

Sl. No	Code	Course	Study Scheme				Evaluation Scheme							Total Marks	Credit
			Pre-requisite	Contact Hours / Week			Theory			Practical					
				L	T	P	End Exam	Progressive Assessment			End Exam	Progressive Assessment			
								Class Test	Assignment	Attendance		Sessional	Viva-voce		
1	CE511	Irrigation Engineering	CE406	3	0	0	70	15	10	5	0	0	0	100	3
2	CE507	Geo-Technical Engineering II	CE506	3	1	0	70	15	10	5	0	0	0	100	4
3	CE502	Design & Detailing II	CE501	3	0	2	70	15	10	5	0	50	0	150	4
5	CE601-604	Elective I		3	1	0	70	15	10	5	0	0	0	100	4
6	CE601-604	Elective-II		3	1	0	70	15	10	5	0	0	0	100	4
7	CE517	Project		0	0	6	0	0	0	0	0	100	50	150	3
8	CE516	Professional Practices – V*		0	0	4	0	0	0	0	0	50		50	2
TOTAL				15	3	12	350	75	50	25	0	200	50	750	24

IRRIGATION ENGINEERING

L T P
3 0 0

Curri. Ref. No.: CE511

Total Contact hrs.:

Total marks: 100

Theory:

Theory: 45

End Term Exam: 70

Theory Class duration:

P.A.: 30

45 classes of 1hr. or

60 classes of 45 minutes

Pre requisite: CE406

Credit: 3

RATIONALE:

Many diploma holders in civil engineering supervise the construction or perform the maintenance of canals, head-works, river training works, cross drainage works, regulatory and other works. Some of diploma holders are also engaged for preventing water logging and irrigation by tube-wells. For a state which does not have a major Irrigation System the subject can be offered as an elective one so that an willing student can plan his carrier in Irrigation Engineering.

Aim:

This subject Irrigation Engineering aims imparting knowledge regarding hydrology, flow irrigation - storage and distribution system, constructional features of head works, river training works, cross drainage works, causes and prevention of water logging and construction of tube-wells.

UNIT TOPIC/SUB-TOPIC Hrs. Total hrs.

1.0	INTRODUCTION:	2
	1.1 Definition of irrigation	
	1.2 Necessity of irrigation	
	1.3 History of development of irrigation in India	
	1.4 Types of irrigation	
	1.5 Sources of irrigation water	
2.0	RAIN FALL AND RUN OFF	3
	2.1 Definition of rainfall and run-off. Catchment area, relationship, Dicken's and Ryve's formulae	
	2.2 Types of rain gauges - Automatic and non-automatic	
	2.3 Stream gauging	
	2.4 Concepts of Hydrograph	
3.0	WATER REQUIREMENT OF CROPS	3
	3.1 Definition of crop season	
	3.2 Duty, Delta and Base Period, their relationship	

	3.3	Gross command area, culturable command area, Intensity of Irrigation, Irrigable area	
	3.4	Water requirement of different crops - Kharif and Rabi	
4.0		LIFT IRRIGATION:	4
	4.1	Types of wells - shallow and deep well, aquifer types, ground water flow, construction of open wells and tube-wells	
	4.2	Yield of an open tube-well and problems	
	4.3	Methods of lifting water - Manual and mechanical devices, use of wind mills	
5.0		FLOW IRRIGATION:	7
	5.1	Irrigation canals	
	5.2	Perennial irrigation	
	5.3	Different parts of irrigation canals and their functions	
	5.4	Sketches of different canal cross-sections	
	5.5	Classification of canals according to their alignment	
	5.6	Design of irrigation canals - Chezy's formula, Mannings formula, Kennedy's and Lacey's silt theories and equations, comparison of above two silt theories, critical velocity ratio	
	5.7	Various types of canal lining - Advantages and disadvantages	
6.0		DIVERSION HEAD WORKS:	3
	6.1	Definition, necessity & objective	
	6.2	General layout, functions of different parts of barrage	
	6.3	Difference between weir and barrage	
7.0		REGULATORY WORKS:	3
	7.1	Functions and explanation of terms used	
	7.2	Cross and head regulators	
	7.3	Falls	
	7.4	Energy dissipaters	
	7.5	Outlets - different types	
	7.6	Escapes	
8.0		CROSS DRAINAGE WORKS:	3
	8.1	Functions and necessity of the following types: aqueduct, siphon, super-passage, level crossing, inlet and outlet	
	8.2	Constructional detail of the above	
9.0		FLOOD CONTROL:	8
	9.1	Necessity, storage structure - dam: Classification: Earthen, masonry and concrete dams	
	9.2	Earthen dams - types, necessity, advantages of earthen dams, materials used in construction, compaction of soil, drainage problem, causes of failure and protection against failures	
	9.3	Masonry and concrete dams: Forces acting on the dam, stresses developed at the base, solution of numerical problems	

9.4	Labeled cross section of gravity dam, Spillways	
9.5	River training works	
10.0	WATER LOGGING AND DRAINAGE:	2
10.1	Definition, causes and effects, detection, prevention and remedies	
10.2	Surface and sub-surface drains and their layout	
11.0	TUBEWELL IRRIGATION:	4
11.1	Introduction, occurrence of ground water, location and command, advantages of tube-wells	
11.2	Tube-wells, explanation of terms water table, radius of influence, depression head, cone of depression, confined and unconfined aquifers	
11.3	Types of tube-wells and their choice-cavity, strainer and slotted type	
11.4	Method of construction-- boring, installation of well assembly, development of well, pump selection, installation and maintenance	
	Class Tests:	3

REFERENCES:

1. Irrigation Engineering - by Basak, N.N.; Tata Mc-Graw Hill
2. A Text Book on Irrigation Engineering - by Singhal, RP; Singhal Publications
3. Fundamentals of Irrigation Engineering - by Bharat Singh; Roorkee, Nem Chand & Bros.
4. Irrigation Engineering and Hydraulics Structures - by Garg, Santosh Kumar; Khanna Publishers, Delhi
5. Irrigation and Water Power Engineering - by Purnima, BC and Pande Brij Bansi Lal; Standard Publishers Distributors, Delhi
6. Text Book of Irrigation Engineering and Hydraulics Structures - by Sharma, RK; Oxford and IBH Publishing Company, New Delhi
7. Principles and Practice of Irrigation Engineering - by Sharma, SK; Prentice Hall of India Pvt. Ltd., New Delhi

GEO-TECHNICAL ENGINEERING – II

L *T* *P*
3 1 0

Curri. Ref. No.: CE507

Total Contact hrs.:

Total marks: 100

Theory:

Theory: 45

End Term Exam: 70

Tutorial: 15

P.A.: 30

Theory Class duration:

45 classes of 1hr. or

60 classes of 45 minutes

Pre requisite: CE 506

Credit: 4

RATIONALE:

The knowledge and skills of Geo-Technical Engineering is very important subject of Civil Engineering. Practical works in Geo-Technical Engineering are equally important. The theory together with practices of this subject will definitely help the Practicing Civil Engineers in Civil Engineering Construction Works, specially in the design and construction of building foundation.

AIM:

Geo-technical Engineering II aims at imparting basic knowledge on Earth Pressure Theories, slope stability, soil exploration, bearing capacity and settlement analysis of shallow foundations, deep foundations and introduction to soil improvement and stabilization techniques.

UNIT	TOPIC/SUB-TOPIC	Hrs.	Total hrs.
1.0	EARTH PRESSURE THEORIES	8	
	1.1 Rankine & Colomb's Earth Pressure theories		
	1.2 Determination of Earth Pressure on retaining wall by applying Rankine's Theory, simple problems		
	1.3 Stability of retaining walls: Fundamental consideration (no derivation)		
2.0	STABILITY OF SLOPES	4	
	2.1 Introduction, definition and types of slope		
	2.2 Slope protection measures		
3.0	SHALLOW FOUNDATIONS	12	
	3.1 Types and definition		
	3.2 Bearing capacity analysis of isolated shallow foundation by Terzaghi's and IS code method (IS 6403-1981)		

	3.3 Settlement: Immediate and consolidation settlement, estimation of immediate and consolidation settlement of isolated footings (IS 8009-part I), simple problems		
4.0	SOIL EXPLORATION & SITE INVESTIGATION	6	
	4.1 Methods, undisturbed and disturbed samples, sampling and samplers		
	4.2 Standard penetration test, plate load test (demonstration of tests)		
5.0	DEEP FOUNDATION	6	
	5.1 Types: Pile foundation, Pier, Well foundation		
	5.2 Determination of pile capacity by IS code method (IS 2911)		
6.0	INTRODUCTION TO GROUND IMPROVEMENT & SOIL STABILIZATION TECHNIQUES	6	
	6.1 Different methods: Pre loading, sand drains, stone columns, grouting, earth reinforcement and stabilization by using admixtures (applicability and fundamental considerations only), Applications of geotextiles and geo-synthetics		
7.0	CLASS TEST	3	
	TOTAL:		45

REFERENCE BOOKS:

S l N o	N a m e o f B o o k	A u t h o r	P u b l i s h e r
1	Principles of Foundation Engineering	B . M . D a s	T h o m s o n
2	Soil Mechanics and Foundation Engineering, 2 ^e ed , w / C	B u d h a	W i l e y I n d i a
3	Soil Mechanics SI Version	L a m b	W i l e y I n d i a
4	Soil Mechanics & Foundation Engineering	R a o	P e a r s o n
5	Soil Mechanics & Foundation Engineering	B . C . P u n m i t A s h o k J a i n A r u n J a i n	L a x m i P u b l i c a t i o n
6	Basic Soil Mechanics Foundation	A l a m S i n g h	C B S P u b l i s h e r
7	Soil Mechanics & Foundation Engineering	V N S M u r t h y	C B S P u b l i s h e r
8	Relevant IS Codes: IS 6403, IS 8009, IS 1892, IS 2911		B u r e a u o f I n d i a S t a n d a r d

- 1.3 Combined detailed drawing of a two storied building with load-bearing wall spread footing and R.C. isolated column footing. (Plate IV).

TOTAL: 30

THEORY

2.0	Design of simple steel structures	15
2.1	State and sketch types of joints, explain and show failure of joints through sketches.	
2.2	State the permissible stresses in rivets and bolts; Design joints (excluding joints subjected to moments).	
2.3	Design determinate framed structure connections, solve problems for riveted and bolted connections.	
2.4	Welding: State and explain the uses and types of welding.	
2.5	State the permissible stresses in welding, minimum size of welding.	
2.6	Design simple welded connections for axial forces.	
3.0	Tension Members	5
3.1	State and sketch the common sections of tension members. State the permissible stresses for structural steel.	
3.2	Explain the net effective sectional area for angles and tees under different conditions, use structural steel section hand book, Design tension members (angle & tubular sections) with detailing, and solve problems.	
4.0	Compression Members	5
4.1	Distinguish between a strut and a column, short and a long column. Explain effective length, state maximum slenderness ratio of different compression members.	
4.2	Explain and perform design of axially loaded compression members (angle & tubular sections) as per IS 800, solve problems	
5.0	Design of simple steel beams for bending and shear	3
6.0	Design (as per IS:883-1970) of timber structural elements for	4

7.0	tension, compression and flexure as well as detailing of joints Stair Case (RCC - LSM)	3	
7.1	State & draw important types of staircases, explain effective span & principles of design		
7.2	Design a dog-legged stair case and show the details of reinforcement		
8.0	Design of footings (RCC - LSM)	4	
8.1	State and sketch different types of footings		
8.2	Explain proportioning of footings, basis of design of footings, soil pressure on foundation, design of independent footings, checking for development lengths, procedure for design of footings		
8.3	Design simple masonry foundation and R.C. slab foundation for a masonry wall		
8.4	Design isolated reinforced concrete square & rectangular footings for given data & draw detailed drawings		
8.5	Solve problems		
9.0	Concept of seismics in Planning and Design of Buildings	03	
9.1	Introduction of earthquakes		
9.2	Magnitude and intensity as per IS:1893-2002		
9.3	Seismic Zoning, zones of different cities (IS:1893-2002)		
9.4	Planning a building in a seismic prone area, general structural arrangement configuration, and requirements of earthquake resistance construction as per IS: 4326		
9.5	Ductile detailing of R.C. structural elements as per IS:13920, detailing of beams, columns and their junctions		
	Class Test:	3	
	TOTAL:		45

REFERENCE BOOKS:

1. Design of Steel Structure -by V.N. Vazirani & M.M. Ratwani
2. Design of Steel Structure -by S. Ramamrutham
3. Design of Steel Structure -by B.N. Duggal
4. Design of Steel Structure -by Kazmi & Jindal
5. Code of Practice for design of structural timber in building - IS:883-1970
6. Limit State Design of Reinforced Concrete - by P.C. Varghese
7. Reinforced Concrete : Limit State Design - by A.K. Jain
1. Reinforced Concrete - by H.J. Shah
2. Design Aids for Reinforced Concrete t0 IS: 456-1978, BIS, SP-16
3. Handbook on Concrete Reinforcement & detailing, BIS, SP-34

2.3	Approach zone survey	
2.4	Soil and drainage survey	
3.0	Aspects of Airport Design and Construction	6
3.1	Flexible and Rigid pavements for airport	
3.2	Brief explanation of factors influencing design of rigid and flexible airport pavements	
3.3	Methods of construction	
3.4	Precautions for quality control and durability	
	Class Test	1
	RAILWAYS	
4.0	Introduction:	2
4.1	Railway terminology	
4.2	Advantages of railways	
4.3	Classification of Indian Railways	
5.0	Permanent way	3
5.1	Definition and components of a permanent way	
5.2	Concept of gauge, different gauges prevalent in India, suitability of these gauges under different conditions	
6.0	Track materials	10
6.1	Rails	
6.1.1	Functions and requirement of rails	
6.1.2	Types of rail sections, length of rails	
6.1.3	Rail joints – types, requirement of an ideal joint	
6.1.4	Purpose of welding of rails & its advantages	
6.1.5	Creep – definition, cause & prevention	
6.2	Sleepers	
6.2.1	Definition, functions & requirements of sleepers	
6.2.2	Classification of sleepers	
6.2.3	Advantages & disadvantages of different types of sleepers	
6.3	Ballast	
6.3.1	Functions & requirements of ballast	
6.3.2	Materials for ballast	
6.4	Fixtures & fastenings	
6.4.1	Connection of rails to rail-fishplate, fish bolts	
6.4.2	Connection of rails to sleepers	
7.0	Geometric for Broad gauge	4
7.1	Typical cross sections of single & double broad gauge	

9.1	Types of signals, location, functional characteristics, special signals	
10.0	Laying & maintenance of track	4
10.1	Methods of laying & maintenance of track	
10.2	Details of a permanent way inspector	
	Class test	2

REFERENCE BOOKS:

1. Dock & Harbour Engg. - by S.P. Bindra; Bhanpat Rai & sons
2. Transportation Engineering Vol.II - by N. Vazirani & S.P. Chandruta; Khanna Publishers
3. A Text Book of Railway Engineering - by S.C. Rangawala
4. A Text Book of Railway Engineering - by R.S. Deshpande; Poona United Book Corporation
5. Roads, Railway, Bridge and Tunnel - by B.L. Gupta & Amit Gupta; Standard publishers

ENVIRONMENTAL ENGINEERING

L *T* *P*
3 1 0

Curri. Ref. No.: CE602

Total Contact hrs.: 60

Total marks: 100

Theory:

Theory: 45

End Term Exam: 70

Tutorial: 15

P.A.: 30

Credit: 4

RATIONALE:

The construction activities taken up by the technical personnel, civil engineering technicians in particular, are responsible for the environmental degradation. The civil engineers are also responsible for adopting the remedial measures. As such, a civil engineering diploma holder should have adequate knowledge about the types of pollution caused by various construction activities for adopting preventive and remedial measures. They should be also be aware of the various environmental laws for effective control of environmental pollution.

AIM:

The course content of Environmental Engineering has been designed to provide adequate information to develop competency in a learner to-

1. explain the different aspects of environmental engineering
2. relate the various components of ecosystem
3. identify the sources and effects of environmental pollution
4. analyze the polluted water, air and soil by using appropriate sampling method
5. describe the role of various agencies in environmental pollution and the environmental laws.

COURSE CONTENT:

<u>UNIT</u>	<u>TOPIC/SUB-TOPIC</u>	<u>Hrs. Total hrs.</u>
1.0	INTRODUCTION:	04
	1.1 Definition of environment and components of Environment and related terms	
	1.2 Aims & objectives of environmental engineering	
	1.3 Impact of population growth, industrialization & urbanization and energy growth on environment	
	1.4 Current issues of environmental concern like-Global warming, Acid rain, Ozone depletion-features, causes and impacts on living being	
2.0	ECOLOGY:	06
	2.1 Concepts of ecosystem and its component	
	2.2 Energy flow through an ecosystem	
	2.3 Biochemical cycles-C,N,P	
	2.4 Interrelationships between communities in an ecosystem	
	2.5 Sustainable development	
3.0	ENVIRONMENTAL POLLUTION:	15
	3.1 Definition of terms, parameters of pollution, types of pollution	
	3.2 Water Pollution- Types of pollutants & their characteristics, Sources of pollutants, effects of water pollution, standards for industrial effluents, remedial measures for control	

3.3	Air Pollution- Types of pollutants & their characteristics Sources of pollutants, effects of pollutants on human, plants & vegetation, structures etc, permissible limits as per Indian and International standard, remedial measures for control	
3.4	Noise Pollution-definition and measure of noise, types, Sources of pollution, effects of noise pollution, prevention & control measures	
3.5	Land Pollution- Causes, Effects of Pesticides & fertilizers used in agricultural practice, impacts of blasting & open cast mining, degradation due to deforestation and due to natural disaster like land subsidence, case studies on mining; blasting and deforestation, soil pollution management-land conservation and land reclamation	
4.0	POLLUTION SURVEY:	05
4.1	Planning survey, sampling locations, criterion, equipment, and techniques for water & air pollution survey	
.2	Analysis of water and air pollutants-principles & methods	
5.0	SOLID WASTE MANAGEMENT:	06
5.1	Definition of related terms and purpose	
5.2	Sources of solid wastes, characteristics of wastes-urban & rural communities, sampling methods	
5.3	Storage & collection- storage methods, frequency of collection, methods of collection, comparison	
5.4	Disposal of solid wastes- principles, description of process, planning, operation, maintenance & suitability of different methods of disposal- sanitary land fill, composting, incineration	
6.0	ENVIRONMENTAL MANAGEMENT:	06
6.1	Environmental legislation- salient features of different environmental protection acts in India	
6.2	Roles of pollution control boards, local bodies and citizens in environmental pollution management	
6.3	Environmental impact assessment- requirements and definition of related terms, method of assessment	
6.4	Environmental ethics	
	CLASS TEST:	03
	TOTAL:	45

REFERENCE BOOKS:

1. Environmental Engineering - by Duggal
2. Water Supply & Sewage - by Steel
3. Environmental Engineering - by A.K.Chatterjee
4. A Text Book of Environmental Engineering - by Peavy, et.al.
5. Water Supply & Pollution Control - by Clark
6. Air Pollution - by Rao
7. Environmental Protection - by Chanlett
8. Fundamentals of Ecology - by Odum

9. Concepts of Ecology - by Koromondy
10. Ecology & Environment - by P.D.Sharma
11. Chemistry for Environmental Engineers - by Sawyer & Macarty
12. Standard Methods for Examination of Water and Waste Water - by APHA
13. Water & Waste Water Analysis a Course Manual - by NEERI

PROJECT

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Curri. Ref. No.: CE517

Total Contact hrs.:

Practical: 90

Pre requisite: Nil
Credit: 3

RATIONALE: The diploma-holders in Civil Engineering, many a times , are involved with project work in design and drawing offices. The major works involve making survey, drawing plan and sections, collection of data , organization and analysis of data, estimation and elementary design of structures or their components. They are also expected to have some knowledge of actual practice in construction work. The course “ Project and Industrial visits” should therefore be very important to the diploma students of Civil Engineering to make them professionally sound and valuable.

AIM: The aim of the course –“ Project and Industrial visits” is to:

- (i) Apply knowledge gained in different subjects through solving real life problems in Civil Engineering.
- (ii) Develop self-confidence for working in Civil Engineering projects.
- (iii) Prepare necessary drawings, estimates and project reports .
- (iv) Develop an idea of the state of art of construction practices through industrial visits

UNIT	TOPIC/SUB-TOPIC	Hrs.	Total hrs.
1.0	Layout plan and detailed plan and section of (<u>any two of the following</u>)	30	
	1.1 Residential Building		
	1.2 Hostel building for accommodation of (80 to 160) students, the number may vary on yearly basis.		
	1.3 Hospital building for rural area.		
	1.4 School building involving science laboratories		
	1.5 An industrial building.		
2.0	Design and Planning	30	
	2.1 Detailed design and planning of a roof truss.		
	2.2 Detailed design and planning of RCC roof slab and beam arrangement for a residential house.		
3.0	Project work on converting a village road	30	
	3.1 Preparation of longitudinal and cross-sections after levelling the proposed road.		
	3.2 Calculation of earthwork after fixing the section and calculation of gradients.		
	3.3 Design for vertical curve, horizontal curve, super elevation if necessary.		
	3.4 Estimation of road materials from the longitudinal and cross-sections.		
	3.5 Full report on the project together with information of existing and new formation levels i.e., plan, elevation and sections.		
TOTAL:			90

PROFESSIONAL PRACTICE – V

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Curri. Ref. No.: CE516

Total Contact hrs.:
Practical: 60
Credit: 2

Total marks: 50

Practical:
P.A : 50

UNIT	TOPIC/SUB-TOPIC	Hrs. Total hrs.
1.0	Organization of engineering department	5
	1.1 Permanent establishment	
	1.2 Duties and responsibilities of subordinate engineers	
2.0	Works	10
	2.1 Classification of work-original, major, minor, petty, repair work, annual repair, special repair, quadrantal repair	
	2.2 Method of execution of works through the contractors, departmentally, contract and agreement, work order, item rate contract, lump sum contract, labour contract and daily labour, piece work agreement, scheduled contract, cost plus percentage contract	
3.0	Account of works	15
	3.1 Explanation of various terms Administrative approval, technical sanction, contingency budget, tender, preparation of notice inviting tender, receiving of quotations, earnest money, security deposit, advance payment, on account payment, intermediate payment, final payment, running bill, final, regular and temporary establishment, cash, major & subhead of account, temporary advance, issue rate, storage, supervision charges, suspense account, debit, credit, book transfer, sub-voucher and related accounts vouchers	
	3.2 Measurement book use & maintenance, procedure of making entries of measurement of work and supply of materials, labour employed, standard measurement books and common irregularity	
	3.3 Master Roll: Its preparation & use for pay and wages	
	3.4 Acquittance Roll: Its preparation & use for making payment of pay & wages	
	3.5 Labour & Labour report, method of labour payment, use of forms and necessity of submission	

- 3.6 Classification of stores, receipt / issue statement on standard form, method of preparation of stock account, preparation and submission of returns, verification of stocks, shortage and excess

Class Test 3
TOTAL: 30

REFERENCE BOOKS:

1. Text Book of PWD Account - by S.C. Dixit
2. PWD Accounts - by A.C. Dhar
3. Engineering Duties & Accounts - by S.K. Hussain
4. PERT & CPM Principles and Applications - by Srinath L.S.; East West Press, New Delhi
5. Construction Planning and Management - by Gahlot P.S. and Dhir, B.M.; Wiley Eastern Limited, New Delhi
6. Construction Management and Accounts - Harpal Singh; Tata Mc.Graw Hill, New Delhi
7. Management in Construction Industry - by Dhawadkar, P.P.; Oxford and IBH, New Delhi