

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI**

DIPLOMA PROGRAMME IN CIVIL ENGINEERING

Semester – V

S.No	Board of Study	Course Code	Course	Periods/Week (in Hours)			Scheme of Examination					Credit L+(T+P)/2	
				L	T	P	Theory			Practical			Total Marks
							ESE	CT	TA	ESE	TA		
1.	Civil Engg.	220511 (20)	Quantity Surveying & Costing-I	4	1	-	100	20	30	-	-	150	5
2.	Civil Engg.	220512 (20)	Structural Design & Drafting-I	5	1	-	100	20	30	-	-	150	6
3.	Civil Engg.	220513 (20)	Railways & Bridges	5	1	-	100	20	20	-	-	140	6
4.	Civil Engg.	220514 (20)	Irrigation Engineering	4	1	-	100	20	20	-	-	140	5
5.	Civil Engg.	220515 (20)	Soil Mechanics	4	1	-	100	20	20	-	-	140	5
6.	Civil Engg.	220521 (20)	Quantity Surveying & Costing- Lab	-	-	4	-	-	-	50	20	70	2
7.	Civil Engg.	220522 (20)	Structural Design & Drafting-I Practical	-	-	2	-	-	-	50	20	70	1
8.	Civil Engg.	220523 (20)	Soil Mechanics Lab	-	-	2	-	-	-	50	20	70	1
9.	Civil Engg.	220524 (20)	Industrial Training	-	-	1	-	-	-	50	20	70	1
TOTAL				22	5	9	500	100	120	200	80	1000	32

PPA : Proficiency in Professional Activities.

L : Lecture hours : T : Tutorial hours, P : Practical hours

ESE – End of Semester Exam.; CT – Class Test; TA- Teacher's Assessment

Note: Students will have to go for 4 weeks Industrial Training just after the end of the 4th Semester examination. The sessional marks and the Credit will be awarded in the V Semester.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL
UNIVERSITY, BHILAI**

- A) **SEMESTER** : **V**
 B) **COURSE TITLE** : **QUANTITY SURVEYING & COSTING - I**
 C) **CODE** : **220511 (20)**
 D) **BRANCH/DISCIPLINE** : **CIVIL ENGINEERING**
 E) **RATIONALE** :

Preparation of quantity and cost estimates of the various items/works is a major job function of a diploma passouts in the field of construction technology and management. The course therefore, aims in developing in the student competency in preparing estimates of all types of civil engineering structures. For achieving this the student is made familiar with the procedures and principles of measuring various works, estimating its cost and computing quantities of material needed. After learning the principles and procedures student applies them to prepare the estimated cost of various types of buildings, earth work and road work.

To ensure that the student has developed the desired competence in preparing estimates he may be given appropriate exercises.

F) TEACHING AND EXMINATION SCHEME:

Course Code	Periods/Week (In Hours)			Scheme of Examination						Credit L+(T+P)/2
	L	T	P	Theory			Practical		Total Marks	
				ESE	CT	TA	ESE	TA		
Quantity Surveying & Costing-I 220511 (20)	4	1	-	100	20	30	-	-	150	5
220521 (20)	-	-	4	-	-	-	50	20	70	2

L : Lecture hours : T : Tutorial hours, P : Practical hours

ESE – End of Semester Exam.; CT – Class Test; TA- Teacher’s Assessment.

Note: the above scheme includes credits and marks for practical also.

G) DISTRIBUTION OF MARKS AND HOURS:

S.No.	Chapter No.	Chapter Name	Hours	Marks
1	1	INTRODUCTION	2	5
2	2	STAGE-I OR APPROXIMATE ESTIMATE	5	5
3	3	TAKING OUT QUANTITIES	8	10
4	4	USE OF SCHEDULE OF RATES	6	10
5	5	ANALYSIS OF RATES	15	20
6	6	DETAILED ESTIMATE OF BUILDINGS	26	30
7	7	EARTHWORK ESTIMATE	18	20
		Total	80	100

H) DETAILED COURSE CONTENTS:

Chapter – 1 : INTRODUCTION

- Purpose of estimate and its importance to the field situations.

Chapter – 2 : STAGE-I OR APPROXIMATE ESTIMATE

- Approximate method of Stage-I estimate
- Service unit method
- Plinth area method
- Cubic content method
- Approximate methods for water supply, sanitary and electrical installations
- Different civil engineering structure like; bridge, culvert, road, dams, over head tanks etc.

Chapter – 3 : TAKING OUT QUANTITIES

- Units of measurements, different items of work required in estimating building works
- Accuracy in measurement and calculating quantities of long and short wall method
- Centerline method
- Standard conversion used in measurements,
- Taking out quantities from working drawing of buildings
- Taking out quantities of existing buildings and buildings during construction.

Chapter – 4 : USE OF SCHEDULE OF RATES

- Information available in schedule of rates with specialization of particular item such as:
 - Labour rates
 - Material rates
 - Transportation rates

Chapter – 5 : ANALYSIS OF RATES

- Purpose of rates analysis
- Task artisan per day
- Materials required for major items
- Labour required for major items
- Analysis of major items of work

Chapter – 6 : DETAILED ESTIMATE OF BUILDINGS

- Pre-requisite for stage II estimates or detailed estimate
- Preparation of abstract from quantity sheets
- Percentage provision to be made in stage II estimate for some items
- Classification of estimates
 - Original work
 - Special repair work
 - Addition/Alternation work
 - Revised estimate
 - Annual repairs
 - Final estimate
- Preparation of detailed estimate for:
 - Small building
 - Small building with pitched roof
 - Shop cum residential multi-storied building

Chapter – 7 : EARTHWORK ESTIMATE

- Calculation of area of cross section for given cross sections:
 - Fully cutting section
 - Partly cutting and partly embankment section
 - Fully embankment section
- Calculation of earth work by using Prismoidal formula
 - Trapezoidal formula, lead and lift
 - Estimate of earth work for 1 K.M. road
 - Using sealing coat as macadam
 - Using sealing coat as bitumen

I) SUGGESTED INSTRUCTIONAL STRATEGIES:

- **Lecture Method.**
- **Industrial visits.**
- **Expert Lecture.**
- **Demonstration.**

J) SUGGESTED LEARNING RESOURCES:

(a) Reference Books :

Sl. No.	Title	Author, Publisher, Edition & Year
1	Estimating and Costing	B.N. Dutta, S.D. Dutta & Co., Tagore Path, Motilal Bose Road, Lucknow
2	Estimating, Costing & Valuation	Rangwala,, Charotar Publications, Station Road, Anand
3	Estimating,& Costing	Birdi, J.C. Kapoor for Dhanpet Rai & Sons, Delhi & Julandhar
4	Estimating & Costing Vol. I & II	J.C. Malhotra, Khanna Publishers, 28, Nath Market, Nai Sarak, New Delhi
5.	Current Schedule of rates from PWD/PHE/Irrigation	-

Subject Title: Quantity Surveying & Costing- Lab

PRACTICAL CODE : 220521 (20)

HOURS: 64

LIST OF PRACTICALS / TUTORIALS:

- Workout the quantities of all items of work for a single storied residential building with flat roof
- Workout the quantities of all items of work for a single storied residential building with pitched roof
- Workout the quantities of all items of work for a shop cum residential double storied building
- Rate analysis for:
 - Brick masonry
 - Excavation in foundation
 - Cement concrete
 - Cement mortar
 - Flooring
 - Woodwork.
- Estimate of earth work for different sections
- Estimate of road of 1 K.M. length for pavement surface
 - W.B.M.
 - Bitumen.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

- A) SEMESTER : V
 B) COURSE TITLE : STRUCTURAL DESIGN & DRAFTING-I
 C) CODE : 220512 (20)
 D) BRANCH/DISCIPLINE : CIVIL ENGINEERING
 E) RATIONALE :

The Technicians in construction industry have to execute R.C.C. work and should be able to design and draft the structural components like slab, beam, columns, column's footing and staircase.

The latest good practice of design is based on Limit State Method. Hence, knowledge of this latest method is most important for civil engineers. The working stress method is also essential for knowledge purpose. LSM of design has been followed and introduction to WSM and Pre-stress Method has been included.

F) TEACHING AND EXMINATION SCHEME:

Course Code	Periods/Week (In Hours)			Scheme of Examination					Total	Credit L+(T+P)/2
	L	T	P	Theory			Practical			
				ESE	CT	TA	ESE	TA		
220512 (20)	5	1	-	100	20	30	-	-	150	6
220522 (20)	-	-	2	-	-	-	50	20	70	1

L: Lecture hours, T: tutorial hours, P: Practical hours.

ESE- End of semester exam, CT- Class Test, T A -Teacher's Assessment.

Note: the above scheme includes credits and marks for practical also

G) DISTRIBUTION OF MARKS AND HOURS:

S. No	Chapter No	Chapter Name	Hours	Marks
1	1	INTRODUCTION	2	2
2	2	INTRODUCTION TO LSM	4	3
3	3	LIMIT STATE OF COLLAPSE “FLEXURE”	14	10
4	4	LIMIT STATE OF COLLAPSE “SHEAR”	7	5
5	5	DEVELOPMENT LENGTH AND ANCHORAGE LENGTH	3	3
6	6	LIMIT STATE OF SERVICEABILITY	2	2
7	7	IS PROVISIONS FOR DESIGN CONSIDERATION	6	5
8	8	DESIGN OF SLABS	10	10
9	9	DESIGN OF BEAMS	10	10
10	10	DESIGN OF STAIR CASE	6	10
11	11	COLUMNS	4	4
12	12	COLUMNS FOOTINGS	8	6
13	13	INTRODUCTION TO WORKING STRESS METHOD	14	10
14	14	INTRODUCTION TO PRESTRESS METHOD OF DESIGN	6	5
Total			96	85 + 15 for Drafting

H) DETAILED COURSE CONTENTS:**Chapter –1 INTRODUCTION**

- S.I. Units
- Meaning of R.C.C.
- Purpose of reinforcement.
- Materials of reinforcement
- Steel as a reinforcing material
- Type of steel used for reinforcement mild steel, Tor steel
- Different mixes of concrete to be used for R.C.C. work

- Use of I.S: 456-2000 and I.S: 875-1984 for designing R.C.C. structures.

Chapter – 2 INTRODUCTION TO LIMIT STATE METHOD

- Limit state of collapse
- Limit state of serviceability
- Characteristic strength of materials
- Characteristic load
- Partial safety factors
- Design values, stress-strain curve for concrete and steel.

Chapter – 3 LIMIT STATE OF COLLAPSE “FLEXURE”

- Assumptions in limit state of collapse for flexure
- Stress block parameters
- Neutral axis, neutral axis depth
- Max. Depth of N A, balanced, under reinforced section
- Ultimate moment of resistance M_u
- Limiting moment of resistance- $M_{u\text{ lim}}$, factored Moment
- Max percentage of tensile steel for singly reinforced section
- Design of sections for flexure – singly reinforced rectangular beam
- Doubly reinforced rectangular beam
- Flanged beam.

Chapter – 4 LIMIT STATE OF COLLAPSE “SHEAR”

- Nominal shear stress
- Design shear strength of concrete with and without-reinforcement
- Min shear reinforcement
- Design of shear reinforcement.

Chapter – 5 DEVELOP LENGTH & ANCHORAGE LENGTH

- Concept and necessity of development length
- Value of design bond stress
- Overlap length
- Necessity of Hook and bend.

Chapter – 6 LIMIT STATE OF SERVICEABILITY

- Deflection
- Control of deflection
- Span by depth ratio
- Cracks, limiting width of crack
- Control of cracking.
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Chapter – 7 I.S. PROVISIONS FOR DESIGN CONSIDERATION

- Effective span
- Control of deflection
- Modification factor for Tensile and compressive steel

- Cover to reinforcement
- Vertical and horizontal Spacing of reinforcement
- Max and min reinforcement
- Development length
- Shear reinforcement
- Curtailment and bending of bars
- Min. positive and negative reinforcement at support
- Min length of reinforcement inside support
- Live load and dead load.

Chapter – 8 DESIGN OF SLABS

- Design of one way slab, roof slab, Sunshade, Balconies
- Design and drafting of one way simply supported slab
 - One way continuous slab – design and drafting of three span continuous slab.
 - Two way slab – design and drafting simply supported slab and Corners held down

Chapter – 9 DESIGN OF BEAMS

- Singly reinforced – Design & Drafting.
- Doubly reinforced – Design & drafting
- Design of lintel
- Flanged beam- Design & Drafting.
- Continuous- Design & Drafting of three span continuous beam.

Chapter – 10 DESIGN OF STAIR CASE

- IS provisions for design of staircase
- Effective span and loading for stairs
- Design and drafting straight flight and cantilever stair
- Doglegged stair case

Chapter – 11 COLUMNS

- Types of column- short and long column
- Axially loaded column, columns subjected to bending
- IS provisions for design of column
- Ultimate load for axially loaded columns P_u ,
- Columns with helical reinforcement
- Design of axially loaded columns.

Chapter – 12 COLUMN FOOTINGS

- IS Code provisions for design of footing
- Design drafting of Isolated footing
- Square and rectangular sloped footing.

Chapter – 13 INTRODUCTION TO WORKING STRESS METHOD

- **Permissible stresses in steel and concrete**
- **Assumption for design in flexure**
- **Under, Over and balanced section**
- **Design constants for balanced sections**

Chapter – 14 INTRODUCTION TO PRE-STRESSED CONCRETE

- **Principles of pre-stressing Method**
- **Method of pre-stressing**
- **Advantage and disadvantage of pre-stressing**

I) SUGGESTED INSTRUCTIONAL STRATEGIES:

- Lecture Method.
- Industrial visits.
- Expert Lecture.
- Demonstration.

J) SUGGESTED LEARNING RESOURCES:

(a) Reference Books :

Sl. No.	Title	Author, Publisher, Edition & Year
1	Limit state theory & design of R.C.C.	Dr. S.R. Karve & Dr. Shah
2	Design of R.C.C.	H.J. Shah
3	R.C.C. design	N.C. Sinha
4	DESIGN OF REIN FORCED CONSTRUCTURES	Dr. B.C. Punamia
5	R.C.C.	Dr. A.K. Jain
6.	IS: 456-2000, 875-1984, 432-Part-I 1786	BIS
7	Design SP:16 Hand Book	BIS
8.	Hand Book for Limit State Method of Design	V.K. Ghanekar & J.P. Javi

Subject Title: Structural Design & Drafting-I Lab

PRACTICAL CODE : 220522 (20)

HOURS: 32

LIST OF PRACTICALS / TUTORIALS:

LIST OF WORKING DRAWING WITH BAR BENDING SCHEDULE TO BE PREPARED:

1. Preparation of structural plan for framing of a building showing position of columns and beams.
2. Longitudinal section, cross section of singly reinforced beam with bar bending schedule .
3. Longitudinal section, cross section of doubly reinforced beam.
4. Drafting of R.C.C chajja with lintel.
5. Longitudinal section and sectional plan of one way R.C.C slab with schedule of reinforcement.
6. Longitudinal section and sectional plan of two way R.C.C slab with schedule of reinforcement
7. Longitudinal section, cross section of T-beam and L-beam
8. Preparation of sectional elevation and plan of column and column's footing.
9. Preparation of sectional elevation and plan of Dog-legged and open well. stair case.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL
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- A) **SEMESTER** : **V**
 B) **COURSE TITLE** : **RAILWAY AND BRIDGES**
 C) **CODE** : **220513 (20)**
 D) **BRANCH/DISCIPLINE** : **CIVIL ENGINEERING**
 E) **RATIONALE**

Transportation engineering has been identified as one of the most important subject for civil engineers. This subject is divided into two parts railway and bridges. This curriculum intends to give adequate knowledge about railways as well as bridge engineering. It is to cater the needs of the technician engaged in the survey. Investigation, planning and construction of permanent way and bridges. Design of waterway, bridge foundations, construction of culverts have been dealt with at diploma level. Site visits will be of immense value for attaining this goal.

F) **TEACHING AND EXMINATION SCHEME:**

Course Code	Periods/Week			Scheme of examination					Total Marks	Credit L+(T+P)/2
				Theory			Practical			
	L	T	P	ESE	CT	TA	ESE	TA		
220513 (20)	5	1	-	100	20	20	-	-	140	6

L: Lecture hours, T: tutorial hours, P: Practical hours.

ESE- End of semester exam, CT- Class Test, T A -Teacher's Assessment

G) DISTRIBUTION OF MARKS AND HOURS:

S. No	Chapter No	Chapter Name	Theory Hours	Marks
RAILWAY				
1.	1	INTRODUCTION	03	--
2	2	PERMANENT WAY	06	10
3	3	RAILWAYS TRACK	08	05
4	4	RAILWAY FIXTURES AND FASTENINGS	05	05
5	5	GEOMETRICS	09	10
6	6	POINTS AND CROSSINGS	09	10
7	7	LAYOUT OF STATIONS AND YARDS	06	10
8	8	SIGNALING AND INTERLOCKING	08	10
9	9	MODERN DEVELOPMENTS IN RAILWAYS	06	05
BRIDGES				
10	10	INTRODUCTION	03	05
11	11	SITE INVESTIGATION AND HYDRAULICS	08	10
12	12	SUB STRUCTURE AND SUPER STRUCTURE OF BRIDGES	09	10
13	13	CONSTRUCTION AND MAINTENANCE OF BRIDGES	08	10
14	14	VISITS AND REPORTS	08	-
		Total	96	100

H) DETAILED COURSE CONTENTS:

Railway

Chapter 1: INTRODUCTION:

- Brief history of railways
- Role of railways in transportation, its advantages
- Comparison of railways and highway transportation

- Classification of Indian railways
- Classification of railway line based on speed criteria
- Railway terminology

Chapter 2: PERMANENT WAY:

- Permanent way and its components
- Requirements of ideal permanent way
- Gauges in railway track
- Selection of gauges
- Uniformity of gauges
- Necessity of adopting different gauges
- Demerits of adopting different gauges
- Railway track crosssections
- Cross section in cutting and filling
- Single line double line drainage in railway tracks and yards
- Coning of wheels.

Chapter 3: RAILWAY TRACK:

- Ballast
 - Functions of ballast, requirement of good ballast, different materials used as ballast, size and section of ballast, scissors method of packing ballast, renewal of ballast and quantity required.
- Sleepers
 - Functions of sleepers, requirements of good sleeper, types of sleepers, their advantages and disadvantages, comparison, of wooden metal and concrete sleepers, spacing of sleepers and sleeper density, adzing of sleepers, bridge sleepers, stacking of sleepers.
- Rails
 - Functions of rails, requirement of rails, types of rail sections, DH BH and FF rails, their standard nomenclature, and comparison, length of rails wear of rails, their causes and remedial measures, rail failures, welding of rail joints, purpose of welding, methods of welding and its advantages, length of welded rails, creep of rails, indications of creep, theories of creep, effects of creep, measurement of creep, prevention of creep.

Chapter 4: RAIL FIXTURES AND FASTENINGS

- Purpose and types of fixtures and fastenings
- fishplates, requirements, sections and failures of fishplates

- Spikes, types, uses, characteristics of good spikes
- Chairs for BH and DH rails, cast iron chairs, slide chairs, keys
- Bearing joints and staggered joints.

Chapter 5: GEOMETRICS:

- Necessity of geometric design of a railway track
- Degree of curve
- Gradient and grade compensation
- Ruling gradient, momentum gradient, pusher gradient, gradient in station yards
- Grade compensation on curves
- Widening of gauge on curves
- Extra clearance on curves
- Super elevation or cant
- Objects of providing super elevation
- Relationship between super elevation, gauge, speed, radius of curve and average speed
- Limits of super elevation
- Cant deficiency
- Negative cant
- Types of curves- transition curves, necessity of providing transition curves, types and length of transition curves
- Curve indicator
- Check rails- purpose and necessity of providing check rails on curves.

Chapter 5: POINTS AND CROSSINGS:

- Necessity of points and crossings
- Functions
- Components of turnouts- Left hand turnout , right hand turnout
- Working of turnout
- Points or switches
- Type of switches
- Crossings- types of crossings and crossing number, crossing used in Indian railways
- Combinations of points and crossings.

Chapter 7: LAYOUTS OF STATIONS AND YARDS

- Definition, functions of stations, requirements of stations, classification of stations, junctions and terminals, plat form

- Station yards, classification of yards
- Sidings
- Level crossings.

Chapter 8: SIGNALLING AND INTERLOCKING:

- Objects
- Engineering principles
- Classification of signals
- Requirements of signaling
- Types of signal
- Electronic system of signalling
- Control system
- Interlocking principles of interlocking.

Chapter 9: MODERN DEVELOPMENTS IN RAILWAYS

- Introduction
- Modernization of tracks
 - Track electrification
 - Speed trends
 - Container transport services
 - Uniformity in gauging
 - Traction and tractive resistance
 - Modern methods of track maintenance.



Chapter 10: INTRODUCTION

- Difference between bridge and culvert
- Components of a bridge
- Various terminologies used in bridges
- Main classification of bridges
- Requirements of an ideal bridge
- Identification of bridge

Chapter 11: SITE INVESTIGATION AND HYDRAULICS

- Selection of bridge site
- Characteristics of an ideal bridge site
- Bridge alignment and collection of bridge design data
- Determination of flood discharge water way

- Economic span
- Scour depth
- Afflux standard values of clearance and free board as per IRC

Chapter 12: SUBSTRUCTURE AND SUPER STRUCTURE

- Types of bridge super structure
- Bridge floorings and their selection
- Bridge piers
- Abutments
- Wing walls
- Approaches
- Bridge bearings and joints in bridges

Chapter 13: CONSTRUCTION AND MAINTENANCE OF BRIDGES

- Erection of steel girder and truss bridges
- Erecting of RCC bridges and suspension bridges
- Maintenance method

Chapter 14: TOPICS FOR VISITS AND REPORTS

- Through packing
- Shovel Packing
- Track maintenance
- Systematic overhauling
- Lifting of track
- Lowering of track
- Counteraction, measurement and adjustment of creep
- Organization tools and equipments for maintenance
- Maintenance of points and crossings
- Maintenance of level crossing
- Maintenance of proper drainage
- Maintenance of gauge
- Maintenance of track components
- Any other item suggested by teacher guide
- Welding of rails.

I) SUGGESTED INSTRUCTIONAL STRATEGIES:

- **Lecture Method.**
- **Industrial visits.**
- **Expert Lecture.**
- **Demonstration.**

J) SUGGESTED LEARNING RESOURCES:

(a) Reference Books :

Sl. No.	Title	Author, Publisher, Edition & Year
1	Text book of railway engineering	R.B.Deshpandey United Book corp. pons
2	Railway engineering	N.K.Vaswani Roorkee publishing house
3	Text book of railways	R.C.Rangwale Charter publishing house, Anand. W.R.
4	Text book of railway engineering	S.C.Saxena & SP Arora Dhanpal Rai an Sons
5	Indian railway track design, construction, maintenance and modernization	M.M.Agrawal Manglik prakeshan 159, Bomani Road, Saharanpur.
6	Permanent way manual	Indian Railway Board
7	Railway Bridge and Tunnel Engg.	Shivanand Kamde Deepak Prakashan, Gwalior
7	Bridge Engineering	By Algia

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL
UNIVERSITY, BHILAI**

- A) **SEMESTER** : **V**
 B) **COURSE TITLE** : **IRRIGATION ENGINEERING**
 C) **CODE** : **220514 (20)**
 D) **BRANCH/DISCIPLINE** : **CIVIL ENGINEERING**

E) RATIONALE:

India is an agricultural country hence Irrigation Engineering is the subject of vast importance. During the job in irrigation, a technician has to perform various activities including pre-project survey, project planning including designing based on irrigation manuals, layout and actual execution of works, maintenance of canal systems etc. The knowledge of various course components will help the students to perform his job functions in the field, where there is high job potential for civil engineering technician.

To make understanding easier, various work , extra visits are also suggested and recommended in the syllabus, which will provide more chances of exposures to students at actual work site. To reinforce the theoretical concepts, the students should be given exposure to some project prepared in the irrigation department, so that they can understand the procedure of project preparation.

F) TEACHING AND EXMINATION SCHEME:

Course Code	Periods/Week (In Hours)			Scheme of Examination						Credit L+(T+P)/2
	L	T	P	Theory			Practical		Total Marks	
				ESE	CT	TA	ESE	TA		
220514 (20)	4	1	-	100	20	20	-	-	140	05

L: Lecture hours: T: Tutorial hours, P: Practical hours

ESE – End of Semester Exam.; CT – Class Test; TA- Teacher’s Assessment ;

F) DISTRIBUTION OF MARKS AND HOURS:

Sl. No.	Chapter No.	Chapter Name	Hours	Marks
1	1.	INTRODUCTION	03	05
2	2.	HYDROLOGY	04	05
3	3.	WATER REQUIREMENTS OF CROPS	08	20
4	4.	SURVEY FOR IRRIGATION PROJECTS	06	10
5	5.	STORAGE WORK	16	20
6	6.	DIVERSION WORK	08	15
7	7.	CANAL WORKS	10	15
8	8.	LIFT IRRIGATION SCHEME	05	05
9	9.	MACHINERY & EQUIPMENTS	02	05
10	10.	VISITS TO VARIOUS WORK SITES	18	-
TOTAL			80	100

H) DETAILED COURSE CONTENTS:

I)

Chapter – 1 INTRODUCTION

- Necessity of irrigation
- Importance of irrigation
- Benefits of irrigation
- Ill effects of irrigation
- Methods of irrigation

Chapter – 2 HYDROLOGY

- Definitions
- Hydrological cycles
- Rainfall
- Runoff
- Flood discharge

Chapter – 3 WATER REQUIREMENTS OF CROPS

- Function of water
- Various crops of area
- Crop season
- Delta
- Duty
- Crop rotation.

Chapter – 4 SURVEY FOR IRRIGATION PROJECTS

- Importance of survey
- Various type of survey
- Reasonability and feasibility of projects

Chapter – 5 STORAGE WORKS

- Components of storage works
- Various zone of storages
- Various types of dams and their suitability
- Construction materials and procedures
- Foundation treatment.

Chapter – 6 DIVERSION WORKS

- Components of diversion work
- Types of diversion work
- Functions and suitability of diversion work
- Types of Weirs

Chapter – 7 CANAL WORKS

- Components of canal work
- Types of canal
- Alignment
- Design of canal
- Different structures in canal network
- Canal lining

Chapter – 8 LIFT IRRIGATION SCHEMES

- Importance of lift irrigation
- Suitability
- Advantages and limitations

Chapter – 9 MACHINERY & EQUIPMENT

- Various machine, their functions & suitability
- List of equipments and their uses.

Chapter – 10 VISIT TO VARIOUS WORK SITES

- To a construction site where foundation work / Dam construction is under progress.
- To existing completed dam site where its all operation are in full running.
- To a canal site, where all the components of an canal work are in running condition.
- To observe the various earth moving equipments at the machine and study their working.
- To a pre-project survey site (if possible) where preliminary survey work is in the progress.

D) SUGGESTED INSTRUCTIONAL STRATEGIES:

- Lecture Method
- Industrial visits
- Expert Lecture
- Demonstration

J) SUGGESTED LEARNING RESOURCES:

(a) Reference Books :

Sl. No.	Title	Author, Publisher, Edition & Year
1	Irrigation and water power Engineering	B.C. Punmia
2	Introductory Irrigation Engg.	B.C. Punmia
3	Fundamental principle of Irrigation Engg.	V.B. Priyani
4	Fundamental principle of Irrigation Engg.	Bharat Singh
5	Irrigation Engg. & Hydraulics structures	S.K. Garg
6	Principles of Irrigation Engg.	S.K. Verma
7	Irrigation Engg.	Birdie
8	Irrigation Engg.	Gurcharan Singh
9	Irrigation Engg.	S.L. Awasthi

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL
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- A) **SEMESTER** : **V**
 B) **COURSE TITLE** : **SOIL MECHANICS**
 C) **CODE** : **220515 (20)**
 D) **BRANCH/DISCIPLINE** : **CIVIL ENGINEERING**
 E) **RATIONALE**

Every Civil Engineering structure consists of main two components i.e. foundation and superstructure. The foundations of buildings, roads, dams etc. rest on soil whose behaviour plays an important role to transfer their loads, therefore, the knowledge of the properties & behaviour of the soil below foundations is essential for their safe design.

F) TEACHING AND EXMINATION SCHEME:

Course Code	Periods/Week (In Hours)			Scheme of Examination						Credit $L+(T+P)/2$
	L	T	P	Theory			Practical		Total Marks	
				ESE	CT	TA	ESE	TA		
220515 (20)	4	1	-	100	20	20	-	-	140	5
220523 (20)	-	-	2	-	-	-	50	20	70	1

L: Lecture hours; T: Tutorial hours, P: Practical hours

ESE – End of Semester Exam.; CT – Class Test; TA- Teacher’s Assessment ;

Note: the above scheme includes credits and marks for practical also.

G) DISTRIBUTION OF MARKS AND HOURS:

S. No.	Chapter No.	Chapter Name	Theory	Marks
1	1	INTRODUCTION	2	4
2	2	WEIGHT & VOLUME RELATIONSHIP	16	15
3	3	CLASSIFICATION OF SOIL	15	15
4	4	PERMEABILITY	11	10
5	5	SHEAR STRENGTH & BEARING CAPACITY	16	20
6	6	COMPACTION	7	10
7	7	EARTH PRESSURE	6	10
8	8	SOIL STABILIZATION	3	8
9	9	SOIL INVESTIGATION	4	8
TOTAL			80	100

H) DETAILED COURSE CONTENTS:

Chapter – 1 INTRODUCTION

- Concept of soil
- Definition and meaning of soil mechanics
- History of soil mechanics
- Scope of soil mechanics
- Soil formation

Chapter – 2 WEIGHT AND VOLUME RELATIONSHIP OF SOIL

- Definition of soil mass
- Components of soil mass
- Phase diagram of soil mass and its labeling
- Weight and volume of soil with usual notation
- Dry soil and wet soil
- Void ratio
- Porosity and their relations
- Types of water in soil
- Relation between, γ , G.S.e and, ω
- Bulk density, saturated, submerged and dry density

- Difference between adsorbed water and absorbed water in soil
- Saturated, partly saturated and dry soil

Chapter – 3 CLASSIFICATION OF SOIL

- Definition of
 - Coarse and fine grained soil
 - Homogeneity
 - Consistency
 - Cohesiveness
 - Toughness
 - Shear strength
 - Compressibility
- Difference between coarse and fine grained soil
- Two methods of soil classification,
- Grain size classification of soil as per I.S.I and classification of soil using plasticity chart
- Sieve analysis
- Stoke's law
- Sedimentation analysis of soil
- Particle size - Distribution curve on semi log scale
- States of consistency and its diagram
- Consistency limits- Liquid limit, plastic limit, shrinkage limit and plasticity index (P.I)
- Laboratory methods to find out these limits
- Field identification tests

Chapter – 4 PERMEABILITY

- Definition and understanding of permeability
- Different types of soil and permeability
- Laminar and turbulent flow
- Importance of permeability
- Darcy's Law
- Coefficient of permeability and its determination in laboratory
- Factors affecting permeability
- Confined and unconfined aquifer
- Dupit's Formula
- Field determination of permeability by pumping out and pumping in test
- Concepts meaning of seepage
- Effects of seepage

- Flow lines and flow net diagram (only understanding)

Chapter – 5 SHEAR STRENGTH AND BEARING CAPACITY

- Concepts of shear strength of loaded soil
- Friction and coefficient of friction between two soils
- Internal friction
- Cohesion
- Normal and shear stress
- Shear strength of soil
- Factors on which shear strength of soil depends
- Coulomb's law
- Shear failure
- Types of shear test- Box shear test and Tri axial test
- Causes of failure of foundation
- Meaning of Bearing capacity and safe bearing capacity
- Concepts of S.B.C. and ultimate bearing capacity
- Methods of finding S.B.C. of soil (Plate load test)
- Factors affecting bearing capacity of soil

Chapter – 6 COMPACTION

- Concepts of meaning of compaction
- Consolidation and its meaning
- Difference between consolidation and compaction.
- Max. Dry density and optimum moisture content
- Proctor test
- Modified compaction test
- Factors affecting compaction
- Methods of compaction in field

Chapter – 7 EARTH PRESSURE

- Define
 - Earth pressure
 - Effective pressure
 - Neutral pressure
 - Total pressure
- Magnitude of earth pressure
- Rankines theory
- Assumptions made in the Rankine's theory
- Earth retaining structures

- Earth pressure on earth retaining structures.

Chapter – 8 SOIL STABILIZATION

- Concepts and purpose of soil stabilization
- Methods of stabilization
- Materials of stabilizing of soil and their uses
- Determination & application of it

Chapter – 9 SOIL INVESTIGATIONS

- Meaning and objectives of soil investigation
- Site investigation
- Site exploration
- Number Depth and disposition of borings
- Methods of exploration
- Trial pits types of Augers- Auger boring, Wash boring and percussion drilling.
- Soil sample and their types
 - Disturbed and undisturbed samples and their meaning
 - Record of boring
 - Borehole log.

I) SUGGESTED INSTRUCTIONAL STRATEGIES:

- **Lecture Method.**
- **Industrial visits.**
- **Expert Lecture.**
- **Demonstration.**

J) SUGGESTED LEARNING RESOURCES:

(a) Reference Books :

Sl. No.	Title	Author, Publisher, Edition & Year
1.	Introductory Soil Mechanics	Dr.B.C. Punamia
2.	Soil Mechanics	S.K. Garg
3.	Soil Mechanics (In Hindi)	K.K. Keseri
4.	Soil Mechanics	S.N. Awasthy
5.	Soil Mechanics	Dr. S.B. Sehgal

6.	Soil Mechanics	Dr. Alam Singh
7.	IS Codes : No. 2720 (Part 1 to 26) IS: 1892, 2132, 2809	BIS Publications

Subject Title: Soil Mechanics Lab

PRACTICAL CODE: 220523 (20)

HOURS: 32

LIST OF PRACTICALS / TUTORIALS:

- (K) To determine field density of soil by core cutter/sand replacement
- (L) To determine moisture contents of soil
- (M) To determine specific gravity of soil by Pycnometer/or density bottle
- (N) To determine liquid limit of soil
- (O) To determine plastic limit of soil
- (P) To determine shrinkage limit of soil
- (Q) Grain size analysis of soil
- (R) Compaction test - Light and Heavy compaction factor test
- (S) Soil sampling
- (T) Box Shear Test
- (U) Field identification tests
- (V) Triaxial Shear Test (demonstration only).

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL
UNIVERSITY, BHILAI**

A)	SEMESTER	:	V
B)	COURSE TITLE	:	INDUSTRIAL TRAINING
C)	CODE	:	220524 (20)
D)	BRANCH/DISCIPLINE	:	CIVIL ENGINEERING
E)	RATIONALE	:	

The purpose of industrial training is to offer wide range of practical exposures to latest practices, equipments and techniques used in the field. This training programme will help the student in acquiring hands on experiences of various practices and events required to perform in different job situations. Through the industrial training the students are given an opportunity to develop psychomotor skills and problem solving ability. The students will have to go for industrial training in the following areas:

- Building work
- Irrigation work
- Water supply and sanitary work
- Housing and construction work
- Road construction

The duration of industrial training will be of four weeks and organised after the end of IV semester examination . The industrial Training has basically the following three components: -

1. Orientation Programme
2. Industrial Training in the Industry
3. Report Writing and Evaluation

Note:

During the orientation programme complete guidelines will be provided to the students regarding planning, implementation and evaluation of industrial training.

During the training student will have to maintain a daily dairy to record his observations and experiences at field and on the basis of daily dairy student has to prepare and submit Industrial Training Report.

For evaluation each student has to prepare and present a seminar paper related to experience gained during the industrial training. Each student will be evaluated on the basis of daily diary, training report, seminar presentation and viva voce.

F) TEACHING AND EXMINATION SCHEME:

Course Code	Periods/Week (In Hours)			Scheme of Examination						Credit L+(T+P)/2
	L	T	P	Theory			Practical		Total Marks	
220524 (20)	-	-	1	ESE	CT	TA	ESE	TA		1
				-	-	-	50	20	70	

L: Lecture hours; T: Tutorial hours, P: Practical hours

ESE – End of Semester Exam.; CT – Class Test; TA- Teacher’s Assessment ;