Programme	:	**Diploma in CE**
Programme Code	:	**01 /15**
Name of Course	:	**Theory of Structures**
Course Code	:	**AM566**

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**01**	**16**

Evaluation Scheme:

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

Course Rationale:

Concepts and principles involved in the design of various structures are covered in this subject. The application of theoretical concepts & principles in practical, field situations is essential. Integration of the principles used to solve the field problems would help the students in understanding the concepts.

Course Objectives:

After studying this course, student will be able to :–
- Identify various elements of a structure.
- Understand basic principles.
- Appreciate the importance of the principles.
- Identify & Analyze the given problem
- Apply the basic principals in solving the problem.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
SECTION-I				
1	**Direct & Bending Stresses:**			
	1.1	Concept of direct and eccentric loads. Condition for no tension or zero stress on extreme fibers, limit of eccentricity,	**10**	**12**
	1.2	Maximum and minimum stresses, core of section for solid rectangular, square and circular sections only. (No derivation in the examination to be asked.) Columns of uniform sections subjected to lateral wind		
	1.3	pressure, Coefficient of wind pressure, stress distribution at base.		
	1.4	Analysis of structures, retaining water and earth- level up to top level, calculation of maximum & minimum stresses at base.		
	1.5	Stability conditions for dams and retaining walls.		
2	**Principal Planes and Principal Stresses**:			
	2.1	Concept of simple shear, complementary shear, normal stress, tangential stress, resultant stress.	**10**	**12**
	2.2	Definition of principal planes and principal stresses. Maximum shear stress, position of planes subjected to max. shear stress.		
	2.3	Planes carrying resultant stress having maximum angle of obliquity. Mohr's Circle method.		
3	**Torsion -**			
	3.1	Theory of pure torsion. Torsion equation.	**04**	**04**
	3.2	Strength of solid & hollow circular shaft, polar modulus of section, power transmitted by shafts.		
	3.3	Simple problems on calculation of angle of Twist, shear test, torsional moment of resistance.(No problems on design of shafts to be asked in the examination.)		

4		**Slope and Deflection -**		
	4.1	Concept of slope and deflection, stiffness of beams, flexural rigidity of beams. Relation between slope, deflection and radius of curvature, differential equation.(No derivation to be asked in examination.)		
	4.2	Slope & deflection by standard formulae. Calculation of slope & deflection of simply supported, cantilever, overhanging beams subjected to concentrated and uniformly distributed loads by Macaulay's method. (Calculations involving solutions of cubical expressions for maximum deflection are not expected).	10	12
	4.3	Propped cantilevers, reactions of prop by superposition theorem, bending moment and shear force diagram for rigid props.(No numerical problems involving solution by integration is expected. Use of standard formula only.)		
SECTION-II				
5.		**Fixed Beams**		
	5.1	Concept of fixity, effect of fixity, advantages and disadvantages, fixed end moments, principle of superposition.	08	10
	5.2	Formula for fixed beams subjected to concentrated loads and uniformly distributed load over entire span. FEMS using standard formula.		
	5.3	Drawing shear force and bending moment diagrams. No problems on fixed beams carrying partial udl.		
6		**Continuous Beams**		
	6.1	Definition, effect of continuity, nature of moments induced due to continuity, deflected shape.		
	6.2	Clapeyron's theorem up to **two span only,** supports at same level, equal or unequal, Flexural rigidity EI, subjected to concentrated and uniformly distributed loads over entire span.	**08**	**12**
	6.3	Drawing shear force and bending moment diagram. The beams with fixed end and overhand are also to be taken.		

7		**Moment Distribution Method**		
	7.1	Introduction, sign convention, carry over factors, stiffness factors, distribution factor.	**08**	**10**
	7.2	Application of moment distribution method to various types of two spans continuous beams and propped cantilevers having rigid supports at same levels subjected to concentrated and uniformly distributed loads over entire span.		
8		**Columns**		
	8.1	Definition, types and classification of columns-long & short.	**06**	**08**
	8.2	Concept of buckling, different end conditions, effective length, radius of gyration, slenderness ratio.		
	8.3	Euler's theory, assumptions, buckling load, factor of safety. Safe load, application of Euler's theory to various sections & built-up sections. (Analysis problems only).		
	8.4	Empirical formula – Rankine's formula, for calculating load for various sections & built-up section (No derivation in theory examination).		
		Total	**64**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Assignment No. 1	02
2.	Assignment No. 2. 3 Problems by Mohr's circle method. Verification by Analytical Method	04
3.	Assignment No.3.	02
4.	Assignment No. 4.	02
5.	Assignment No.5.	02
6.	Assignment No. 6.	02
7.	Assignment No. 7.	02
	Total	**16**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
	SECTION-I	
1.	Direct & bending stresses	Lecture Method, Discussion
2.	Principal planes and principal stresses	Lecture Method, Discussion
3.	Torsion	Lecture Method, Discussion
4.	Slope and deflection	Lecture Method, Discussion & demo
	SECTION-II	
5.	Fixed beams	Lecture Method, Discussion & demo.
6.	Continuous beams	Lecture Method, Discussion & demo.
7.	Moment and distribution	Lecture Method, Discussion & demo.
8.	Columns	Lecture Method, Discussion & demo.

Text Books:

Sr. No	Author	Title	Publication
1.	M.V. Panchanadikar	Theory of structures	PVG Publication
2.	S.Ramamrutham	Theory of structures	Dhanpat Rai & Sons.
3.	B.Junnarkar & Adavi	Mechanics of structures	Charotar Publishing House,
4.	R.S. Biyani	Vol. I & II -Theory of Structure	Vrinda Prakashan

Reference Books:

Sr. No	Author	Title	Publication
1.	Bilber & Morris	Elements of Analysis of Structures	McGraw Hills
2.	Vazirani & Ratwani	Theory of structures	Khanna Publishers, Delhi.
3.	Singer & Pytel	Strength of materials.	Harper & Row Publishers, New Yark.

Learning Resources: Books, Models, Transparencies, IS Codes

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
SECTION-I					
1.	Direct & Bending stresses	2	4	6	12
2.	Principal Planes & Principal stresses	2	2	8	12
3.	Torsion	--	4	--	4
4.	Slope & Deflection	2	2	8	12
	Total	**06**	**12**	**22**	**40**
SECTION-II					
5.	Fixed Beams	4	--	6	10
6.	Continuous Beams	2	4	6	12
7.	Moment Distribution method	2	2	6	10
8.	Columns	2	2	4	8
	Total	**10**	**08**	**22**	**40**

(Prof. R.M. Koranne)   (Prof. S. B. Kulkarni)   (Prof.C.C. Dandvatimath)

(L.A.M.)   (I/c H.C.E.D.)

Prepared By   Secretary, PBOS   Chairman, PBOS

Programme	:	Diploma in CE
Programme Code	:	01 /15
Name of Course	:	Analysis & Design of R.C. Structures
Course Code	:	AM 567

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

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

Course Rationale:

Reinforced Cement Concrete is very widely used for almost all types of structures. As concrete can be cast in any shape, the architects prefer reinforced concrete as the main construction material; for residential, public and all other important decorative buildings. Hence, it becomes essential for every Civil engineer to study Properties & behavior of RCC.

While working as a supervisor, the diploma students should be aware of the basic concepts of RCC design & should be able to prepare, read & interpret structural drawings. The students should be familiar with the relevant IS codes & be aware of the standard requirements, while executing the construction work. He should be also capable of designing simple structures.

Course Objectives:

After studying this course, student will be able to :–
- Understand concept of RCC
- Know various methods for designing RCC structures
- Analyze given sections & will apply the knowledge of designing standard structural elements viz, slabs, beams, columns, staircase & footing; using Limit State Method
- Know the rules & regulations given in IS-456-2000
- Prepare, read and interpret a structural drawing.

Course Content:

Chapter No.		Name of Topic/Sub topic	Hrs	Weightage
		SECTION-I		
1		**Introduction**		
	1.1	Introduction to reinforced concrete,	**04**	**04**
	1.2	Advantages and limitations of RCC,		
	1.3	Various grades of Concrete and Steel.		
	1.4	Introduction to various loads with reference to IS 875-1984.		
	1.5	I.S.Code requirements governing reinforcement detailing – Cover, max. & min. spacing, reinforcement percentage - max & min. for various structural components like slab, beam, column & footing.		
2		**Introduction to LSM**		
	2.1	Methods of analysis & design of RCC members- WSM, LSM, Ultimate Load Theory (list of methods only).	**06**	**08**
		Definition and objectives of limit state method, Various		
	2.2	Limit states, assumptions of LSM, advantages of LSM over WSM.		
	2.3	Partial safety factors for materials and loads.		
	2.4	Stress diagram, neutral axis, balanced, over-reinforced and under reinforced sections.		
	2.5	Moment of Resistance. Its relation with bending		

		moment; design constants for different combinations of concrete and steel grades.		
3	**Torsion**			
	3.1	Analysis of Singly reinforced sections (Capacity of the section only).		
	3.2	Tee and L sections, advantages over rectangular sections.		
	3.3	Conditions under which section can act as a flanged section, calculation of effective flange width & MR of the section.(Problems on MR of T beams with NA lying in the web with 0.43 Xu < Df are not to be asked in Exam.	**12**	**16**
	3.4	Concept of Doubly reinforce sections, conditions under which they are provided. Calculation of capacity of the section only.		
4	**Design of Beams**			
	4.1	Design of singly reinforced beams for given loading - size given or size not given.		
	4.2	Design of doubly reinforced beams by LSM.		
	4.3	Design of T beams by LSM.	**10**	**12**
	4.4	Moment and shear force diagram for rigid props.(No numerical problems involving solution by integration is expected. Use of standard formula only.)		
	SECTION-II			
5.	**Limit State of Collapse for Shear & Bond**			
	5.1	Concept of shear force and shear stress, diagonal tension,		
	5.2	Necessity of shear reinforcement, shear taken by concrete alone, design of vertical stirrups for shear reinforcement, minimum or nominal shear reinforcement.	**10**	**10**
	5.3	Concept of bond, bond stress, flexural bond, anchorage bond, development bond, anchorage length, development length.		
	5.4	Simple Numerical on calculation of development length. No problems to be asked on check for flexural bond.		

6		**Design of Slabs**		
	6.1	Types of slabs, concept of one way and two way action.	10	14
	6.2	Design of one-way simply supported slabs for flexure.		
	6.3	Design of two way simply supported slabs with corners free to lift.		
	6.4	Design of cantilever slabs.		
	6.5	Design of a flight of a dog-legged staircase.		
7		**Column & Footing**		
	7.1	Assumptions of limit state of collapse- compression.	06	08
	7.2	Classification of columns, min. eccentricity.		
	7.3	Analysis and design of axially loaded, short, square, rectangular and circular columns with lateral ties. (No helical steel).		
	7.4	Design of square sloped footing for square columns loaded axially. Calculations of depth & reinforcement for B.M. criteria only. (No checks for one way & two way shear.)		
8		**Columns**		
	8.1	Definition, types and classification of columns-long & short.	06	08
	8.2	Concept of buckling, different end conditions, effective length, radius of gyration, slenderness ratio.		
	8.3	Euler's theory, assumptions, buckling load, factor of safety. Safe load, application of Euler's theory to various sections & built-up sections. (Analysis problems only).		
	8.4	Empirical formula – Rankine's formula, for calculating load for various sections & built-up section (No derivation in theory examination).		
		Total	64	80

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
	SECTION-I	
1.	Assignment No. 1.	06
2.	Assignment No. 2.	06
3.	Assignment No. 3.	04
	SECTION-II	
4.	Assignment No. 4.	08
5.	Assignment No. 5	08
	Total	**32**

* Term work shall consist of assignments and three half imperial size drawing sheets showing typical RCC details of slabs, beams, columns staircase and footings designed in the assignments.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
	SECTION-I	
1.	Introduction	Lecture Method
2.	Introduction to LSM	Lecture Method, discussion
3.	Analysis of Beams	Lecture Method
4.	Design of beams	Lecture Method.
	SECTION-II	
5.	Limit state of collapse for shear & bond	Lecture Method
6.	Design of Slabs	Discussion, Lecture Method
7.	Column & Footing	Lecture Method.

Text Books:

Sr. No	Author	Title	Publication
1.	V.L. Shah & S.R. Karve	Illustrated RCC Design	Structures Publishers.
2.	B.C. Punmia	R.C. Structures	Std. Pub. Distributors
3.	H.J. Shah	Reinforced Concrete	Charotar Pub. House.
4.	P.C. Varghese	Limit State Design of Reinforced concrete	P.H.I. Pvt. Ltd.

Reference Books:

Sr. No	Author	Title	Publication
1.	Purushothaman P.	R.C.Struct. Elements, Behaviour, ana. & Design	TMH Pub. Co. Ltd.,
2.	V.L.Shah & S.R. Karve	Limit State Theory & Design of R.C.	Structures Publication
3.	N. Krishna Raju & R.N. Prakash.	Reinforced Concrete Design	New Age International.
4.	M.L. Gambhir.	Reinforce Concrete Design	P.H.I. Pvt. Ltd.

Learning Resources: Books, Relevant IS codes.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
SECTION-I					
1.	Introduction	04	--	--	04
2.	Introduction to LSM	04	04	--	08
3.	Analysis of Beams	--	04	12	16
4.	Design of beams	04	--	08	12
	Total	**12**	**08**	**20**	**40**
SECTION-II					
5.	L.S. of Collapse for Shear & Bond	02	02	06	10
6.	Design of Slabs.	02	04	12	18
7.	Column & Footing	02	04	06	12
	Total	**06**	**10**	**24**	**40**

(Prof. R.M. Koranhe)   **(Prof. S. B. Kulkarni)**   **(Prof. C.C. Dandvatimath)**
Prepared By   **Secretary, PBOS**   **Chairman, PBOS**

Programme	:	**Diploma in CE**
Programme Code	:	**01 /15**
Name of Course	:	**Project & Seminar**
Course Code	:	**CE 561**

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**--**	**--**
Practical	**08**	**128**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests, each of 60 minutes	--	--	--	--
Marks	**50**	**--**	**--**	**50**	**50**

Course Rationale:

The Project work is included in the curriculum to encourage the students to undertake and tackle an independent problem related to Civil Engineering field. The project also comprises of literature survey of a problem assigned. Students will be acquainted with the skill required for independent thinking and applications to a problem where he can develop in himself, self reliance.

Course Objectives:

After completing the project work, the student will be able to:
- Work independently as a leader as well as member of a team.
- Collect data and prepare a report of these activities.
- Use and integrate knowledge of different subjects to prepare working drawings of scheme.
- Draw detail drawing considering rules and laws for submission to sanctioning authority.

- Make simple designs according to data collected with the help of handbooks, standard data books, I.S. codes etc.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1	**Main Project**			
	1.1	The students will select a topic related to any course in the curriculum, design various units involved & submit a report of the work done. The Project work will be done by a group of 4 to 6 students. Oral will be based on term-work.	**64**	**75**
2	**Road Project**			
	2.1	Road project for all students for a road length of about 1 Km with at least one cross drainage work. First sheet on key plan, longitudinal section and cross section. Second sheet on details of cross drainage work will be prepared. Oral will be based on term work.	**40**	**45**
3	**Seminar**			
	3.1	Each student will select a topic related to technical field and collect detailed information on it. He / She will prepare a report & deliver a seminar on it. Seminar presentation will be assessed internally.	**24**	**30**
		Total	**128**	**150**

OR –(B) – Inplant Training				
4.	**In plant training**			
	4.1	The students will be placed in an industry for a period of 16 weeks. He will work 6 days in a week for 8 hours / day (768 hours). During the industrial training programme the students will get familiar with filed-work, skills and can co-relate his theoretical knowledge in the field. He will be familiar with field atmosphere and will get hands on experience on various construction activities, such as interpretation of drawing, Measurements & working out quantities. He will also supervise various activities on construction site such as concreting, masonry work, and finishing works. The students will maintain a daily diary in systematic manner & prepare a report on his in plant training.	**768**	**150**

The in plant training of the student will be monitored by a staff member from the institute once in a month

(Prof. C.C. Dandvatimath)   **(Prof. S. B. Kulkarni)**   **(Prof. C.C. Dandvatimath)**
I/c HCED   **C.D.C. Incharge**   **I/c H.C.E.D.**
Prepared By   **Secretary, PBOS**   **Chairman, PBOS**

Programme	:	**Diploma in CE**
Programme Code	:	**01 /15**
Name of Course	:	**Estimation & Costing**
Course Code	:	**CE 562**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**4**	**64**
Practical	**2**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	Two class tests, each of 60 minutes	4	--	--	--
Marks	**20**	**80**	--	**25**	**25**

Course Rationale:

The subject is of core Technology - Diploma Students will learn concepts, principles and procedures of Estimation and Contracts. The students should be able to (i) find the cost of Civil Engg structure (ii) calculate the quantities of material required (iii) Measurement of quantities during construction and after construction for necessary payments and also for repair and maintenance (v) P.W.D. procedure of Execution of Civil Engg works. (vi)Know administrative procedure to be - followed, for preparing Tender documents. Allotment of works to contractor, and supervision at the time of construction, economically by achieving the required strength.

Course Objectives:

After studying this course, student will be able to :–
- To prepare Estimate before construction
- To know modes and units of measurements, Rules for deduction as per IS 1200 for items.

- To draft specifications.
- To prepare rate analysis.
- To know procedure of Execution in P.W.D. and by - Builders, contractors
- To understand the Administrative procedure to be followed at the time of execution of the project
- To know how to maintain accounts of expenditure of the project.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
		SECTION-I		
1	**Types of Estimates**			
	1.1	Meaning of the terms - Estimating & Costing & Valuation.	06	10
	1.2	Purpose of Estimating & costing,		
	1.3	Types of Estimates		
	1.4	Uses of approximate estimates, method of approximate Estimate for buildings, roads, bridges. Irrigation works, water supply and sanitary works,		
	1.5	Detailed estimates, its uses and types Detailed Estimate for New works,		
	1.6	Revised estimate, Supplementary estimate,		
	1.7	Repair - Maintenance and Additions & alteration Estimates		
2	**Modes of Measurement**			
	2.1	Modes of Measurements of items of work as per P.W.D. and IS-1200.	03	06
	2.2	Desired accuracy in taking measurements		
3	**Detailed Estimates**			
	3.1	Requirements for preparing detailed Estimate	10	16
	3.2	Procedure for preparing detailed estimate		
	3.3	Procedure of taking out quantities for different items. Long wall short wall method, Centre line method.		
	3.4	Road Estimates, Quantities for Earth work in roads dams, canals, sectional area method, mean area method, trapezoidal method, prismoidal formula method.		

	3.5	Standard measurement sheet and abstract sheet.		
	3.6	Provisions to be made in detailed Estimates- contingencies, Work charged Establishments, water supply and sanitary works, electrification, Tools and plant, Quality control charges. Provisional quantities, provisional sum. Prime cost items		
	3.8	Small Exercises. Preparation of schedule of Bars.		
4.	**Water Supply and Sanitary Works**			
	4.1	Method of measurement of water supply and sanitary works based on IS-1200.	**05**	**08**
	4.2	Detailed estimate of water supply system, sanitary system &drainage in building.		
SECTION-II				
5.	**Rate Analysis**			
	5.1	Definition of Rate analysis, factors affecting rate analysis		
	5.2	Market rates of materials & labours. Requirements for preparing rate analysis.	**07**	**12**
	5.3	Definition of Task work, Task works of items, factors affecting Task work, Transportation charges, vehicles for transporting materials and their capacities .		
	5.4	Preparing rate analysis for items of Civil Engineering works, Schedule of rates		
6.	**Specifications**			
	6.1	Definition of specifications and its necessity.		
	6.2	Types of specifications. Points to be considered in framing the specification of an item. List of necessary information to be given in specification of an item.	**07**	**12**
	6.3	Drafting specification for building items. Standard specification book.		
7.	**Valuation**			
	7.1	Definition and necessity of valuation. Definition of cost, price and value and differences between them.		
	7.2	Types of values - book value, scrap value salvage value, speculation value, distress value, factors affecting value.	**10**	**16**
	7.3	Definition of depreciation and obsolescence, sinking fund		

	7.4	Methods of calculating depreciation. Straight line method, sinking fund method, contract percentage method, quantity survey method. Computation of capitalized value, gross income outgoing, net-Income, years purchase. Types of outgoings and their percentage.		
	7.5	Valuation of lands and buildings, factors affecting their valuation, Book value method, replacement value method & comparison method.		
	7.6	Fixation of rent as per P.W.D. practice.		
	7.7	Land acquisition act and its basic principle.		
	7.8	Lease hold property, free hold property, types of lease.		
	7.9	Mortgage, Mortgage deed precautions while making mortgage.		
		Total	**48**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Detailed Estimate of a Bldg at least 3-4 rooms with Flat roof.	06
2.	Detailed Estimate of any one of the following works .i) Septic Tank ii) Sump well iii)Community well	04
3.	Estimate of any one of the following (only given below items) i)Two room R.C.Cbldg ii)R.C.C.Cycle stand iii)R.C.C. bus stand iv)Elevated service reservoir a)Concrete Quantities b)Form work c)Steel Quantities	06
4.	Detailed Estimate Bitumen Road with Earth work	04
5.	Detailed Estimate of any one i) Pipe culverti i) Slab culvert iii) Canal iv) K.T. weir	06
6.	Prepare rate analysis for five items.	04
7.	Drafting of detailed specification for five items.	02
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
	SECTION - I	
1.	Types of Estimates	Class room teaching
2.	Modes of Measurement	Class room teaching, models
3.	Detailed Estimates	Class room teaching, transparencies
4.	Water Supply and Sanitary Works	Class room teaching
	SECTION - II	
5.	Rate Analysis	Market Survey
6.	Specifications	Class room teaching
7.	Valuation	Class room teaching

Text Books:

Sr. No	Author	Title	Publication
1.	B. N. Datta	Estimating & costing	UBS Publishers & Distributors Ltd. 5 Ansari Road, Delhi.
2.	G.S. Birdi	Estimating & costing	Dhanpat Rai & Sons. Delhi
3.	S.C. Rangawala	Elements of Estimating & costing	Charatar Publishers House Anand
4.	B.N. Chakraborty	Estimating & costing, Specification & valuation	M. Chakraborty, Calcatta 700026

Reference Books:

Sr. No	Author	Title	Publication
1.	--	Standard specification book	Govt. of Maharashtra
2.	Superintendent Engg. P. W.D. Pune – Circle, Pune	Schedule of Rates	Govt. of Maharashtra

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	**Comprehension**	**Application**	
SECTION-I					
1.	Types of Estimates	06	04	--	10
2.	Modes of Measurement	04	02	--	06
3.	Detailed Estimates	--	06	10	16
4.	Water supply & sanitary works	04	--	04	08
	Total	**14**	**12**	**14**	**40**
SECTION-II					
5.	Rate Analysis	04	04	04	12
6.	Specifications	04	04	04	12
7.	Valuation	04	04	08	16
	Total	**12**	**12**	**16**	**40**

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L.C.E.   I/c H.C.ED
Prepared By   Secretary, PBOS   Chairman, PBOS

Programme   :   **Diploma in CE**
Programme Code   :   **01 /15**
Name of Course   :   **Irrigation Engineering**
Course Code   :   **CE563**

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**4**	**64**
Practical	**02**	**32**

Evaluation Scheme:

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

Course Rationale:

India is basically an agricultural country and all its resources depend on agricultural out-put. Also, food production has to be increased to meet the increasing demand of food grains. Water is evidently the most vital resource in increasing agricultural out-put. Water is normally supplied to the plants by nature through rains. However, India has unequal distribution of rainfall over the country. This heads to the famine in one part and flood in other part of the country simultaneously. Proper distributions of water and flood control are the remedial measures that can be achieved through Irrigation and Irrigation Engineering. Therefore, knowledge of this applied technology course is must for the technicians like diploma holders to perform their duties when they are engaged in the field of Irrigation Engineering.

Course Objectives:

After studying this course, student will be able to :–
- To understand the procedure of investigation and data collection for Irrigation Projects.
- To enable the students to design & check feasibility of components of small Irrigation schemes.
- To promote ability of supervision of construction works of new Irrigation structures.
- To promote ability of supervision of construction works of new Irrigation structures.

Course Content:

Chapter No.		Name of Topic/Sub topic	Hrs	Weightage
SECTION-I				
1		**Introduction to Irrigation Engg.**		
	1.1	Definition and necessity of Irrigation in India. .	**03**	**04**
	1.2	Types of Irrigation,		
	1.3	Advantages and Disadvantages of irrigation. Single and Multipurpose projects.		
	1.4	Data collection for Irrigation projects.		
2		**Hydrology**		
	2.1	Precipitation, measurement of rainfall, rain gauges. Non-automatic and automatic rain gauges. Average rain-fall calculations - Arithmetic, average Method, Thiesson polygon method, Isohyetal Method.	**06**	**08**
	2.2	Catchments - Definition, types. Runoff - Factors affecting runoff computation of run-off. Inglis formula, Strange's table & curves,		
	2.3	Hydrograph. Estimation of yield from catchment. Maximum flood discharge - factors contributing value of MFD. Methods of estimation of MFD - Empirical formula,		
	2.4	River Gauging. Simple numerical problems on above sub-topics.		

3		Water requirements of crops		
	3.1	Cropping seasons and crops in Maharashtra.	07	08
	3.2	Definitions of terms - Crop season, crop period, base period, crop rotation, Intensity of Irrigation, command area, Gross command area, Culturable command area, Irrigable command area, Crop pattern.		
	3.3	Duty & Delta, Relation between duty & delta, factors affecting duty, Methods of improving duty. Time factor, capacity factor.		
	3.4	Simple problems on water requirements & capacity of Canal		
4.		**Reservoir Planning** :		
	4.1	Investigation for reservoir planning - computation of capacity from basin contour map, Capacity – Elevation and Area – elevation curves of a reservoir site. water tightness of reservoir, suitability of foundation,	08	10
	4.2	Selection of site for a reservoir.		
	4.3 4.4	Reservoir sedimentation - factors affecting silting, reservoir sediment control,		
	4.5	Evaporation from reservoir, method of reducing evaporation.		
	4.6	Calculation of dead storage, live storage, gross storage, flood absorption capacity of reservoir. Fixing control levels of reservoir - dead storage level, full reservoir level, high flood level and top of bund level.		
	4.7	Simple numerical examples on fixing control levels		
5.		**Minor Irrigation**		
	5.1	**Definition, types and study of an aquifer.**	08	10
	5.2	Well Irrigation - Open well, tube well, Yield of wells. Methods of determining yield- recuperation tests. Merits & demerits of well Irrigation.		
	5.3	Lift Irrigation - Definition, Layout of lift Irrigation scheme - components of lift Irrigation scheme such as		

		intake well, jack-well & pump house, rising main, main distribution chamber, gravity main.		
	5.4	Percolation Tank - Necessity, selection of site, Component parts and construction,		
	5.5	Underground bandhara.		
	5.6	Micro Irrigation - types of micro Irrigation – sprinkler and drip Irrigation - component parts, layout, operation and maintenance of scheme, merits &demerits, precautions to be taken for efficient working.		
SECTION-II				
6.	**Gravity Dams**			
	6.1	Classification of dams according to its use, hydraulic design, material.		
	6.2	Gravity dams - Forces acting on gravity dam, condition of stability, theoretical and practical profile, High & low dams.		
	6.3	Component parts and construction details of gravity dam.	08	10
	6.4	Function of drainage gallery, transverse gallery, Longitudinal gallery,		
	6.5	Outlets in gravity dams, Joints, keys and water seals in gravity dams.		
	6.6	Simple numerical examples on conditions of stability of a gravity dam.		
7.	**Earthen Dams**			
	7.1	Types of earthen dams, materials used.		
	7.2	Components of earthen dam & their functions.		
	7.3	Typical cross-sections of an earthen dam According to nature of foundation strata and its depth.	08	10
	7.4	Seepage through earthen dams, methods to reduce Seepage through embankment & foundation. Phreatic line & its characteristics.Slope protection,		
	7.5	Criteria for safe design of earthen dam. Construction and causes of failure of earthen dam.		

	7.6	Outlets through earth dams, function & component parts.		
8.	**Spillways**			
	8.1	Definition, purpose, Types of spillways - with & without gates-ogee spillway, conditions favoring each type.	**03**	**04**
	8.2	Energy dissipation below spillways, stilling basin.		
	8.3	Spillway crest gates - Radial and vertical lift gates.		
9.	**Diversion head-works**			
	9.1	Layout of diversion head-work - its component parts and their function - weir or barrage, divide wall, pocket, scouring sluices, silt excluder, silt extractor, fish ladder.	**03**	**04**
	9.2	Weirs - Functions, site selection, types - sloping weir, vertical drop weir, situation favoring its construction,		
	9.3	K.T.Weir component & construction.		
10	**Canals**			
	10.1	Definition, classification - based on the function and relative importance in the network of canals.		
	10.2	Canal alignments - ridge canal, contour canal, side slope canal		
	10.3	Typical cross section of canals, balancing depth of canal, canal discharge, Design of cross section of canals.		
	10.4	Canal structures - Necessity location & function of Head regulators, cross regulators, canal falls, canal escapes, canal outlets.		
	10.5	Cross-drainage works-Types - C.D. work carrying Canal over the drainage - Aqueduct, C.D. work carrying drainage over the canal - super-passage, canal siphon, C.D. work admitting the drainage water into the canal - level crossing. Selection of suitable type of C.D. work.	**08**	**08**
	10.6	Losses of water in canals. Canal lining- Definition, materials used advantages of providing canal lining, Types of canal lining.		
	10.7	Canal out-lets - location, function, requirement and types of canal outlets.		

	10.8	Maintenance of canals		
	10.9	Simple problems on design of canal cross section.		
	10.10	Definition, causes and control of water logging.		
11.	**Watershed Development**:			
	11.1	Definition, Necessity of Watershed Development,	**02**	**04**
	11.2	Works undertaken-Contour trenching, Nalla bunding, Vasant bandhara, slope protections, plantation.		
		Total	**64**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Assignment on Hydrology	04
2.	Assignment on Water requirement of crops	04
3.	Assignment on Reservoir Planning	04
4.	Assignment on Minor Irrigation.	04
5.	Assignment on Gravity Dams	04
6.	Assignment on Earthen Dams.	04
7.	Assignment on Spillways	04
8.	Assignment on Canals	04
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
	SECTION -I	
1.	Introduction to Irrigation Engg.	Class-room teaching
2.	Hydrology	Class-room teaching
3.	Water Requirements of Crops	Class-room teaching
4.	Reservoir Planning	Class-room teaching & Visit
5.	Minor Irrigation	Class-room teaching & Visit
	SECTION - II	
6.	Dams	Visits, Class-room teaching
7.	Earthen Dams	Visits, Class-room teaching
8.	Spillways	Visits, Class-room teaching
9.	Diversion Head works	Visits, Class-room teaching
10.	Canals	Visits, Class-room teaching
11.	Watershed Development	Visits, Class-room teaching

Text Books:

Sr. No	Author	Title	Publication
1.	Punmia, B.C., Pande B.B. Lal	Irrigation and water Power Engineering	Standard Publishers & Distributors, Delhi.
2.	Dahigaonkar J.G.	Test Book of Irrigation Engineering	Wheeler Publishing, Allahabad
3.	Gajare V.S.	Test Book of Irrigation Engineering	Nirali Prakashan, Pune - 2.

Reference Books:

Sr. No	Author	Title	Publication
1.	Garg S.K.	Irrigation and water Power Engineering	Khanna Publishers, Delhi - 6.
2.	Priyani V.B.	Irrigation Engineering	Charotar Book Stall, Anand

Learning Resources: Charts / Drawings, Models, Books

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
SECTION-I					
1.	Introduction to Irrigation Engineering	02	02	--	04
2.	Hydrology	02	02	04	08
3.	Water Requirements of Crops	02	04	04	10
4.	Reservoir Planning	--	04	06	10
5.	Minor Irrigation	02	02	04	08
	Total	**08**	**14**	**18**	**40**
SECTION-II					
6.	Dams	04	--	06	10
7.	Earthen Dams	--	04	06	10
8.	Spillways	--	02	02	04
9.	Diversion Head works	--	02	02	04
10.	Canals	--	04	04	08
11.	Watershed Development	02	02	--	04
	Total	**06**	**14**	**20**	**40**

(Prof. P.S. Dale)   **(Prof. S. B. Kulkarni)**   **(Prof. C.C. Dandvatimath)**
Ex-H.CED., GPDL, Pune   **I/c H.C.ED**
Prepared By   **Secretary, PBOS**   **Chairman, PBOS**

Programme	:	**Diploma in CE**
Programme Code	:	**01 /15**
Name of Course	:	**Environmental Engineering**
Course Code	:	**CE564**

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**4**	**64**
Practical	**02**	**32**

Evaluation Scheme:

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

Course Rationale:

Water plays a critical role in maintaining a balance between living things and the environment in which they live. The quest for pure water can benefit the life and health of everyone. Water purification is now confronted with a myriad of difficulties. Problems caused due to sources receiving greatly increased pollution loads of domestic and industrial wastes. This course is an attempt to present those essential principles and present day practices necessary to the solution of the problems of water collection, water purification and water distribution.

Every community produces both liquid as well as solid wastes. If the waste matter, created and given out by the human and animal life, is allowed to accumulate, it will get decomposed and will contaminate or pollute air, water and food. Hence it is essential to remove the contaminants from the waste water through appropriate treatment methods. This course is an attempt to present essential principles and modern practices and techniques in the field of sanitary Engineering.

Course Objectives:

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

Section – I – Water supply Engineering :
- Know various water demands and demand of water to city.
- Know standards of purity of water.
- Understand different methods of water treatment and design, construction and maintenance aspects of treatment units.
- Understand methods of distribution of water.

Section – II – Sanitary Engineering :
- Know the methods of collection and disposal of dry refuse in villages and town.
- Understand significance, use and maintenance of various sanitary fittings used for house drainage.
- Understand different methods of sewage treatment.
- Understand design, construction and maintenance of water carriage system of sewerage.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
	SECTION-I			
1	**Water Supply Engineering Introduction :**			
	1.1	General importance of water supply project. Need for protected water supply		
	1.2	Sources of water supplies Surface and ground water sources, requirements of source of water.		
	1.3	Intakes – canal intake, river intake, reservoir intake. Location of intake works	03	04
	1.4	Duties of water work Engineer.		
	1.5	Air pollution, soil pollution, cause of air & soil pollution & remedies.		

2	Quantity of Water :			
	2.1	Demand – Meaning, factors affecting rate of demand.		
	2.2	Types of demand – Domestic, public, industrial, fire fighting, compensate losses demand. Per capita Demand, design period.	06	08
	2.3	Estimating population-Methods of population forecasting. Factors affecting estimated population.		
3	Quality of Water :			
	3.1	Potable/wholesome water		
	3.2	Reasons for analysis of water.		
	3.3	Impurities present in water.		
	3.4	Collection of water samples, precautions to be taken while collecting water samples.	03	04
	3.5	Tests on water Physical, chemical and Bacteriological tests.		
	3.6	Standards of water purity for portable water (As per specification).		
4.	Treatment of Water			
	4.1	Aeration: Objects, Methods of aeration.		
	4.2 4.3	Sedimentation: Plain sedimentation-objects, theory of plain sedimentation. Types of tanks.		
	4.4	Sedimentation with coagulation. Purpose, Principle of coagulation, Chemical coagulation, Advantages of alum, Feeding devices-wet feed and dry feed, Mixing devices, Flocculation, jar test for optimum coagulant dose.	10	12
	4.5	Filtration:- 1) General 2) Theory of filtration 3)Requirements of Sand for filtration 4) Gravel for filtration 5) Classification of filters 6) Slow Sand filter (over-view) 7) Rapid Sand filters (gravity pipe) Construction and working of rapid sand filters. Loss of head and negative head and back washing of filters. Comparison between slow sand & rapid sand filter.		

	4.6	Objects of disinfection: Theory of disinfection, Minor methods of disinfection. Chlorination: Properties of chlorine, action of chlorine. Application of chlorine forms of chlorination. -Break point chlorination-its importance, residual chlorine, Tests for chlorine, Orthotolodine test, starch-iodide test		
	4.7	Flow diagram of water treatment plant.		
5.	**Conveyance and Distribution of water**			
	5.1	Conveyance: Meaning, pipes used in conveyance of water		
	5.2	Joints in pipes, Laying and testing of pipes,		
	5.3	Valves- Sluice air relief, reflux, scour valve, their functions and location on pipeline.		
	5.4	Distribution System: Gravity system, pumping system, Dual system. Layout of distribution system Dead end system, Grid iron system Circular system, Radial system.	**10**	**12**
	5.5	ESR, GSR, service reservoir & their purpose		
	5.6	Systems of supply of water. Continuous system, Intermittent system		
	5.7	Water supply arrangement in buildings		
SECTION –II				
6.	**Sanitary Engineering Introduction**			
	6.1	Necessity and principles of sanitation,		
	6.2	Some common terms used in sanitary Engineering,		
	6.3	Aims and objects of sewage-disposal. Conservancy system, water-carriage system, Merits and demerits of these systems. Types-separate, combined, partially separate system, their merits & demerits,	**06**	**06**
	6.4	Methods of collection, conveyance and disposal of dry refuse.		

7.	**Quantity of sewage, sewers and sewer appurtenances**			
	7.1	Sources of Sanitary sewage,		
	7.2	Factors affecting quantity of Sewage, Variations in quantity of Sanitary sewage, Peak flow, minimum flow, Storm water.		
	7.3	Factors affecting storm sewage. Design period Minimum velocity, maximum velocity or non-scoring and self-cleansing velocity, Size of sewers, Materials for sewers, sewer joints,	04	10
	7.4	Laying and testing of sewers.		
	7.5	Sewer Appurtenances: Manholes- types, purpose, location Inlets, Sand, Oil, and grease traps. Catch basins, Ventilation of Sewers.		
8.	**Quality of Sewage**			
	8.1	Characteristics of Sewage-physical, chemical, biological.		
	8.2	Importance of B.O.D. aerobic and anaerobic decompositions.	04	04
	8.3	Chemical oxygen demand-COD its significance.		
9.	**Sewage Treatment**			
	9.1	Objects of treatment, degree of treatment		
	9.2	.Primary treatment- Screens, Grit chamber, detritus tank Skimming tanks, clarifiers, coagulation.		
	9.3	Secondary treatment- Activated sludge process. Trickling filters.		
	9.4	Sludge disposal methods- drying beds, disposal into sea, Incineration, press and vacuum filters, sludge digestion tanks	10	10
	9.5	Effluent disposal methods, Septic tanks.		
10.	**House drainage (Building sanitation):**			
	10.1	Meaning, principles of house drainage		
	10.2	Traps- p. q. s. traps, floor trap, gully traps, interceptor traps.. Inspection chambers. Sanitary fittings – sinks,	08	10

		urinals, basins, flushing cisterns, water closets-Indian & European type		
	10.3	Systems of plumbing-single stack, one pipe system, and one pipe partially ventilated Two pipe systems.		
	10.4	Drainage plans of buildings. Testing & Maintenance of house drainage system. Role of State Pollution Control Board regarding water supply and Wastewater treatment.		
		Total	**64**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Assignment- Collecting data regarding population of city / village and forecast population after 3 decades and find out the Total water demand	04
2.	Water Analysis. Conduct tests on water sample to determine its - 1) Turbidity 2) PH value 3)Total dissolved solids 4) Dissolved oxygen	04
3.	Conduct test on water Sample for determination of optimum dose of coagulant.*Visit to a water treatment plant to study various treatment units and functions. Prepare detailed visit report and flow chart.	08
4.	Study of different fixtures used in Building water supply like water meter, taps, elbow, bend, Junction, showers etc. Study of different types of joints and values.	04
5.	Visit to sewage treatment plant to study the different units and their functions and preparing layout plan and visit report.	08
6.	Visit to residential/ public buildings to study different systems of plumbing and sanitary fitting like W.C. Urinals, Flushing cisterns, Assignment –Prepare the layout plan of house drains system for two storied residential building and show all details like pipes, drains, traps I.C. etc.	04
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
	SECTION - I	
1.	Introduction	Chalk, board, Transparencies.
2.	Quantity of water	Chalk, board
3.	Quality of water	Chalk, board, Transparencies, Lab Work
4.	Treatment of water	Chalk, board, chart, Visits
5.	Conveyance and distribution of water	Chalk, board, Transparencies, field visit
	SECTION - II	
6.	Introduction	Chalk, board,
7.	Quantity of Sewage, Sewers & Appurtenances.	Chalk board
8.	Quality of Sewage	Chalk, Black board, Models, field visit
9.	Sewage Treatment	Chalk, board, Field visits
10.	House drainage	Chalk, board, Model, Visits

Text Books

Sr. No	Author	Title	Publication
1.	S.C.Rangwala	Water supply & Sanitary Engineering.	Charotar Book Stall, Anand
2.	Santosh Garg.	Water supply & Sanitary Engineering	Khanna Publications, New Delhi
3.	G.S. Birdie & J.S. Birdie	Water supply & Sanitary Engineering	Dhanpat Rai & sons. New Delhi.

Reference Books:

Sr. No	Author	Title	Publication
1.	A Kamala	Environmental Engg.	Tata McGraw.
2.	V.N.Gharpure	Water supply Engg	Pune Engg. Book Publishing Co.
3.	V.N.Gharpure	Sanitary Engg.	Pune Engg. Book Publishing Co.

Specification Table:

Sr. No.	Topic	Knowledge	Comprehension	Application	Total
		Cognitive Levels			
SECTION-I					
1.	Introduction	04	---	--	04
2.	Quantity of Water	--	04	04	08
3.	Quality of Water	--	04	--	04
4.	Treatment of Water	04	02	06	12
5.	Conveyance & distribution of water	04	04	04	12
	Total	**12**	**14**	**14**	**40**
SECTION-II					
6.	Introduction	06	--	--	06
7.	Quantity of Sewage, Sewers & Sewers appurtenances	02	04	04	10
8.	Quality of Sewage	--	04	--	04
9.	Sewage Treatment	04	04	02	10
10.	House drainage	04	02	04	10
	Total	**16**	**14**	**10**	**40**

(Prof. P.S. Dale)   **(Prof. S. B. Kulkarni)**   **(Prof. C.C. Dandvatimath)**

Ex-H.CED., GPDL, Pune   **I/c H.C.ED**

Prepared By   **Secretary, PBOS**   **Chairman, PBOS**

Programme	:	**Diploma in CE**
Programme Code	:	**01 /15**
Name of Course	:	**Contracts & Accounts**
Course Code	:	**CE565**

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Two class tests each of 60 minutes.**	3	--	--	--
Marks	**20**	**80**	--	**25**	**25**

Course Rationale:

The course is of core Technology - Diploma Students will learn concepts, principles and procedures of Contracts and Accounts. The students should be able to (i) P.W.D. procedure of Execution of Civil Engg works. (ii) Know administrative procedure to be - followed, for preparing Tender documents. Allotment of works to contractor, and supervision at the time of construction, economically by achieving the required strength.

Course Objectives:

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

- To know procedure of Execution in P.W.D. and by - Builders, contractors
- To understand the Administrative procedure to be followed at the time of execution of the project.
- To know how to maintain accounts of expenditure of the project.
- Understand design, construction and maintenance of water carriage system of sewerage.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
SECTION-I				
1	**Tenders and Tender documents**			
	1.1	Inviting Quotations & Tenders.		
	1.2	Drafting of Tender notices,		
	1.3	Classification of tenders.	**08**	**12**
	1.4	Tender Notice and Information to be given in tender notice.		
	1.5	Preparation of Tender document for Building Road & Irrigation works Scrutiny of tenders, work order		
2	**Contract**			
	2.1	Definition, object and requirement of Valid contract.		
	2.2	Types of contracts. Lump sum, item rate, percentage, cost plus percentage rate contract, Labour contract and sub-contract, B.O.A.T. type contract.	**08**	**12**
3	**Conditions of contract**			
	3.1	Earnest Money, security deposit, time limit and its importance.		
	3.2	Important conditions of contracts like defect liability period		
	3.3	Liquidated damages.	**08**	**16**
	3.4	Arbitration, Termination of contract, subletting of contract		
	3.5	Escalation/price and Extra items.		
SECTION –II				
4.	**Methods of Execution of works**			
	4.1	Fundamental principles of execution of work in P.W.D. & in private sector		
	4.2	Procedure for Administrative approval, technical sanction	**06**	**12**
	4.3	Procedure of execution or work by appointing various subcontractors in private sector.		

	4.4	Piece work, Rate list, day's work. Departmental method, Daily labour		
	4.5	Procedure of Registration as contractor in P.W.D. Various certificates required from corporation (Local bodies) in connection with construction.		
5.	**Payments of works and supplies**			
	5.1	Measurement Book, Inspection and checking the measurement.		
	5.2	Method of measurement work and payment in private sector.	**06**	**10**
	5.3	Interim payment, secured Advance, Advance payment, petty advances. Running Bill and Final Bills, Mobilization Advance, Bill Forms		
6.	**Accounts**			
	6.1	Classification of Accounts,		
	6.2	Heads of Accounts.		
	6.3	Importance of maintaining accounts of works and stores	**06**	**08**
	6.4	Daily diary, Imprest, Indent, bin card, work abstract, Computerization of accounts in office and store.		
7.	**Arbitration**			
	7.1	Arbitration, duties & quality of Arbitrator needs of Arbitration.		
	7.2	Arbitration procedure of selflement of disputes in Civil Engineering contract by arbitration. Arbitration awards, setting aside of the award.	**06**	**10**
	7.3	Power of court to modify award. Renoval of arbitrators advantages of arbitration over a court decision.		
		Total	**48**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Prepare following tender documents as per P.W.D. norms for building works. i) Tender Notice ii) Tender Agreement iii) Schedule A & B	08
2.	Assignment on conditions of contract	08
3.	Assignment on Payments of works and supplies	08
4.	Assignment on Arbitration.	08
	Total	32

Instructional Strategy:

SECTION -I		
Sr. No.	**Topic**	**Instructional Strategy**
1.	Tender & Tender documents	Class room teaching
2.	Contracts	Class room teaching
3.	Conditions of contract	Class room teaching,
SECTION - II		
4.	Methods of Execution of works	Class room teaching
5.	Payments of works & supplies	Class room teaching
6.	Accounts	Class room teaching

Text Books :

Sr. No	Author	Title	Publication
1.	B. N. Datta	Estimating & costing	UBS Publishers & Distributors Ltd. 5 Ansari Road, Delhi.
2.	G.S. Birdi	Estimating & costing	Dhanpat Rai & sons
3.	S.C. Rangawala	Elements of Estimating & costing	Charatar Publishers House Anand
4.	B.S. Patil	Contracts and Estimates	Orient Longman Ltd. Delhi
5.	B.S.Chakraborty	Estimating & costing, Specification & valuation	M. Chakraborty, Calcatta 700026

Reference Books:

Sr. No	Author	Title	Publication
1.	---	Standard specification book	Govt. of Maharashtra
2.	Superintendant Engg. P. W.D. Pune - Circle Pune	Schedule of Rates	Govt. of Maharashtra

Learning resources: Books, Schedule of rates, specification Book, Tender Documents.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
SECTION-I					
1.	Tender & Tender documents	06	---	06	12
2.	Contracts	06	06	---	12
3.	Conditions of contract	06	04	06	16
	Total	**18**	**10**	**12**	**40**
SECTION-II					
4.	Methods of Execution of works	04	04	04	12
5.	Payments of works & supplies	02	02	06	10
6.	Accounts	04	04	--	08
7.	Arbritration	02	04	04	10
	Total	**12**	**14**	**14**	**40**

(Prof.C.C.Dandvatimath)	**(Prof. S. B. Kulkarni)**	**(Prof. C.C. Dandvatimath)**
H.CED.		**I/c H.C.ED**
Prepared By	**Secretary, PBOS**	**Chairman, PBOS**