class room teaching
5.	Concreting Equipment	Class room teaching, site visit
6.	Machinery for execution of concrete work	Class room teaching
7.	Quality control of concrete	Class room teaching
8.	Deterioration and repairs of concrete	Class room teaching
9.	Design of Building for comfort in hot climates	Class room teaching

**Text Books:**

<b>Sr. No</b>	<b>Author</b>	<b>Title</b>	<b>Publication</b>
1.	Shri. M.S. Shetty	Concrete Technology	S. Chand & Co.
2.	M.L. Gambhir	Concrete Technology	Tata McGraw Hill Publishing Co. New Delhi
3.	R.L. Peuritoy	Construction Planning & Equipment	McGraw Hill Publisher Co.

**Reference Books:**

<b>Sr. No</b>	<b>Author</b>	<b>Title</b>	<b>Publication</b>
1.	Dr. Neville	Concrete Technology	E.L.B.S. London
2.	Dr. Orchanrd	Concrete Technology	
3.	P.D. Kulkarni	Manual of Concrete Technology	

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**Specification Table:**

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
<b>SECTION-I</b>					
1.	Concreting in Extreme Environmental Conditions.	04	06	---	10
2.	Grouting and Shotereting	06	04	---	10
3.	Joints in Concrete	04	---	06	10
4.	Special Formworks	04	06	---	10
<b>Total</b>		<b>18</b>	<b>16</b>	<b>06</b>	<b>40</b>
<b>SECTION-II</b>					
5.	Concreting Equipment	02	02	04	08
6.	Machinery for execution of concrete work	02	02	04	08
7.	Quality control of concrete	04	02	02	08
8.	Deterioration and repairs of concrete	02	02	04	08
9.	Design of Building for comfort in hot climates	04	02	02	08
<b>Total</b>		<b>14</b>	<b>10</b>	<b>16</b>	<b>40</b>

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**Programme** : **Diploma in CE**  
**Programme Code** : **01 /15**  
**Name of Course** : **Railway & Tunnel Engineering**  
**Course Code** : **CE 763**

**Teaching Scheme:**

	<b>Hours /Week</b>	<b>Total Hours</b>
<b>Theory</b>	<b>04</b>	<b>64</b>
<b>Practical</b>	<b>02</b>	<b>32</b>

**Evaluation Scheme:**

	<b>Progressive Assessment</b>	<b>Semester End Examination</b>			
		<b>Theory</b>	<b>Practical</b>	<b>Oral</b>	<b>Term work</b>
<b>Duration</b>	Two class tests, each of 60 minutes	--	--	--	--
<b>Marks</b>	<b>20</b>	<b>80</b>	--	<b>25</b>	<b>25</b>

**Course Rationale:**

Civil Engineering Diploma technicians have job opportunities in various construction field including. Railways and Tunnelling. This course has been compiled with a view to familiarize the students with the construction techniques for Railway and Tunnel Engineering.

**Course Objectives:**

After studying this course the student will be able to :

- Know component parts of Permanent Way and their requirements.
- Acquaint with Geometric Design and branching of tracks.
- Know various features about station and yards and track maintenance.
- Know fundamental principles of tunnel surveying.
- Understand different methods of tunnelling.
- Acquaint with different tunnelling equipments and works related with tunneling.

**Course Content:**

Chapter No.	Name of Topic/Sub topic	Hrs	Weightage
<b>SECTION-I</b>			
<b>1</b>	<b>Permanent Way</b>		
	1.1. Definition, requirement of an ideal permanent way.	<b>12</b>	<b>16</b>
	1.2. Different components of permanent way and its maintenance.		
	1.3. Cross-section of Broad Gauge and Meter Gauge single and double line in cutting and embankment.		
	1.4. Rails-Different types, functions, dimensions and weight per meter length.		
	1.5. Types of rail joints, ideal joint.		
	1.6. Welding of rails – purpose & advantages of welding of rails.		
	1.7. Sleeper- Functions and requirement. Types of sleepers – wooden, Metal, cast iron, steel trough and prestressed concrete sleepers.		
	1.8. Gauges - Different Gauges – Broad Gauge, Meter Gauge, Narrow Gauge their gauge width, circumstances under which they are used Necessity and importance of uniform gauge.		
	1.9. Rail fixtures and fastenings - Fixtures and fastenings between rail and sleepers. Bearing plates, keys bolts, elastic fastenings.		
	1.10. Ballast- Functions and requirement Different types of ballast and their properties.		

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<b>2</b>	<b>Geometric Design</b>				
	2.1	Coning of wheels & rails,	<b>06</b>	<b>08</b>	
	2.2	Super – elevation on curves,			
	2.3	Cant deficiency and grade compensation.			
	2.4	Creep of rails- Definition causes, effects & prevention of creep			
<b>3</b>	<b>Branching of tracks</b>				
	3.1	Simple split switch turnout consisting of points and crossings.	<b>04</b>	<b>06</b>	
	3.2	Line sketches showing different components and their functions.			
	3.3	Line sketches of diamond crossing, crossovers and their salient features.			
<b>4.</b>	<b>Station and Yards</b>				
	4.1	Functions, factors affecting selection of station.	<b>05</b>	<b>06</b>	
	4.2	Study of functions of different types of yards- Passenger, goods. Man hauling and locomotive yards.			
<b>5</b>	<b>Maintenance of Railway track</b>				
	5.1	Introduction, Importance of Maintenance.	<b>05</b>	<b>04</b>	
	5.2	Types of maintenance Daily maintenance, periodical maintenance.			
	5.3	Inspection of track. Working and suitability of each vibrator.			
<b>SECTION-II</b>					
<b>6.</b>	<b>Primary Aspects in Tunneling</b>				
	6.1	Necessity of tunneling.	<b>02</b>	<b>04</b>	
	6.2	Advantages of tunneling.			
	6.3	Economics of tunnelling.			
<b>7.</b>	<b>Tunnel Surveying</b>				
	7.1	Initial surveys,	<b>04</b>	<b>06</b>	
	7.2	Setting out of the tunnel center line on the surface setting out inside tunnel			
	7.3	Transferring of alignment through shafts.			
	7.4	Adjustment at meeting point of tunnels.			

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<b>8.</b>	<b>Method of tunnelling in soft strata :</b>			
	8.1	Tunnelling in firm ground.		
	8.2	Tunnelling in soft ground. Shield method of tunnelling. Method of supporting Roof and sides in multiple drift method.	<b>08</b>	<b>08</b>
<b>9.</b>	<b>Method of tunnelling in hard strata (Rock):</b>			
	9.1	Sequence of operation for construction of tunnel in rocky strata. Drilling. Blasting. Inspection and handling misfire.	<b>08</b>	<b>10</b>
	9.2	Tunnel shafts & caissons. Introduction, Timber shaft, Rock shaft, steel lining for shaft, shafts by caissons, Drop shafts		
<b>10.</b>	<b>Ventilation, lighting &amp; drainage of tunnels</b>			
	10.1	Introduction, Definition of ventilation, objects of tunnel ventilation.	<b>10</b>	<b>12</b>
	10.2	Methods of ventilation in tunnels, Mechanical ventilation, Dust control lighting of tunnels, Drainage of tunnel.		
		<b>Total</b>	<b>64</b>	<b>80</b>

**List of Practicals/ Experiments/Assignments:**

<b>Sr. No.</b>	<b>Name of Practical/Experiment/Assignment</b>	<b>Hrs</b>
1.	Visit (1) : A visit to Railway station should be arranged to demonstrate & observe the different component parts of Permanent way, Geometric Design and branching of tracks.	08
2.	Assignment No (2): An assignment on Maintenance of Railway track.	04
3.	Visit (2) : A visit to tunnel should be arranged.	08
4.	Assignment No. 3: An assignment on different methods of tunnelling in soft strata.	04
5.	Assignment No (4) : An assignment on Methods of tunnelling in hard strata	04
6.	Assignment No (5) : An assignment on ventilation of tunnels	04
	<b>Total</b>	<b>32</b>

**Instructional Strategy:**

Sr. No.	Topic	Instructional Strategy
<b>SECTION-I</b>		
1.	Permanent Way	Class room teaching, site visit, transparencies
2.	Geometric Design	Class room teaching, site visit, transparencies
3.	Branching of tracks	Class room teaching, site visit, transparencies
4.	Station and yards	Class room teaching, site visit, transparencies
5.	Maintenance of Railway Track.	Class room teaching, transparencies
<b>SECTION-II</b>		
6.	Primary aspects in tunnelling	Class room teaching, transparencies
7.	Tunnel surveying	Class room teaching, transparencies
8.	Method of tunnelling in soft strata	Class room teaching, transparencies
10.	Method of tunnelling in hard strata	Class room teaching, transparencies
11.	Ventilation, lighting & drainage of tunnels	Class room teaching, Site visit, transparencies

**Text Books:**

Sr. No	Author	Title	Publication
1.	N.L. Arora	Transportation Engineering	New India Publishing House
2.	A. Kamala	Transportation Engineering	Tata McGraw Hill Co. New Delhi
3.	S.C. Saxena	Railway Engineering	

**Reference Books:**

Sr. No	Author	Title	Publication
1.	V.N. Vazirani & S.P. Chandola	Transportation Engineering	Khanna Publisher, Delhi
2.	S.C. Rangawala	Railway Engineering	

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**Specification Table:**

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
<b>SECTION-I</b>					
1.	Permanent Way	08	04	04	16
2.	Geometric Design	04	04	---	08
3.	Branching of tracks	02	04	---	06
4.	Station and yards	02	02	02	06
5.	Maintenance of Railway track.	---	02	02	04
<b>Total</b>		<b>16</b>	<b>16</b>	<b>08</b>	<b>40</b>
<b>SECTION-II</b>					
6.	Primary aspects in Tunnelling.	04	---	---	04
7.	Tunnel surveying	---	04	02	06
8.	Method of tunnelling in soft strata	---	04	04	08
9.	Method of tunnelling in hard strata	02	04	04	10
10	Ventilation, lighting & drainage of tunnels	04	04	04	12
<b>Total</b>		<b>10</b>	<b>16</b>	<b>14</b>	<b>40</b>

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**Programme** : **Diploma in CE**  
**Programme Code** : **01 /15**  
**Name of Course** : **CAD & Computer Applications**  
**Course Code** : **CE 765**

**Teaching Scheme:**

	<b>Hours /Week</b>	<b>Total Hours</b>
<b>Theory</b>	<b>02</b>	<b>32</b>
<b>Practical</b>	<b>04</b>	<b>64</b>

**Evaluation Scheme:**

	<b>Progressive Assessment</b>	<b>Semester End Examination</b>			
		<b>Theory</b>	<b>Practical</b>	<b>Oral</b>	<b>Term work</b>
Duration	Two class tests, each of 60 minutes	--	03	--	--
Marks	<b>20</b>	--	<b>80</b>	<b>25</b>	<b>25</b>

**Course Rationale:**

As diploma engineer student must know more about computer operation & its applications. In order to work in software engineering fields in Civil Engineering the student must know drafting methodologies and their applications to various Civil Engineering fields.

**Course Objectives:**

After studying this course the student will be able to :

- Understand the importance of CAD
- Draw different drawings by using computer aided drafting.
- Understand various latest software packages being used in Civil Engineering.

**Course Content:**

Chapter No.	Name of Topic/Sub topic	Hrs	Weightage Pract
<b>1</b>	<b>Recapitulation :</b>		
	1.1 Windows- operations such as moving, Resize, close, minimize, maximize. Windows operation using my computer, control panel, accessories.	<b>02</b>	<b>04</b>
<b>2</b>	<b>Computer aided drafting (CAD) :</b>		
	2.2 Introduction to CAD Applications Advantages of CAD,CAM,CAE,	<b>06</b>	<b>15</b>
	2.3 CAD Packages available in market, Auto CAD, Omega Designer, P-CAD, RoboCAD, Felix CAD, IntelliCAD, LisCAD.		
	2.4 Auto CAD and manual drafting, advantage. System requirements, CAD peripherals,		
	2.5 Opening screen, functional and control keys.		
<b>3</b>	<b>CAD Commands-(Draw &amp; Modify) :</b>		
	3.1 Line, circle, arc, Redraw, Erase, Undo, Redo. Osnap, Ellipse, Polygon, copy move, setting up of drawing, Paper sizes, limits, layers, Grid, snap zoom, pan, Regen, Color, Array, Rotate, Scale, Trim, Break, Extend, Fillet, Chamfer, Text, mirror, Stretch, Line mode, Arc mode, area list Bblast.	<b>10</b>	<b>30</b>
<b>4.</b>	<b>Dimensioning Commands:</b>		
	4.1 Drawing, Dim, Dimscale, Linear, Angular, Adjustable, Geometric dimension, Editing dimension text and variables.	<b>05</b>	<b>10</b>
<b>5.</b>	<b>Drawing Organization and Set up</b>		
	5.1 Organization Drawing with layers, layer state creating new layer Changing object properties.	<b>05</b>	<b>15</b>



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	5.2	Drawing set up – Controlling unit display, sizing the drawing sheet, creating new drawing with Wizards and Templates.		
<b>6.</b>	<b>Study of latest software packages used in Civil Engineering</b>			
	a) STADD b) FABRICAD c) STARDYNE d) STADRRO e) STRUDD		<b>04</b>	<b>06</b>
		<b>Total</b>	<b>32</b>	<b>80</b>

**List of Pacticals/Experiments/Assignments:**

<b>Sr. No.</b>	<b>Name of Experiment/Assignment</b>	<b>Hrs</b>
1.	Practicing of Windows-2000 commands using control panels & my computer. Use and apply commands of CAD.	08
2.	Writing Assignment	04
3.	Practicing writing Assignment. Drafting using DRAW and MODIFY commands.	16
4.	Assignment. Showing dimensions on drawing.	04
5.	To prepare, drawing for any civil engineering structure using any available CAD package.	16
6.	To prepare drawing to show structural details using any CAD package.	16
	<b>Total</b>	<b>64</b>

**Instructional Strategy:**

<b>Sr. No.</b>	<b>Topic</b>	<b>Instructional Strategy</b>
1.	Recapitulation	Classroom Teaching accompanied with Demonstration on Computer.
2.	Computer aided drafting..	Classroom Teaching accompanied with Demonstration on Computer.
3.	CAD Commands-(Draw & Modify)	Classroom Teaching accompanied with Demonstration on Computer.

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4.	Dimensioning Commands	Classroom Teaching accompanied with Demonstration on Computer.
5.	Drawing Organization and Set up	Classroom Teaching accompanied with Demonstration on Computer.
6.	Study of latest software packages used in Civil Engineering.	Demonstration & practices of using the software.

**Text Books:**

Sr. No	Author	Title	Publication
1.	BPB Publication	Auto CAD Practice 2000	BPB Publication, New Delhi
2.	BPB Publication	Auto CAD Practice 2004	BPB Publication, New Delhi

**Reference Books:**

Sr. No	Author	Title	Publication
1.	Raker & Rice Alan Miller	Inside Auto CAD The ABC's of Auto CAD-2004	McGraw Hill , New Delhi
2.	Raker & Rice Alan Miller	Inside Auto CAD The ABC's of Auto CAD-2004	McGraw Hill , New Delhi

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**Specification Table:**

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Recapitulation	04	--	--	04
2.	Computer Aided drafting	05	10	--	15
3.	CAD Commands-(Draw & Modify)	05	05	20	30
4.	Dimensioning Commands	--	05	05	10
5.	Drawing Organization and Set up	--	05	10	15
6.	Study of latest software packages used in Civil Engineering	06	--	--	06
<b>Total</b>		<b>20</b>	<b>25</b>	<b>35</b>	<b>80</b>

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**Programme** : **Diploma in CE**  
**Programme Code** : **01 /15**  
**Name of Course** : **Advanced Surveying**  
**Course Code** : **CE 766**

**Teaching Scheme:**

	<b>Hours /Week</b>	<b>Total Hours</b>
<b>Theory</b>	<b>04</b>	<b>64</b>
<b>Practical</b>	<b>02</b>	<b>32</b>

**Evaluation Scheme:**

	<b>Progressive Assessment</b>	<b>Semester End Examination</b>			
		<b>Theory</b>	<b>Practical</b>	<b>Oral</b>	<b>Term work</b>
<b>Duration</b>	Two class tests, each of 60 minutes	<b>3 hours</b>	--	--	--
<b>Marks</b>	<b>20</b>	<b>80</b>	<b>25</b>	--	<b>25</b>

**Course Rationale:**

The students have learnt conventional surveying as a basic technology for Civil Engineering. However, due to the modernisation & development in technologies, diploma technicians of present time should know advanced instruments & advanced survey methods. The knowledge of advanced surveying will help diploma technician for the various surveys such as city zoning & planning, mineral exploration, archaeology, natural hazards, water bodies, geology, traffic studies, water resources for power & irrigation, route surveys etc.

**Course Objectives:**

After studying this course the student will be able to :

- Understand working principles, construction, application and handling of advanced surveying instruments.
- Understand the principles and methods of advanced surveys.
- Develop skills of interpretation & plotting survey data.

**Course Content:**

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
<b>SECTION-I</b>				
<b>1</b>	<b>Adjustment of the transit theodolite</b>			
	1.1	Permanent adjustments. Adjustment of plate level. Adjustment of horizontal & vertical hair. Adjustment of horizontal axis. Adjustment of altitude bubble and adjustment of vertical circle (Index frame)	<b>06</b>	<b>08</b>
<b>2</b>	<b>Trigonometric Levelling</b>			
	2.1	Introduction. Angular correction for curvature and refraction. Axis signal correction..	<b>06</b>	<b>08</b>
	2.2	Methods of trigonometrical levelling. By single observation and by reciprocal observation. Numerical problems		
<b>3</b>	<b>Tacheometrical Surveying:</b>			
	3.1	Principle of stadia method.	<b>08</b>	<b>10</b>
	3.2	Determination of tacheometric constant.		
	3.3	Analytic lens – object & theory.		
	3.4	Methods of tacheometry . Fixed hair method – line of sight inclined and staff held vertical.		
	3.5	Tacheometric tables. Field work. Numerical problems.		
<b>4.</b>	<b>Geodetic Surveying :</b>			
	4.1	Triangulation. Triangulation figure.	<b>12</b>	<b>14</b>
	4.2	Classification of triangulation system.		
	4.3	Reconnaissance. Station marks. Base line measurement. Measurement of angle. Field checks in triangulation.		
	4.4	Examples on base line measurement.		

<b>SECTION-II</b>				
<b>5.</b>	<b>Hydrographic Surveying</b>			
	5.1	Definition, objects, principles of hydro graphic surveying	<b>08</b>	<b>10</b>
	5.2	Establishing controls.		
	5.3	Shore line survey, Tides & Tide gauges Soundings, Datum Equipments for measuring soundings		
	5.4	Methods of locating soundings Reduction of soundings, plotting of soundings.		
	5.5	Three point problem, its solution by analytical & graphical method.		
<b>6.</b>	<b>Aerial Photogrammetry</b>			
	6.1	Definition, Objects, Applications of aerial photogrammetry	<b>08</b>	<b>10</b>
	6.2	Aerial photograph, air survey camera, comparison of map & aerial photograph.		
	6.3	Terminology used in aerial photogrammetry		
	6.4	Scale of vertical & tilted photograph. Displacement & errors in aerial photogrammetry.		
	6.5	Procedure of aerial survey – Ground control, flight planning overlap etc.		
	6.6	Photo interpretation equipments – stereoscope. Photo interpretation.		
	6.7	Parallax, Measurement of parallax.		
	6.8	Plotting the details. Mosaic, Photographic maps. Numerical problems.		
<b>7.</b>	<b>Remote Sensing</b>			
	7.1	Definition, Basic principles.	<b>08</b>	<b>10</b>
	7.2	Electromagnetic energy, Electromagnetic spectrum. Effect of atmosphere on electromagnetic radiation.		
	7.3	Remote Sensing Systems Different types of data products. Applications of remote sensing.		
	7.4	GIS : Introduction, Uses, Different software.		

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<b>8.</b>	<b>Modern Surveying Equipments :</b>		
8.1	Electromagnetic distance measurement – principle. Types of Electromagnetic Distance Meters (E.D.M.) – Geodimeter, Tellurometer, Distomat.	<b>08</b>	<b>10</b>
8.2	One Second Micro – optic Theodolite Electronic Digital Theodolite. Total Station.		
8.3	1) Three dimensional coordinate Measurement 2) Traverse – style coordinate Measurements 3) Remote Elevation Measurements 4) Area Measurements 5) Earth work calculation for Road, Canals, Railway embankments etc.		
8.4	G.P.S. Introduction, Principle, Working.		
	Total	<b>64</b>	<b>80</b>

**List of Practicals/Experiments/Assignments:**

<b>Sr. No.</b>	<b>Name of Experiment/Assignment</b>	<b>Hrs</b>
1.	Permanent adjustments of transit theodolite.	02
2.	To find the constants of a tacheometer.	02
3.	Contouring by tacheometry soft strata.	02
4.	Solution of three point problems by analytical & any one graphical method (Tutorial.)	02
5.	Study & use of Mirror Steroscope & finding out air base distance	02
6.	Study & use of parallax bar for measuring parallax & finding out the difference of elevation between points.	02
7.	To find out the scale of the photograph.	02
8.	To read and interpret from imageries or Google earth, Wikimapia, GIS software.	02
9.	Study & use of one second theodolite & measurement of horizontal angle.	02
10.	Setting out given horizontal angle.	02
11.	Measurement of horizontal angle by reiteration method. 8. study and use of E.D.M	02
13.	Study & use of total station.	02
14.	Measurements of two & three dimensional co-ordinates.	02
15.	Measurements of remote elevations	02
16.	Measurement of area of plot and earth work calculation for road.	02
	<b>Total</b>	<b>32</b>

**Instructional Strategy:**

Sr. No.	Topic	Instructional Strategy
<b>SECTION-I</b>		
1.	Adjustment of the transit theodolite	Class room teaching & field practicals
2.	Trigonometric Levelling	Class room teaching & field practicals
3.	Tacheometric Surveying	Class room teaching & field practicals
4.	Geodetic Surveying	Class room teaching
<b>SECTION-II</b>		
5.	Hydrographic Surveying	Class room teaching & Assignments
6.	Aerial Photogrammetry	Class room teaching & practicals
7.	Remote Sensing	Class room teaching
8.	Modern Surveying Equipments	Class room teaching & field practicals
9.	Hydrographic Surveying	Class room teaching & Assignments

**Text Books:**

Sr. No	Author	Title	Publication
1.	Kanetkar T.P. & Kulkarni S.V.	Surveying & Levelling, Part – 2	Pune Vidyarthi Griha Prakashan, Pune – 30
2.	Duggal, S.K.	Surveying Vol – II	Tata McGraw Hill Publisher Co. Ltd. New Delhi
3.	Punmia B.C.	Surveying Vol – II & III	Laxmi Publication, Delhi – 110 006

**Reference Books:**

Sr. No	Author	Title	Publication
1.	Shahani P.B.	Advanced Surveying	Oxford & IBH Publishing Co.
2.	Basak, N.N.	Surveying & Levelling	Tata McGraw Hill Publisher Co. Ltd. New Delhi



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**Specification Table:**

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
<b>SECTION-I</b>					
1.	Adjustments of sthe transit theodolite	02	---	06	08
2.	Trigonometric Levelling	02	02	04	08
3.	Tacheometric Surveying	04	02	04	10
4.	Geodetic Surveying	04	04	06	14
<b>Total</b>		<b>12</b>	<b>08</b>	<b>20</b>	<b>40</b>
<b>SECTION-II</b>					
5.	Hydrographic Surveying	04	04	04	12
6.	Aerial Photogrammetry	02	02	04	08
7.	Remote Sensing	04	04	---	08
8.	Modern Surveying Equipment	04	04	04	12
<b>Total</b>		<b>14</b>	<b>14</b>	<b>12</b>	<b>40</b>

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**Programme** : **Diploma in CE**  
**Programme Code** : **01 /15**  
**Name of Course** : **Construction Equipment & Machinery**  
**Course Code** : **CE767**

**Teaching Scheme:**

	<b>Hours /Week</b>	<b>Total Hours</b>
<b>Theory</b>	<b>04</b>	<b>64</b>
<b>Practical</b>	<b>02</b>	<b>32</b>

**Evaluation Scheme:**

	<b>Progressive Assessment</b>	<b>Semester End Examination</b>			
		<b>Theory</b>	<b>Practical</b>	<b>Oral</b>	<b>Term work</b>
<b>Duration</b>	Two class tests, each of 60 minutes	<b>3 hours</b>	--	--	--
<b>Marks</b>	<b>20</b>	<b>80</b>	--	<b>25</b>	<b>25</b>

**Course Rationale:**

With ever – growing construction activity, the world over, new and sophisticated equipments are being developed. Suitability of every equipment to perform specific jobs for specific needs is required to be studied by Civil Engineering Students. The course is intended to expose the students to different construction equipments, their suitability and outputs.

**Course Objectives:**

After studying this course, student will be able to :-

- Select the appropriate type of equipment for a job.
- Decide output of excavating and other equipments
- Understand the construction and working of equipment.
- Understand the methods of soil stabilization.
- Understand the working of crushers.

**Course Content:**

Chapter No.	Name of Topic/Sub topic	Hrs	Weightage
<b>SECTION-I</b>			
<b>1</b>	<b>Factors Affecting Selection of Equipment</b>		
	1.1	General. Standard types of equipment.	<b>06</b> <b>08</b>
	1.2	Special equipments. Replacement of parts.	
	1.3	Cost of owning and operating equipments. Investment costs, Depreciation. Operating costs,	
	1.4	Economic life of equipment	
<b>2</b>	<b>Excavating Equipment</b>		
	2.1	Introduction.	<b>10</b> <b>12</b>
	2.2	Power shovels. Basic parts and operation of shovel. Selecting the type and size of power shovel. Optimum depth of cut, Output of power shovels, Factors affecting output	
	2.3	Draglines. Types of draglines, Basic parts and operation of dragline, Optimum depth of cut, Factors affecting output	
	2.4	Clamshells. General information, Clamshell buckets.	
	2.5	Hoes General Basic parts and working. Working ranges of hoes	
	2.6	Trenching machines. Types, Selection of suitable equipment for trenching	
<b>3</b>	<b>Earth – Moving Equipments</b>		
	3.1	General.	<b>10</b> <b>12</b>
	3.2	Scrapers. Types of scrapers and working of scraper, Cycle time for a scraper.	
	3.3	Tractor and tractor units. Types and factors affecting selection. Crawler versus wheeled tractors.	
	3.4	Bull – dozers. Crawler mounted versus wheel mounted bulldozers, Output of bulldozers.	
	3.5	Front end loaders.	
	3.6	Trucks and wagons, Dumpers, Their capacity.	

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<b>4.</b>	<b>Rock-Drilling Equipments</b>			
	4.1	Drill bits, Drifters, Rotary percussion drill, Jumbo drill, Blast hole drill, diamond drill, Fusion, piercing,	<b>06</b>	<b>08</b>
	4.2	Factors affecting selection of drilling methods and drilling patterns.		
	4.3	<b>Tunnel Boring Machine:</b> Applications, Limitations.		
<b>SECTION-II</b>				
<b>5.</b>	<b>Hoisting equipment</b>			
	5.1	Introduction.	<b>06</b>	<b>08</b>
	5.2	Hoisting equipment – Pulleys, Jacks. Chain hoist – types, Hoist winches.		
	5.3	Fork trucks.		
	5.4	Cranes – types, Derrick crane, mobile crane, whirled crane, tower crane, hydraulic crane, gantry crane,		
	5.5	Safety in crane operation.		
<b>6.</b>	<b>Conveying Equipment</b>			
	6.1	Introduction. Package conveyors, Screw conveyors. Flight or scrap conveyors. Bucket conveyors, Bucket elevators.	<b>10</b>	<b>12</b>
	6.2	Band or belt conveyor. Idlers, Belt drive. Pneumatic conveyor.		
	6.3	Aerial transport. Cable way, Aerial ropeway.		
<b>7.</b>	<b>Soil Compacting Equipment</b>			
	7.1	Introduction. Specification for compacting soil.	<b>10</b>	<b>12</b>
	7.2	Types of compacting equipment. Tamping roller, Smooth wheel roller. Pneumatic tyre roller, Vibrating rollers including tamping, smooth wheel and pneumatic, Vibrators. Self propelled vibrating plates and / or shoes Manually propelled vibrating plates Vibratory compactors for deep sand		

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8.	<b>Crushed Stone Aggregate</b>			
	8.1	Introduction ,needs of crushing,	<b>06</b>	<b>08</b>
	8.2	Stages in crushing. Primary, secondary, Tertiary.		
	8.3	Types of crusher - Jaw crusher, Gyratory crushers, Hammer mill crusher, cone crusher, roll crusher, Rod and ball mill crusher		
	<b>Total</b>		<b>64</b>	<b>80</b>

**List of Practicals/Experiments/Assignments:**

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Tutorial based on theory	04
2.	Tutorial based on theory	04
3.	Tutorial based on theory	04
4.	Tutorial based on theory	04
5.	Tutorial based on theory	04
6.	Tutorial based on theory	04
7.	Tutorial based on theory	04
8.	Tutorial based on theory	04
	<b>Total</b>	<b>32</b>

**Instructional Strategy:**

Sr. No.	Topic	Instructional Strategy
<b>SECTION-I</b>		
1.	Factors affecting selection of equipment	Class room teaching
2.	Excavating equipment	Class room teaching, Models, Toys
3.	Earth moving equipment	Class room teaching, Internet Printouts
4.	Tunnelling Equipment	Class room teaching, Internet Printouts
<b>SECTION-II</b>		
5.	Hoisting equipment	Class room teaching, Models, Toys
6.	Conveying equipment	Class room teaching, Internet Printouts Video cassettes.
7.	Soil stabilisation and compaction	Class room teaching, Internet Printouts
8.	Crushed stone aggregate	Class room teaching, Internet Printouts

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**Text Books:**

Sr. No	Author	Title	Publication
1.	By R.L. Peurifoy	Construction planning and equipment	McGraw Hill Publication
2.	By Dr. Mahaesh Varma	Construction equipment its planning and application	Metropolitant book Company

**Reference Books:**

Sr. No	Author	Title	Publication
1.	V.N. Vazirani and S.P. Chandola	Transportation Engg. Volume - I	Khanna Publisher

**Specification Table:**

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
<b>SECTION-I</b>					
1.	Factors affecting selection of equipment	04	02	02	08
2.	Excavating equipment	04	04	04	12
3.	Earth Moving equipment	04	04	04	12
4.	Tunnelling Equipment	04	---	04	08
<b>Total</b>		<b>16</b>	<b>10</b>	<b>14</b>	<b>40</b>
<b>SECTION-II</b>					
5.	Hoisting equipment	04	02	02	08
6.	Conveying equipment	04	04	04	12
7.	Soil stabilisation and compaction	04	04	04	12
8.	Crushed stone aggregate	04	04	--	08
<b>Total</b>		<b>16</b>	<b>14</b>	<b>10</b>	<b>40</b>

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