Syllabi Book

For
Under Graduate Course of
Civil Engineering

Department of Civil Engineering
Faculty of Technology
Dharmsinh Desai University
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http://www.ddu.ac.in

(w.e.f January- 2008)

CREDIT SCHEME FOR B.TECH (CIVIL ENGINEERING) w.e.f.2009-2010.

SEMESTER -I [EC / IC / IT / CE / CH / CL]

SUBJECT NO.	SUBJECT	TEACHING SCHEME			CREDIT STRUCTURE		TOTAL
		LEC.	TUT.	PRA.	L+T	P	
AF111	MATHEMATICS - I	3	1	--	4	0	**4**
AF112	BASIC ELECTRICAL ENGG.	3	1	2	4	1	**5**
AF113	COMPUTER PROGRAMMING-I	2	1	2	3	1	**4**
AF114	ENGG. GRAPHICS	**2**	**1**	**3**	3	1.5	**4.5**
AF115	ENGINEERING MECHANICS	**3**	1	**1**	4	0.5	**4.5**
AF116	WORK SHOP - I	--	--	3	0	1.5	**1.5**
		14	**5**	**11**	**18**	**5.5**	**23.5**

SEMESTER -II [EC / IC / IT / CE / CH / CL]

SUBJECT NO.	SUBJECT	TEACHING SCHEME			CREDIT STRUCTURE		TOTAL
		LEC.	TUT.	PRA.	L+T	P	
AF201	MATHEMATICS - II	3	1	--	4	1	**5**
AF202	BASIC ELECTRONICS	3	1	2	4	1	**5**
AF203	COMPUTER PROGRAMING-II	3	1	2	4	1	**5**
AF204	MECHANICS OF SOLIDS	3	1	2	4	1	**5**
AF205	HEAT POWER	3	1	2	4	1.5	**5.5**
AF206	WORK SHOP - II	--	--	3	0	0	**0**
	COMMUNICATION SKILLS						
		15	**5**	**11**	**20**	**5.5**	**25.5**

SEMESTER -III [CIVIL]

SUBJECT NO.	SUBJECT	TEACHING SCHEME			CREDIT STRUCTURE		TOTAL
		LEC.	TUT.	PRA.	L+T	P	
CL301	MATHEMATICS - III	4	--	--	4	0	**4**
CL303	STRUCTURAL ANALYSIS -I	3	2	--	5	0	**5**
CL304	SURVEYING -I	3	--	3	3	1.5	**4.5**
CL307	FLUID MECHANICS-I	3	--	2	3	1	**4**
CL308	CONSTRUCTION TECHNOLOGY -I	3	--	--	3	0	**3**
CL309	ENGINEERING MATERIALS	3	--	--	3	0	**3**
	YOGA	1		1	1	0.5	**1.5**
		20	**2**	**5**	**22**	**3**	**25**

SEMESTER -IV [CIVIL]

SUBJECT NO.	SUBJECT	TEACHING SCHEME			CREDIT STRUCTURE		TOTAL
		LEC.	TUT.	PRA.	L+T	P	
CL401	MATHEMATICS - IV	4	--	--	4	0	**4**
CL403	SURVEYING -II	3	--	3	3	1.5	**4.5**
CL406	STRUCTURAL ANALYSIS -II	3	2	--	5	0	**5**
CL407	ENGINEERING GEOLOGY	3	--	2	3	1	**4**
CL408	FLUID MECHANICS - II	3	--	2	3	1	**4**
CL409	RAILWAY ENGINEERING AND TOWN PLANING	3	--	--	3	0	**3**
	PERSONALITY DEVELOPMENT	2	--	--	2	0	**2**
		21	**2**	**7**	**23**	**3.5**	**26.5**

SEMESTER -V [CIVIL]

SUBJECT NO.	SUBJECT	TEACHING SCHEME			CREDIT STRUCTURE		TOTAL
		LEC.	TUT.	PRA.	L+T	P	
CL501	GEOTECHNIQUES & APPLIED GEOLOGY	4	--	3	4	1.5	**5.5**
CL503	ENVIRONMENTAL ENGINEERING -I	3	--	2	3	1	**4**
CL507	STRUCTURAL ANALYSIS -III	3	1	--	4	0	**4**
CL508	PLANNING & ARCHITECTURE	3	--	2	3	1	**4**
CL509	WATER RESOURCES ENGINEERING	3	1	--	4	0	**4**
CL510	DESIGN OF STRUCTURE - I	4	1	--	5	0	**5**
		20	**3**	**7**	**23**	**3.5**	**26.5**

SEMESTER -VI [CIVIL]

SUBJECT NO.	SUBJECT	TEACHING SCHEME			CREDIT STRUCTURE		TOTAL
		LEC.	TUT.	PRA.	L+T	P	
CL601	SOIL MECHANICS	3	--	2	3	1	**4**
CL603	ENVIRONMENTAL ENGINEERING -II	3	--	2	3	1	**4**
CL605	CONSTRUCTION TECHNOLOGY -II	3	1	--	4	0	**4**
CL608	CONCRETE TECHNOLOGY	3	--	2	3	1	**4**
CL609	DESIGN OF STRUCTURE - II	4	2	--	6	0	**6**
	ELECTIVE-1	3	1	--	4	0	**4**
		19	**4**	**6**	**23**	**3**	**26**

SEMESTER -VII [CIVIL]							
SUBJECT NO.	SUBJECT	TEACHING SCHEME			CREDIT STRUCTURE		TOTAL
		LEC.	TUT.	PRA.	L+T	P	
CL701	IRRIGATION ENGINEERING	3	1	--	4	0	**4**
CL703	PROFESSIONAL PRACTICE AND VALUATION	3	2	--	5	0	**5**
CL704	FOUNDATION ENGINEERING	3	--	2	3	1	**4**
CL705	CONSTRUCTION MANAGEMENT	3	1	--	4	0	**4**
CL707	HIGHWAY ENGINEERING	3	--	2	3	1	**4**
	ELECTIVE-2	3	1	--	4	0	**4**
		18	**5**	**4**	**23**	**2**	**25**

SEMESTER -VIII [CIVIL]								
SUBJECT NO.	SUBJECT		TEACHING SCHEME			CREDIT STRUCTURE		TOTAL
			LEC.	TUT.	PRA.	L+T	P	
	CIVIL ENGINEERING PROJECT							
CL801	SEMINAR	--	--	--	--			
	PROJECT WORK	--	--	--	--			
						18		**18**

	ELECTIVE-1
	FINITE ELEMENT METHODS IN CIVIL ENGINEERING
	BUILDING REPAIR & REHABLITATION
	PRESTRESSED CONCRETE
	DESIGN OF HYDRULIC STRUCTURES

	ELECTIVE-2
	EARTH QUAKE ENGINEERING
	PROJECT PLANNING AND CONTROL
	ADVANCED CONCRETE TECHNOLOGY
	DESIGN OF SPECIAL SRUCTURES

Total Course Credits= 196

AX - 122 BASIC ELECTRICAL ENGINEERING

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	1	2	3	60	40	25	25	150

1. FUNDAMENTALS OF CURRENT ELECTRICITY AND DC CIRCUITS:

Introduction: Definition, Symbol and Unit of Quantities, Multiple and sub-multiple units, Computation of Resistance at constant temperature, Temperature dependence of resistance, Computation of resistance at different temperatures, Computations of at different temperatures, Ohm's law statement, Illustration and limitation, Unit work, power and energy (Electrical, Thermal and Mechanical),Circuits-Identifying the elements and the connected terminology. Kirchhoff's laws-statement and illustration, Resistance in parallel and current division technique , Method of solving a circuit by Kirchhoff's laws.

2. MAGNETIC CIRCUITS:

Introduction, Definition of Magnetic questions, Magnetic circuit, Leakage flux, Fringing effect, Comparison between magnetic and electric circuits.

3. ELECTROMAGNETIC INDUCTION:

Introduction, Magnetic effect of electric current, Current carrying conductor in magnetic field, Law of electromagnetic induction, Induced emf, Self inductance (L) ,Mutual inductance(M) ,Coupling coefficient between two magnetically coupled circuits(K).

4. AC FUNDAMENTALS:

Introduction, Generation of alternating emf, Waveform terminology, Concept of 3-phase EMF Generation, Root mean square (RMS) of effective value, Average Value of AC, Phasor representation of alternating quantities, Analysis of AC circuit.

5. SINGLE PHASE AC CIRCUITS:

Introduction, j operator,, Complex algebra ,Representation of alternating quantities in rectangular and polar forms, R-L series circuit, R-C series circuit, R-L-C series circuit, Admittance and its components, Simple method of solving parallel A.C. circuits, Resonance.

6. ELECTRICAL MACHINES:

Introduction, D.C. generator, D.C. motor, Transformer, Three phase induction Motor, Applications of electrical machines.

7. PASSIVE CIRCUIT COMPONENTS:

Constructional details of, Resistors, Capacitors, Inductors.

	Title	Publisher	Author of the Book
Text Book	**Basic Electrical, Electronics and Computer Engineering**	**Tata McGraw Hill**	**R. Muthusubramaniam et al.**

AX - 123 ADVANCED 'C' PROGRAMMING - I

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
2	1	2	3	60	40	25	25	150

1. INTRODUCITON TO COMPUTER:
C.P.U. Input/Output Devices, Memory: RAM, ROM, Disc Operating System, High level languages, assembly & machine languages.

2. OVERVIEW OF "C":
Introduction, Importance of "C" language, Sample "C" programs, Basic structure of "C" programs, Programming style, executing a "C" program.

3. CONSTANTS, VARIABLES & DATA TYPES:
Introduction, Character set, "C" tokens, Key words & Identifiers, Variables Constants Data types, Declaration of Variables Assigning values to variables, Defining symbolic constant, Case studies.

4. OPERATORS & EXPRESSION:
Introduction, Arithmetic of operators, Relational operators, Logical operators, Assignment operators, Increment & decrement operators, Conditional operators, Bit wise operators, Special operators, Arithmetic expressions, Evaluation of expressions, Precedence of arithmetic operators, Computational problems, Type conversions, Operator precedence & associatively, Mathematical functions, Case studies.

5. MANAGING INPUT & OUTPUT OPERATORS:
Introduction, Reading character, Writing a character, Formatted input & Output, Case studies.

6. DECISION MAKING & BRANCHING:
Introduction, Decision making with IF statement, Simple IF statement, IF ELSE statement, Nesting of IF ELSE statement, the ELSE-IF ladder, SWITCH statement,? Operator, GO TO statement, Case studies.

7. DECISION MAKING & LOOPING:
Introduction, The WHILE statement, DO statement, FOR statement, Jumps in loops, Review questions & exercises.

	Title	Publisher	Author of the Book
Text Book	**Programming in Ansi C**	**TMH**	**Balagurusamy**
Reference Books 1	**Programming in Ansi C**	**TMH**	**Kanigham and Ritchi**

AF-115 - ENGINEERING GRAPHICS

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	3	3	60	40		50	150

TOPICS:

(a) **Plane Geometry: Engineering Curves:**

Construction of curves used in engineering such as Conics

(Ellipse, Parabola, Hyperbola)

Cycloidal curves -Cycloid, Epi-Cycloid, Hypo-Cycloid,

Involutes,

Archemedian spirals

(b) **Solid Geometry:**

Projections of Points, Projections of Lines, construction for H.T. & V.T.

Applications of projection of points and lines

Projections of regular planes such as square, rectangle, triangle,

circle, pentagon, hexagon, rhombus, etc

Projections of Right & Regular Solids (Prisms, Pyramids, Cylinder and Cone)

(a) Orthographic Projections:

First angle projection method and third angle projection method.

Dimensioning techniques and methods.

Conversion of pictorial views into Orthographic Projections with dimensions.

(b) Sectional orthographic projection.:

Orthographic vies with section, types of sections – Full section,

Half section, offset section, Local section, Partial section, Conventions

adopted for sectional views, interpretation of orthographic views.

(d) Isometric Projections:

Conversion of Orthographic views into Isometric Projections and views

(e) Machine parts:

Sketches of various important machine parts with empirical dimensions:

Types of threads, Bolts, various types of Nuts, Locking devices for Nuts,

Rod connections like Cotter Joint & Knuckle Joint, Shaft Couplings like

protected type shaft coupling and pin type flexible coupling, Bearings,

Welded Joints, etc.

(f) Computer Graphics:

Introduction to Computer Graphics.

Term Work:- The term work shall be based on the above syllabus.

	Title	Publisher	Author of the Book
Text Book	**Civil Engg. Drawing Bldg. Construction**	**Charotar Publication**	**Guracharan Singh & Subhash Chander Rangwala**
Reference Books 1	**Bldg. Drawing and detailing**	**Charotar Publication**	**Prabhu, Paul & Vijayan**

AF - 114 ENGINEERING MECHANICS

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	Exam Theory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	1	1	3	60	40	25	25	150

STATICS:

Introduction, engineering and S.I. units, accuracy in engineering calculations, Vectors composition and resolution, concept of Rigid Body.

Resultant of a force system:

i) Concurrent Coplanar Force System [03]

ii) Non concurrent Coplanar Force System [04]

(a) parallel and (b) non parallel

Using analytical as well as graphical methods.

iii) Simple cases of concurrent force system in space.

Concept of internal force, free body diagram. Equilibrium of force system listed above. [03]

Friction : Friction on an inclined plane, ladder friction, wedge friction, screw friction, belt and rope drive. [05]

Centre of gravity of lines, plane figures, volumes, bodies and Pappu's Theorems. [04]

Principle of Virtual Work and its application.

Types of Beams, Types of Supports, Support Reaction for statically determinate beams. [02]

Simplest equivalent for a general force system “Wrench’. [08]

Equation of Static for rigid body assemblies for general force system [02]

DYNAMICS:

Review of Particle Kinematics-Laws of Motion-Principle of Momentum, Instantaneous centre in plane motion, Motion along an inclined plane, Mass Moment of Inertia in Rotational Motion, Motion of connected bodies, Impulse and Momentum, Impact, work power and Energy, D’Alemberts principle, vibrations of SDOF systems. [08]

Term work:-(1)Experiments (2) Problems based on theory .

	Title	Publisher	Author of the Book
Text Book	**Engg. Mechanics**	**Umesh Pub.**	**A.K. Tayal**
Reference Books 1	**Engg. Mechanics: Vol-Iand II**	**MGH-Pub.**	**Beer & Johnson**
2	**Engg. Mechanics**	**Dhanpatrai & sons**	**S. Ramamrutham**
3	**Engg. Mechanics**	**S. Chand**	**R.S. Khurmi**

AF - 116 WORKSHOP: I

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
-	-	3	-	-	-	-	50	50

1. INSTRUCTION:

Kinds of wood, types of carpentry tools, carpentry joints, Plumbing tools, pipe fittings, tin smithy and soldering tools.

2. DEMONSTRATIONS:

Operation of wood working machines.

3. TERM WORK:

Each candidate shall submit the following term work.

1. Practice job in carpentry ---- One job.
2. Simple carpentry joint ---- One job.
3. Threading of pipe and pipe fittings ---- One job.
4. Tin smithy and soldering ---- One job.

SEMESTER II (ALL)

AF-201 – MATHEMATICS - II

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	1	-	3	60	40	-	-	100

[A] PARTIAL DIFFERENTIATION & ITS APPLICATIONS :
Partial derivatives, Homogenous functions Euler's theorem, Total derivatives - Differentiation of implicit functions, Change of variables, errors and approximations, Maxima & Minima of functions of two variables, Lagrange's method of undetermined multipliers.

[B] MULTIPLE INTEGRALS & THEIR APPLICATIONS :
Double integrals, definition evaluation, change of order of integration, double integrals in polar co-ordinates, area enclosed by plane curves, Triple integrals, change of variables, volume of solids.

[C] INFINITE SERIES :
Introduction, Definitions, Convergence, divergence and Oscillation of a series, P-test, Comparision test, Ratio test, Root test, Higher rario test, Rabbe's test, Log test, Alternating Series, Leibnitz's rule.

[D] COMPLEX NUMBER :
Definition, elementary operations, Argan's diagram, De- Moivre's theorem, and its applications To expand $\sin n\theta, \cos n\theta$ in powers of $\sin\theta$, $\cos\theta$ respectively, To expand $\sin^n\theta$,$\cos^n\theta$ and $\sin^m\theta$. $\cos^n\theta$ in a series of Sines or Cosines of multiples of θ, Hyperbolic functions, Formulae of hyperbolic functions, Inverse hyperbolic functions, Logarithm of complex quantities. Separation of real and imaginary parts. C + iS method.

[E] LAPLACE TRANSFORMS :
Introduction, Definition Transforms of elementary functions, properties of Laplace tramsforms, Inverse transforms, Note on partial fractions, Transforms of derivatives,Transforms of integrals. Multiplication and division by t, convolution theorem.

		Title	Publisher	Author of the Book
Text Book	**1**	**Higher Engineering Mathematics**	**Khanna Publishers**	**Dr. B. S. Grewal**
Reference Books	**1**	**Applied Mathematics for engineers and physicists**	**McGraw Hill Ltd.**	**Pipes and Harvil**
	2	**Applied Mathematics**	**Pune Vidyarthi**	**I.N.& J.N. Wartikar**

AX-212 - ELECTRONICS PRINCIPLES

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	1	2	3	60	40	25	25	150

1. DIODE THEORY

Semiconductor theory, Conduction in crystals, Doping source, The unbiased diode, Forward biad, Reverse bias, Linear devices, The diode graph, Load lines, Diode approximations, D.C. resistance of a diode.

2. DIODE CIRCUITS

The since wave, The transformer, The half wave rectifier, The full wave rectifier, The bridge rectifier, The capacitor input filter.

3. SPECIAL PURPOSE DIODES

The zener diode, The dener regulator, Optoelectronic devices.

4. BIPOLAR TRANSSISTOR

Some basic ideas, Forward-reverse biad, The CE connection, Transistor characteristics, DC load lines, The transistor switch.

5. TRANSISTOR BIASING CIRCUITS

Base biad, Emitter-feedback biad, Collector--feedback, Voltage divider bias, Emitter bias, Moving ground around, PNP circuits.

6. CE AMPLIFIERS

Coupling and bypass capacitors, The superposition theorem for amplifiers, AC resistance of the emitter diode, AC beta, The grounded emitter amplifier, The ac model of a CE stage.

7. CC AND CB AMPLIFIERS

The CC amplifier, The ac model of an emitter follower, Types of coupling ,Direct coupling.

8. CLASS A AND B POWER AMPLIFIER

The ac load line of a CE amplifier, AC load lines of other amplifier, Class An operation.

9. OP-AMP CIRCUITS

Non inverting voltage amplifiers, The inverting voltage amplifiers, The summing amplifier, Comparators.

10. OSCILLATORS AND TIMERS

Theory of sinusoidal oscillation, The wein-bridge oscillator.

11. THYRISTORS

The ideal latch, The four-layer diode, The silicon controlled rectifier.

12. FREQUENCY DOMAIN

The Fourier series, The spectrum of a signal.

13. FREQUENCY MIXING

Nonlinearity ,Medium-signal ,operation with one sine wave, Medium signal operation with two sine waves.

14. AMPLITUDE MODULATION

Basic idea, Percent modulation, AM spectrum, The envelope detector, The super heterodyne receiver.

15. DIGITAL ICS

Number system, Boolean algebra, Logic gates.

	Title	Publisher	Author of the Book
Text Book 1	**Basic Electrical, Electronics and Computer Engineering**	**Tata McGraw Hill**	**R. Muthusubramaniam et al.**

AX - 223 ADVANCED "C" PROGRAMMING - II

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	1	2	3	60	40	25	25	150

1 ARRAYS:

Introduction, One-dimensional and two dimensional arrays, Initializing two-dimensional arrays, Multidimensional arrays, Case studies.

2 HANDLING OF CHARACTER STRINGS:

Introduction, Declaring and initializing string variables, Reading and Writing strings, Arithmetic operations on characters, Putting strings together, Comparison of two strings, strings-handling functions, Table of strings, Case studies.

3 USER DEFINED FUNCTIONS:

Introduction, Need for user-defined functions, A multifunction program, The form of "C" functions, Return values and their types, Calling a function, Category of functions, Nesting of functions , Recursion, Functions with arrays, The scope and lifetime of variables in functions, Ansi C functions, Case study.

4 STRUCTURES AND UNIONS:

Introduction, Structure definition, Giving values to members, Structure initialization, Comparison of structure variable, Arrays of structures, Arrays within structures, Structures and functions, Unions, Size of structures, Bit fields, Case studies.

		Title	Publisher	Author of the Book
Text Book	**1**	**Programming in Ansi C**	**TMH**	**Balagurusamy**
Reference Books	**1**	**Programming in Ansi C**	**TMH**	**Kanigham and Ritchi**

AF-204 - MECHANICS OF SOLIDS

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	1	2	3	60	40	25	25	150

[A] SIMPLE STRESSES AND STRAINS : [08]

Introduction, stress, strain, tensile, compressive and shear stresses, Elastic limit, Hooke's law, Poisson's Ratio, Modulus of Elasticity, Modulus of Rigidity, Bulk Modulus, Bars of Varying sections, Extension of tapering rods, Bars of uniform strength, temperature stresses, Hoop stress, stress on oblique sections, State of simple shear, Relation between Elastic constants.

[B] MECHANICAL PROPERTIES OF MATERIALS : [03]

Ductility, Brittleness, Toughness, Malleability, Behavior of ferrous and non ferrous metals in tension and compression, shear and bending tests, Standard test pieces, Influence of various parameters on test results, True and nominal stress, Modes of failure, Characteristic stress-strain curves, Strain hardening, Hardness, Different methods of measurement, Izod, Charpy and tension impact tests, Fatigue, Creep, Correlation between different mechanical properties, Effect of temperature. Testing machines and special features, Different types of extensometers and compressometers, Measurement of strain by electrical resistance strain gauges.

[C] BENDING MOMENT AND SHEAR FORCE : [06]

Bending moment, shear force in statically determinate beams subjected to uniformly distributed, concentrated and varying loads. Relation between bending moment, shear force and rate of loading.

[D] MOMENT OF INERTIA : [03]

Concept of moment if Inertia, Moment of Inertia of plane areas, polar moment of Inertia, Radius of gyration of an area, Parallel Axis theorem, Moment of Inertia of composite Areas, product of Inertia, Principal axes and principal Moments of Inertia.

[E] STRESSES IN BEAMS : [07]

Theory of simple bending, Bending stresses, moment of resistance, modules of section, Built up and composite beam section, Beams of uniform strength, Distribution of shear stress in different sections.

[F] TORSION : [04]

Torsion of circular. solid and hollow section shafts, shear stress angle of twist, torsional moment of resistance, power transmitted by a shaft, keys and couplings, combined bending and torsion, close coiled helical springs.

[G] Stresses in cylindrical and spherical shells under fluid pressure. [03]

[H] Inelastic bending of beams. [02]

[I]Principal stresses and strain. [04]

Term work:-This will consist of experiments and solution of problems based on syllabus.

		Title	Publisher	Author of the Book
Textbook	**1**	**Strength of Materials**	**Dhanpat Rai**	**S. Ramamruthum & R. Narayan**
Reference-Books	**1**	**Strength of Materials**	**Khanna Publishers**	**Sadhu Singh**
	2	**Strength of Materials Vol. 1 & 2**	**CBS**	**S.Timoshenko**

AF - 205 HEAT POWER

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	1	2	3	60	40	25	25	150

(1) PROPERTIES OF STEAM:
Distinction between gas and vapour, sensible heat, latent heat, total heat and super heat of steam, condition of steam, dryness fraction, methods of determination of dryness fraction, internal energy of steam, specific volume, critical pressure and temperature.

(2) PROPERTIES OF GASES:
Zeroth, first and second laws of thermodynamics, laws of perfect gases(Boyle's law, Charle's law, Regnault's law, Joule's law), Characteristic equation of gas, gas constants, internal energy, specific heat at constant pressure and specific heat at constant volume, relationship between specific heats, thermodynamic processes of perfect gases

(3) FUELS & COMBUSTION:
Solid, liquid and gaseous fuels used for boilers and I.C. engines, combustion of fuels, air required, products of combustion of fuel, analysis of flue gases, calorific value of fuels and its determination

(4) BOILERS:
Classification of boilers, Cochran & Babcock-wilcox boiler, boiler mountings and accessories, draught (Natural & Artificial)

(5) I. C. ENGINES:
Prime movers, classification of prime movers with examples of each classes, advantages of I.C. engines over E.C. engines, classification of I.C. engines, thermodynamic air cycles (Carnot cycle, Constant volume auto cycle, Constant pressure Joule cycle, Diesel cycle), Air standard efficiency, construction and working of 2–stroke and 4–stroke cycle engines, P-v diagrams, determination of I.P., B.P., fuel supply in I.C. engines, ignition system of I.C. engines, Cooling of I.C. engines, Lubrication & governing of I.C. engines

(6) SOLAR ENERGY:
Introduction to solar energy systems

Term work:- The term work shall be based on the above syllabus.

		Title	Publisher	Author of the Book
Text Book	**1**	**Elements of Heat Engines (S.I. Units) Vol. 1**	**Acharya Book Depot**	**R. C. Patel and C.J. Karamchandani**
	2	**Elements of Heat Engine**	**Charotar Publishing House**	**N.C.Pandya and C.S.Shah**
Reference Books	**1**	**Heat Engine**		**P.L. Ballaney**
	2	**A Course in thermodynamics and Heat Engine**		**Kothandaraman**

AF-206 - WORKSHOP: II

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
-	-	3	-	-	-	-	50	50

[A] INSTRUCTION:

Introduction to fitting shop tools, taps, dies, drills, drilling machines, welding process, welding equipment for arc welding, forging tools, forging, bending, upsetting, drawing, adhesive bonding.

[B] DEMONSTRATIONS:

Demonstration of general operation of drilling, turning, shaping.

[C] TERM WORK :

Each candidate shall submit the following term work.

1. Filing and fitting practice ---- One job.
2. Simple welding joint ---- One job.
3. Forging practice ---- One job.
4. Wooden utility job with adhesive bonding ---- One job.
5. PCB making ---- One job.

SEMESTER III (CIVIL)

CL-301 – MATHEMATICS - III

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	-	-	3	60	40	-	-	100

[A] FOURIER SERIES :

Euler's Formulae, condition for a Fourier expansion, functions having points of discontinuity, change of interval, odd & even functions, Expansion of odd & even periodic functions, Half-range series, practical harmonic analysis.

[B] NUMERICAL METHOD :

Solution of algebraic and transcendental equations, by Newton - Raphson method, Direct iteration method, false position method, Solution of linear simultaneous equation : (1) Gauss - elimination (2) Gauss - Jordan (3) Gauss - Siedal method , Numerical methods to solve first order and first degree ordinary differential equations by Picard's method &Taylor's series method, Euler's Method, Modified Euler's Method, Milne's Method, Runge's method, Runge kutta method.

[C] INTEGRAL TRANSFORMS :

Definition, Fourier integral, Fourier sine & cosine integrals, Complex form of Fourier integral, Fourier transform, Fourier sine & cosine transforms, finite Fourier sine & cosine transform, fourier transform of the derivative of a function, Inverse Laplace transform by method of residues, Application of transforms to boundary value problems.

[D] DIFFERENTIAL EQUATIONS :

Linear differential equations of higher order with constant coefficients, equations reducible to linear equations with constant coefficients, Simultaneous linear equations with constant coefficients. Application to engineering problems. Series solution of differential equations of the second order with variable coefficients.

[E] PARTIAL DIFFERENTIAL EQUATIONS :

Introduction, formation,linear equation of first order, non- linear equations of first order-Charpit's method, homogenous linear equations with constant coefficient to find the complementary functions & the particular integral, non- homogenous linear equations with constant coefficients. Monge's Method, Method of separation of variables - vibrating string problem, Heat flow equation etc.

[F] LAPLACE TRANSFORMS :

Application to differential equation, simultaneous linear equation with constant coefficients.

		Title	Publisher	Author of the Book
Text Book	**1**	**Higher Engineering Mathematics**	**Khanna Publishers**	**Dr. B. S. Grewal**
Reference Books	**1**	**A Text book of Applied Mathematics**	**Pune Vidyarti**	**I. N. & J. N. Wartikar**
	2	**Mathematics for Engineering**		**Chandrika Prasad**
	3	**A Text book of Applied Mathematics**		**Dr. K.N.Shrivastava and Dhavan**

CL303: STRUCTURAL ANALYSIS - I

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	3	60	40	25	25	150

1. FORCES IN DETERMINATE PIN JOINTED TRUSSES:

Different types of pin jointed trusses and their statical determinacy, Methods of analysis : (i) Method of Joints (ii) Method of Sections (iii) Graphical Method (iv) Method of Tension Coefficients - Simple Space Frames

Deflection of Trusses using Castigliano's First Theorem. [10]

2. STRAIN ENERGY:

Resilience, Strain Energy in Tension Compression, Bending and Torsion, Proof Resilience, Impact Loads. [02]

3. STRENGTH THEORIES:

Different Theories of Elastic Failure and their Applications. [02]

4. SLOPE AND DEFLECTION OF STATICALLY DETERMINATE BEAMS:

Differential Equation of the Elastic Curve, Relation between Moment, Slope and Deflection using fundamental Double Integration Method, Macualay's Method (Method of Singularity Function), Moment Area Method, Conjugate Beam Method and Castigliano's Theorem. Effect of Shearing Force on Deflection of Beams. Fixed Beams. [14]

5. DIRECT AND BENDING STRESSES:

Short Columns subjected to eccentric load, Middle Third Rule, Kernal (Core) of Section, [03]

6. COLUMNS AND STRUTS:

Buckling of Columns, different end conditions, effective length, least radius of gyration, Euler's Theory of Long Columns - its applicability and limitations, Columns with initial curvature, Eccentrically Loaded Columns. Rankine's Formula, Secant Formula and Column as per I.S. 800 - 1984. [05]

7. UNSYMMETRICAL BENDING:

Principal Axis of Inertia, Mohr's Circle of Inertia, Ellipse of Inertia. Unsymmetrical Bending, Z - Polygon, Shear Centre [04]

Term Work shall consist of Graphical and/or analytical problems based on all the topics of the syllabus of Structural Analysis - I.

		Title	Publisher	Author of the Book
Text Book	**1**	**Mechanics of Structures- Vol.1**	**Charotar Publication, Anand**	**S.B.Junarkar /H.J.Shah**
Reference Books	**1**	**Strength of Materials & Mechanics of Structures**	**Standard publishers**	**B.C.Punamia**
	2	**Intermediate Structural analysis**	**MacGraw Hill**	**C.K.Wang**

CL304: SURVEYING – I

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	0	3	3	60	40	25	25	150

1. INTRODUCTION: [02]

Introduction to Surveying. Classification of Surveys and Classification of Surveying.

2. MEASUREMENT OF DISTANCES:

Chain and Tape Survey, Standard Metric Chains, Methods of Chaining, Instruments used for taking offsets, Correction for Sloping Ground, Obstacles in Chain Surveying, Field Works, Plotting, Conventional Signs, Degree of Accuracy. [05]

3. COMPASS SURVEYS:

Magnetic Compass - Principles, Procedures, Precautions and Corrections; Traverse with Prismatic Compass. [08]

4. LEVELLING:

Dumpy, Tilting and Automatic Levels, Staves - Methods of Leveling, Precautions and Corrections, Level Field Book, Plotting and Contouring. [07]

5. THEODOLITE:

Transit Theodolite- Uses, Temporary Adjustments, Measurement of Vertical and Horizontal Angles, Theodolite Traverse, Latitude and Departure, Balancing. [08]

6. MINOR INSTRUMENTS:

Principles and Uses of Planimeter, Abney Level, Tangent, Clinometers, Box Sextant, Pantograph. [03]

7. PLANE TABLE SURVEY:

Instruments, Adjustments, Methods of Plane Tabling, Errors, Accuracy and Advantages. [04]

8. SETTING OUT WORKS: ALIGNMENTS OF BRIDGE, TUNNEL, AND DAM.

Practical, Sectional Work and Term-Work shall be based on the course under Surveying-II [03]

Term work includes setting out of Foundations for Buildings, Profile Leveling, Contouring and Theodolite Traverse. The Survey Drawing for the same shall be submitted by each student together with the field book. Practical, Term work and Sessional shall be based on the course under Surveying-I.

		Title	Publisher	Author of the Book
Text Book	**1**	**Surveying & Levelling**	**Tata McGraw Hill**	**N.N.Basak**
Reference Books	**1**	**Surveying & Levelling _ I**	**Pune Vidyarthi Griha Prakashan**	**Kanetkar & Kulkarni**
	2	**Surveying & Levelling**	**Charotar Publication**	**S.C.Rangwala**

CL 307: FLUID MECHANICS - I

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	3	60	40	25	25	150

1. INTRODUCTION:

(a) Introductory Concepts And Definitions: Fluids and Soils; Liquid, Gas and Vapor; Coordinate systems ; Continuum; Control volume.

(b) Properties Of Fluids: Density; Specific weight; Specific Volume; Specific Gravity; Bulk modulus of Elasticity; Pressure; Viscosity; Surface Tension; Capillarity .

[04]

2. FLUID STATICS:

(a) Fluid Pressure and It's measurement: Introduction; Variation of static pressure; Atmospheric, Gauge and Absolute Pressure; Hydrostatic Paradox; Pressure measurement by different devices; Hydraulic press.

(b) Hydrostatic Force: Pascal's Law; Hydrostatic force on submerged plane and curved surfaces ; Location of Hydroststic force ; Applications of Hydrostatic force.

(c) Buoyancy: Archimedes' Principle; Buoyant force; Determination of metacentric height; Stability of floating bodies.

[10]

3. FLUID - FLOW CONCEPTS AND BASIC EQUATIONS:

(a) Fundamentals of Fluid Flow: Introduction; Methods of describing fluid motion; Velocity and Acceleration of a fluid particle; Types of fluid flow; Streamline, Path line and Streak line; Continuity Equation in Integral form and Differential form; Existence of flow.

(b) Vortex Motion.

(c) Equation of Motion and Energy Equation: , Forces acting on fluid in motion; Euler's equation of motion for one - dimensional flow; Bernoulli's equation from Euler's equation of motion.

[08]

4. FLUID FLOW MEASUREMENT:

Measurement of discharge through a pipe by Venturimeter, Orificemeter, Orifice, Mouthpiece, Rotameter and velocity measurement by Pitot Tube.

Measurement of discharge through an Open Channel by a Weir, and Notch.

[03]

5. FLOW THROUGH PIPES:

Introduction; Types of flow; Reynolds's experiments; Laws of Fluid Friction; Frictional loss: Darcy - Weisbach formula, Chezy's formula, Manning's formula; Other Minor losses in pipe flow ; Total Energy line and Hydraulic Gradient Line; Power transmission through pipes; Pipes in series and Equivalent pipe; Pipes in parallel; Branched pipe; Water hammer phenomena in pipe flow; Loss of head due to friction in tapering pipe; Loss of head due to friction in a pipe with side tapings.

Steady flow in conduits: Network of pipes and its hydraulic analysis by Hardy Cross method; Syphon and Rising Mains.

6. IMPACT OF JET ON VANES :

Stationary and moving vanes ; Jet propulsions.

[01]

7. DIMENSIONAL ANALYSIS: [04]

8. COMPUTER APPLICATIONS TO SPECIFIED PROBLEMS: [04]

Term Work shall be based on Practical on the course under Fluid Mechanics - I .

		Title	Publisher	Author of the Book
Text Book	**1**	**Textbook of Fluid Mechanics & Hydraulic Machines**	**Laxmi Publications**	**Dr.R.K.Bansal**
Reference Books	**1**	**Hydraulics, Fluid Mechanics & Fluid Machines**	**Dhanpatrai Publihshers**	**S Ramamurtham**
	2	**Fundamentals of Fluid Mechanics**	**Scientific Publishers, Jodhpur**	**R.K.Purohit**
	3	**Fluid Mechanics & Machinery**	**CBS Publishers**	**H M Raghunath**

CL 312: CONSTRUCTION TECHNOLOGY-I

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	0	3	60	40	-	-	100

Introduction: Classification of buildings, Components of buildings and their broad functions. [02]

Foundation: Open excavations, braced excavations, Functions, Classification, suitability and constructional features of shallow foundations, building foundation in black cotton soil, machine foundation, failure of building foundation, constructional features and suitability of pile foundations used for buildings, Damp proofing in building construction. [09]

Masonry: Technical terms used in masonry, design concepts, Classification and construction features of common stone masonry, principles of brick masonry construction, bonds in brick masonry, construction of reinforced brick masonry and partition walls used in buildings, design concepts and construction details of Arches & lintels. `
[06]

Flooring: Type of flooring and its suitability, Construction details of CC/RCC flooring, Tile floorings (mosaic, glazed, marble), timber floorings, Industrial floorings. [04]

Stair case: Requirement, location and classification, construction features of RCC, metal stairs. [02]

Doors & Windows: Classification, material, suitability, requirement & location, construction features of paneled & flushed doors/windows, fixtures & fastenings for doors/windows, metal doors/windows
[05]

Roofs: Classification, functions and requirement of roofs, roofing materials, construction of trussed roofs with AC/GI sheets, pre-cast and in-situe RCC roofs. [04]

Building frames: Systems & Construction features of RCC frames, structural steel frames, Connection details of Steel members. [03]

Building finishes: Plastering, pointing, painting and white washing: construction materials & methods.
[03]

Building protection and maintenance: Fire proofing, water proofing and anti-termite treatments, building maintenance. [04]

		Title	Publisher	Author of the Book
Text Book	**1**	**Building Construction**	**A. Saurabh & Co. N. Delhi**	**Dr.B.C.Punamia**
Reference Books	**1**	**Building Construction**	**Charotar Publications**	**S.C.Rangwala**
	2	**Building Construction**	**Standard Publishers**	**Shushil Kumar**
	3	**The Construction of Building**	**ELBS**	**R. Barry**
	4	**Building Construction Handbook**	**Butterworth & Heinemann**	**Chudley & Greeno**

CL 311: ENGINEERING MATERIALS

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	-	-	3	60	40	-	-	100

1. INTRODUCTION: [04]

Engineering requirements of Materials - Mechanical, Thermal, Electrical, Chemical and Optical properties. Structure of Atom, Bonding in Solids, Metallic Bonding, Ionic Bonding, Van der Walls Force. Crystalline and Non-Crystalline nature of Solids, Crystal Structure, Imperfections in Crystal Structure, Types of Imperfections - Vacancies, Dislocations. Plastic Deformation of Single Crystal, Slip, Twinning etc.

2. BRICKS:

Constituents of Brick-Clay, Manufacture of Bricks, BIS norms for Bricks.

[04]

3. CERAMIC MATERIALS:

Tiles, Roofing Tiles, Flooring Tiles, Glazed Tiles, Special Industrial Tiles, Earth ware, Stoneware, Porcelain.

[02]

4. LIME:

Definitions, Source of Lime, Constituents of Limestone, Type of Lime - Methods of Preparation and uses.

[02]

5. TIMBER:

Types, Defects, Seasoning. Methods of Preservation, Uses, Reconstructed Wood - Plywood, Laminated Wood and Decorative Laminates.

[06]

6. PAINTS:

Types of Paints, Varnishes and Lacquers, Distempers and Wall Papers.

[04]

7. PLASTICS:

Thermosetting and Thermoplastic Materials, Types of Plastic Materials. Properties and Industrial Applications of Plastics.

[04]

8. METALS AND ALLOYS:

Ferrous Alloys like plain Carbon and Alloy Steels. Cast Iron. Non-Ferrous Alloys of Copper, Nickel and Aluminum: Their compositions, properties and Industrial Applications.

[12]

9. ADVANCED MATERIALS USED FOR BUILDING CONSTRUCTION. [02]

		Title	Publisher	Author of the Book
Text Book	**1**	**Engineering Materials**	**Charotar Publications.**	**S.C.Rangwala**

B.E. SEM IV (CIVIL)

CL401 – MATHEMATICS : IV

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	-	-	3	60	40	-	-	100

[A] FUNCTIONS OF COMPLEX VARIABLE :
Analytic functions, Cauchy -Rieman equations, Harmonic functions, orthogonal system, complex potential function, Determination of conjugate function, conformal transformation, some standard transformations, bilinear transformation, line integral, properties of complex integration, Cauchy's theorem and Cauchy's integral formula.

[B] NUMERICAL METHODS :
Solution of algebraic and transcendental equations, by Newton - Raphson method, Direct iteration method, false position method, Solution of linear simultaneous equation :
(1) Gauss - Elimination (2) Gauss - Jordan (3) Gauss – Siedal method , Numerical methods to solve first order and first degree ordinary differential equations by Picard's method Taylor's series method, Modified Euler's Method, Milne's Method, Runge's method, Runge Kutta method.

[C] FINITE DIFFERENCES & DIFFERENCE EQUATIONS :
Finite difference, Interpolation, Newton's forward and backward and central differences and Lagrange's formula, Sterling & Bessel's formula, Numerical differentiation & Integration, Trapezoidal rule, Simpson's (both) rules, Difference equations with constant coefficient.

[D] VECTOR CALCULUS :
Vector function of a single scalar variable, Differentiation of vectors, simple applications to plane, motion, scalar and vector point functions, Del applied to scalar point function (gradient) Divergence of a vector point function, curl of a vector, second order expressions, line integrals, surface integrals, Gauss theorem and Stoke's theorem.

[E] STATISTICAL METHODS :
Binomial distribution, poison distribution, normal distribution, calculation of errors, probable errors, standard error, coefficient of correlation, lines of regression.

		Title	Publisher	Author of the Book
Text Book	**1**	**Higher Engineering Mathematics**	**Khanna Publishers**	**Dr. B. S. Grewal**
Reference Books	**1**	**A Text book of Applied Mathematics**	**Pune Vidyarthi Griha**	**I. N. & J. N. Wartikar**

CL403 - SURVEYING -II

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	0	3	3	60	40	25	25	150

1. PERMANENT ADJUSTMENTS : [04]
Optics of the Telescope; Permanent Adjustment of Dumpy Level, Tilting Level and the Vernier Theodolite.

2. TACHEOMETRY: [05]
Principles of Tachometry; Use of analytic lenses; Field-work; Computation, Tachometric Table, Direct Reading Tachometers: Applications of Tachometry

3. CURVES: **[06]**
Theory of Simple, Compound, Reverse & Vertical Curves, Transition curves – Cubic Spiral, Cubic Parabola and Lemniscates.

4. ELECTRONIC DISTANCE MEASUREMENTS: [04]
Principles & Instruments used, Trilateration.

5. PHOTOGRAMMETRY: **[04]**
Principles, Photo-Theodolite. Aerial Photogrammetry, Stereoscopy and parallax and their applications, Field-Work, Plotting from air photographs, Applications of air Surveys.

7. ERRORS: [04]
Mistakes; Cumulative & Compensating Errors, Probability Curve; Principle of Least Squares; Probable Errors; R.M.S. Value; Weighted Observations. Adjustments of a Trilateration Network.

8. HYDROGRAPHY: [05]
Gauge, Sounding, Location of Sounding.

9. Field astronomy fundamentals, spherical Trigonometry, determination of terrestrial co-ordinates and Azimuth, Introduction to GIS and GPS.

[08]

		Title	Publisher	Author of the Book
Text Book	**1**	**Surveying & Levelling**	**Tata McGraw Hill**	**N.N.Basak**
Reference Books	**1**	**Surveying & Levelling _ I & II**	**Pune Vidyarthi Grih Prakashan**	**Kanetkar & Kulkarni**
	2	**Surveying & Levelling**	**Charotar Publication**	**S.C.Rangwala**

CL 406 - STRUCTURAL ANALYSIS - II

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	3	60	40	25	25	150

1. GENERAL: [03]
Static and Kinematic Indeterminacy of Planer Frames, Planer Truss Structures, Three Dimensional Structures. Stable and Unstable Structures. Principle of Superposition, Maxwell's Reciprocal Theorem.

2. ENERGY PRINCIPLES: [05]
Castigliano's Theorem II, Deflection of Statically Determinate Beams and Frames using Unit Load Method. Analysis of Statically Indeterminate Beams and Frames by Method of Consistent Deformation. Analysis of Statically Indeterminate Trusses by the Method of Consistent Deformation.

3. SLOPE DEFLECTION METHOD: [05]
Analysis of Continuous Beams including settlement/rotation of support.

4. MOMENT DISTRIBUTION: [07]
Analysis of Continuous Beams and Frames including sway. Use of Symmetry.

5. INFLUENCE LINES: [09]
Statically Determinate Beams - I.L. for Support Reaction, Deflection, Shear and Moment for UDL and several Point Loads. Criteria for maximum effect.
Statically Determinate Trusses - I.L. for Forces in members for UDL and Point Loads. Criteria for maximum effect.

6. ANALYSIS OF ARCHES: [04]
Three Hinged, Two Hinged and Fixed Arches.

7. MATRIX METHODS:
Introduction to Flexibility and Stiffness Method. Application of Stiffness Method System Approach to analysis of Beams and Plane Frames. [04]

8. APPLICATION OF COMPUTER FOR SIMPLE PROBLEMS OF STRUCTURAL ANALYSIS [04]

Termwork :
Shall consist of at least 25 problems based on the Course under STRUCTURAL ANALYSIS-II

		Title	Publisher	Author of the Book
Text Book	**1**	**Intermediate Structural Analysis**	**Mc-Graw Hill Publication**	**C. K. Wang**
	2	**Matrix Analysis for Framed Structures**	**CBS Publishers**	**Gere & Weaver**
Reference Books	**1**	**Indeterminate structural analysis**	**Oxford & IBH Publication**	**J. Sterling Kinney**
	2	**Mechanics of Structure Vol. II**	**Charotar Publishing**	**S. B. Junarkar & H. J. Shah**
	3	**Structural Analysis**	**Tata Mc-Graw Hill Publication**	**R. S. Jangid**

CL407 - ENGINEERING GEOLOGY

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	2	3	60	40	25	25	150

1. GEOLOGY AND ENGINEERING: [04]

Introduction, Branches of Geology, Use of Geological Studies in Engineering, Age and Interior of the Earth, Crust of the Earth.

2. MINERALS: [05]

Definition, important physical properties of Minerals, basic idea of Crystal System, study and identification of common rock forming Minerals, Clay Minerals and their properties.

3. ROCKS: [08]

Definition and Main rock types

A. Igneous rocks: Definition, Acidic and Basic Rocks, Textures and Classification of Igneous Rocks, Dykes and Sills, Study and Identification of Common Igneous Rocks with their uses.
B. Sedimentary Rocks : Definition, Mode of Formation, Particle Size in Sediments, Consolidation, Structures of Sedimentary Rocks, Classification, Study and Identification of common Sedimentary Rocks with their uses.
C. Metamorphic rocks; Definition; Agents, Types and Grades of Metamorphism. Classification and Structures of Metamorphic Rocks. Study and Identification of common Metamorphic rocks with their uses.

4. GEOLOGICAL STRUCTURES: [06]

Stratification, Outcrops, Dip and Strike, Use of Clinometer Compass, Types of Folds & Faults, Unconformity and Joints, Effects of Geological Structures on Engineering Structures.

5. PHYSICAL GEOLOGY: [07]

Weathering, Formation and types of Soils. Geological work of Stream, Wind, Glacier, Ocean and Underground water. Features produced by agents and their engineering significance. Cycle of river erosion, base level of erosion, Types of Rivers, Drainage Pattern, Flood Control and River Training.

6. VOLCANOES: [02]

Types, Surface Appearance of Lava flows, Volcanic products and their Engineering significance.

7. EARTHQUAKES: [06]

Epicenter, Causes, Effects, Classification and Distribution of an Earthquake, Intensity and Magnitude Scale, Isoseismic Lines, Earthquake Measuring Equipments, Types of Waves. Seismic Zones of India, Outlines of Earthquake Resisting Structures.

8. STRATIGRAPHY OF INDIA:

Outline of Stratigraphy, Principles of Stratigraphy, Geological Time Scale, Physiographic division of India, Broad outline of important system of India and distribution of rocks with their utility as Building Stones, Geology of Gujarat State and available Building Stones. [02]

TERM WORK IS BASED ON THE TOPICS LISTED ABOVE.

		Title	Publisher	Author of the Book
Text Book	**1**	**Engineering and General Geology**	**Katson Publication**	**Parbin Singh**
Reference Books	**1**	**Textbook of Engineering Geology**	**McMillan Publishers**	**N. Chennakesavulu**
	2	**Principles of Engineering Geology**	**Standard Publication**	**K. N. Bangar**

CL 408 - FLUID MECHANICS - II

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	3	60	40	25	25	150

1. KINEMATICS OF FLUID FLOW: [04]

Rotational and irrotational flow; circulation and vorticity; continuity equation in polar coordinates; acceleration of a fluid particle ; types of accelerations; stream function and velocity potential function : relationship between these functions in Cartesian and polar coordinates; flow nets.

2. DYNAMICS OF FLUID FLOW: [04]

Euler's equation of motion for Three - Dimensional flow; Bernoulli's equation from Euler's equation of motion.

3. OPEN CHANNEL FLOW: [10]

(a) Introduction; comparison between open channel flow and pipe flow ;classification of open channel flows; Velocity distribution in open channel flow ; Uniform flow : Chezy, Bazin ,Manning , Ganguillet and Kutter's formula; most efficient hydraulic channel cross sections.

(b) Specific energy: concept of specific energy and specific force; specific energy and specific force curves; applications of these curves to channel transitions; metering flumes.

(c) Critical flow: critical flow in trapezoidal, rectangular and triangular channel.

(d) Gradually Varied Flow: Dynamic equation of gradually varied flow; classification of channel slopes; classification of surface profiles; Characteristics of surface profiles; back water and draw down profile computations.

(e) Hydraulic Jump: Hydraulic jump in rectangular channel; Sequent depths and their relation; Classification of jump; loss of energy in hydraulic jump; elements and characteristics of hydraulic jump; location of hydraulic jump; Applications of Hydraulic Jump.

4. VISCOUS FLOW: [04]

Introduction; laminar flow in circular pipes: Hagen - Poiseullie Equation ; laminar flow between parallel plates: (i) both plates at rest (ii) lower plate at rest and upper plate moving in it's own direction - Coquette's flow; viscosity and it's measurement.

5. TURBULENT FLOW IN PIPES: [06]

Characteristics of turbulent flow; hydro-dynamically smooth and rough boundaries; velocity distribution for turbulent flow in pipes; Karman - Prandtl equation; Nikuradse's experiments on artificially roughened pipes; Moody's diagrams; Aging of pipes; Friction factor in turbulent flow for smooth & rough pipes.

6. DIMENSIONAL ANALYSIS AND PRINCIPLES OF SIMILITUDE: [03]

Concepts of dimensions and dimensional homogeneity; dimensionless parameters; Raleigh and Buckingham theorems; principles of similitude applied to the models of hydraulic structures; selection of scales; distorted models; scale effect.

7. HYDRAULIC MACHINES: [06]

(a) Turbines: Types of turbines; their characteristics and working; selection of turbines; cavitation.
(b) Pumps: Types of pumps; their characteristics and working.
(c) Hydraulic ram, hydraulic cranes and lifts.

8. COMPUTER APPLICATIONS TO SPECIFIED PROBLEMS.

[03]

Term work shall be based on the topics of course stated above.

		Title	Publisher	Author of the Book
Text Book	**1**	**Fluid Mechanics**	**Khanna publishers**	**A.K. Jain**
Reference Books	**1**	**Theory & Applications of fluid mechanics**	**McGraw Hill**	**K. Subramaya**
	2	**Open Channel Flow**	**McGraw Hill**	**K. Subramanya**
	3	**Open Channel Flow**	**McGraw Hill**	**V.T. Chow**

CL 410: RAILWAY ENGINEERING & TOWN PLANNING

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	Exam	Theory	Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	0	0	3	60	40	-	-	100

Each part shall have equal weightage.

(A) RAILWAY ENGINEERING

1. INTRODUCTION: **[02]**
Types, Gauge, Alignment, of Railways; Track Components.

2. PERMANENT WAY: **[04]**
Flat footed Rails and Fastening, Welding of Rails, Conning of Wheels, Roaring Rails, Creep. Sleepers: Timber, Steel, Cast iron and Concrete Sleepers, Sleeper Spacing. Ballast: Functions and Specifications, Formation and Drainage of Permanent Way.

3. GEOMETRIC DESIGN: **[03]**
Grade and Curves, Super Elevation, Cant deficiency, Grade compensation.

4. RESISTANCE TO TRACTION: **[03]**
Stresses in Rails; Sleeper; Ballast and Formation.

5. POINTS AND CROSSINGS: **[02]**
Layout of simple turnouts, A Crossover, Gathering line.

6. STATION AND YARDS : **[03]**
Layout of wayside stations, Junctions and Terminals, Marshalling Yards and Formation of Trains.

7. SIGNALLING AND INTERLOCKING : **[03]**
Working of Engineering block, Mechanical, Electrical and Automatic Signalling and Interlocking, Centralized Traffic Control.

(B) TOWN PLANNING

1. INTRODUCTION: **[02]**
Origin and Growth of Town.

2. CIVIL SURVEYS: **[04]**
Purpose, Type, Data Required; Elements of City Planning. Circulation Pattern, Landscape Pattern of Building; Use of Master Plan. Central Areas : Town centre, Civil Spaces, Shopping Centre.

3. HOUSING: **[05]**
Neighbourhood Units, Layout with Houses, Building Bye-Laws.

4. INDUSTRY: [05]
Priorities, Classifications, Siting Industrial Estate.

5. REDEVELOPMENTS : [04]
Slum Clearance Scheme, Town Planning Schemes, Satellite Town, Control of Ribbon Development.

Term work shall be based on the course under Railway Engineering and Town Planning. It also includes Visit to Railway Staff College for studying the Models of Railway Engineering.

		Title	Publisher	Author of the Book
Text Book	**1**	**Town Planning**	**Charotar Publication**	**S C Rangwala**
Reference Books	**1**	**Fundamentals of Town Planning**	**Dhanpat Rai & sons**	**G K Hiraskar**
	2	**Planning & Designing Buildings**	**Engineering Book Publishers**	**Sane Y S**

B.E. SEM V (CIVIL)

CL501 - GEOTECHNIQUES & APPLIED GEOLOGY

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	0	3	3	60	40	25	25	150

Each part shall have equal weightage.

(A) GEOTECHNIQUES:

1. INTRODUCTION: **[02]**
Definition, brief historical development, future prospects.

2. ORIGIN AND NATURE OF SOIL: **[02]**
Formation of soil by various agents, residual soils, alluvial soils, marine and lacustrine soils, Loess, Till, Peat.

3. SOIL STRUCTURE AND TEXTURE: **[07]**
Soil particle size and shape, specific surface, Clay minerals, atoms and atomic bonds, structure of clay minerals, different types of soil mass structures, soil particle size distribution, mechanical and hydrometer analysis.

4. PHYSICAL PROPERTIES OF SOILS: **[03]**
Void ratio, Porosity, degree of saturation, moisture content, unit weight, specific gravity, relative density of soil, Weight-Volume functional relationship.

5. SOIL WATER: **[02]**
Effect of moisture content on soil, ground water, hygroscopic moisture, capillary water, apparent cohesion.

6. SOIL-WATER CONSISTENCY: **[05]**
Liquid limit, Plastic limit, Plasticity Index, Liquidity Index, Shrinkage limit, Plasticity chart.

7. IDENTIFICATION AND CLASSIFICATION OF SOIL: **[03]**
Field identification of soil Engineering classification of soil, Textural classification of soil, group index, Unified classification of soil, I.S. Classification of soil, Practical use of soil classification.

8. SUBSURFACE INVESTIGATION: **[03]**
Planning soil exploration, Methods of exploration, Soil borings, sounding, sampling, spacing and depth of borings, Stand and penetration test, record of field investigation.

(B) APPLIED GEOLOGY

1. GEOLOGICAL EXPLORATION: **[03]**
Geological mapping and its techniques, Types of Geological maps, Outlines of Geophysical methods, Bore hole logging, Use of geological maps in engineering.

2. DAM SITE AND RESERVOIR: **[05]**
Types of dams, Site selection criteria, Geological investigation, Effects of Geological structures and different types of rocks on Foundation sliding, Abutments, uplift and channel section problem. Effect of ground water.

3. TUNNELING: **[05]**
Terminology, Types of rock ground, pressure relief phenomena, Influence of Geological structures on Tunneling, Bridging capacity of rocks and methods of Tunnel excavation, Over break, Geological survey for Tunneling.

4. LANDSLIDES: **[03]**
Types of landslides, causes and prevention of landslides, Influence of dip and slope on stability of hill slope, Subsidence and its causes.

5. ROAD AND BRIDGES: [03]
Geological consideration for Highways and Bridges, Road in hilly region.

6. SUBSURFACE WATER: [03]
Source, varieties and distribution of subsurface water, Water Table, Ground water mounds and depression effects of Cone of depression. Fluctuation of water table relationship, Fresh and Saline ground water. Artesian water and Springs, Methods of ground water investigation.

7. ROCK MECHANICS: **[05]**
Rocks for Engineers, Rocks as construction material, Geological and Engineering classification of rocks, Methods of rock exploration, Core drilling and core recovery, R.Q.D., Outlines of Seismic and Resistively methods, Important physical and mechanical properties of rocks and their methods of testing in laboratory.

Term work will based on the topics listed above.

		Title	Publisher	Author of the Book
Text Book	**1**	**Soil Mechanics and Foundations**	**Laxmi Publication**	**Dr.B.C. Punamia**
	2	**Soil Mechanics and Foundation Engineering**	**UBS Publishers**	**V.N.S. Murthy**

CL511 - ENVIRONMENTAL ENGINEERING-I

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	Exam	Theory	Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	2	3	60	40	25	25	150

1. INTRODUCTION TO ENVIRONMENTAL ENGINEERING: [02]
Environmental systems overview, Environmental ethics, Ecology.

2. DEMOGRAPHY: [05]
Current demographic trends, Population projection, Theories of population, Socioeconomic measures for population control, use of contraceptives & family planning.

3. WATER POLLUTION: [06]
Sources & types of Pollutants, Self- purification capacity, thermal pollution, oil pollution, Eutrophication, Ground water pollution.

4. AIR POLLUTION & ITS CONTROL: [08]
Physical & Chemical Fundamentals, Sources of Air pollutants, classification of pollutants, Ambient Air Quality standards, Effects of air pollutants, Origin & Fate of air pollutants, Micro & Macro Air Pollution, Air pollution meteorology, Atmospheric Dispersion, Air pollution Control of Mobile & Stationary Sources.

5. NOISE POLLUTION: [05]
Introduction, Effects of noise on human beings, Rating systems, Community noise sources & Criteria, Transmission of sound outdoors, Noise control.

6. SOLID WASTE MANAGEMENT: [04]
Perspective, collection; inter-route transfer, sources & classification of solid wastes, Disposal by sanitary Landfill.

7. AGROCHEMICALS & ENVIRONMENTAL POLLUTION: [03]
Use of pesticides & fertilizers, adverse effects of pesticides, Bioamplification, Integrated Pest Management.

8. ORGANOMETALLLIC COMPOUNDS IN THE ENVIRONMENT: [03]
Organolead, Organomercury compounds, Use & toxicity, Detection & transformation in the environment, health effects.

9. ENERGY: [04]
Renewable & Non Renewable sources of energy, Sustainable development, non-conventional energy sources & its Environmental implications.

Termwork will be based on Practicals carried out under the above course.

	Title	Publisher	Author of the Book
Text Book 1	**Introduction to Environmental Engineering**	**McGraw Hill Publisher**	**M. L. Devis & David**
Reference Books 1	**Air Pollution**	**WEL**	**C. S. Rao**
2	**Environmental Pollution**	**TMH**	**H. M. Dix**
3	**Environmental Noise Pollution**	**TMH**	**C. Cuniff**
4	**Pollution Control**	**TMH**	**R. M. Harrison**

CL 507 - STRUCTURAL ANALYSIS-III

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	3	60	40	25	25	150

1. PLASTIC METHODS: **[06]**

Elementary Plastic Theory of Bending, Moment Curvature Relationship, Plastic Hinges, Plastic Moment of Resistance, Shape Factor, Load Factor, Collapse Load, Collapse Mechanism, Equilibrium and Yield Conditions, Analysis of Beams and Portals.

2. INFLUENCE LINES FOR INDETERMINATE STRUCTURES: **[08]**

Muller Breslau Principle applied to Beams & Frames.

3. APPROXIMATE METHODS: **[04]**

(i) Portal Method
(ii) Cantilever Method
(iii) Substitute Frame Method

4. BEAMS CURVED IN PLAN AND ELEVATION: **[03]**

5. SPHERICAL AND CONICAL DOMES: **[03]**

Analysis of Forces due to
(i) UDL all over
(ii) Central Point Load
(iii) Collar Load

6. COLUMN ANALOGY METHOD: **[06]**

Application to Fixed Beams - Prismatic and Non-Prismatic types. Evaluation of Stiffness and Carry-Over Factors. Analysis of Gable Frames and Box Culverts.

7. PRESTRESSED CONCRETE: **[05]**

Properties of High Grade Concrete and High Steel, Pre-tensioning and Post-tensioning, Methods of Prestressing, Losses in Prestress, Analysis of sections in Flexure and Deflection.

8. STIFFNESS MEMBER APPROCH **[06]**

Stiffness Member Approach for beams, plane frames and grids

Term work:

It shall consist of at least 20 Problems based on the Course under Structural Analysis - III.

		Title	Publisher	Author of the Book
Text Book	**1**	**Basic Structural Analysis**	**Tata McGraw Hill**	**C. S. Reddy**
Reference Books	**1**	**Indeterminate Structural Analysis**	**Oxford**	**Kinney**
	2	**Indeterminate Stru. Analysis**	**Tata McGraw Hill**	**C. K. Wang**
	3	**Prestressed Concrete**	**Tata McGraw Hill**	**Krishna Raju**

CL 508 - PLANNING & ARCHITECTURE

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	-	2	3	60	40	25	25	150

Study of general principles of architectural proportions and compositions, [02]

Principles of planning: grouping, circulation, orientation, flexibility, roominess, privacy etc, [03]

Elements of Building drawing procedure, graphic codes, symbols and labeling [02]

Elements of perspective drawing. [05]

Building regulations & building bye-laws, layout plan, built-up area, FSI, frontage/setbacks, parking etc., vertical transportation, projections, fire & safety [04]

Planning of residential buildings & public buildings: Space/functional/regulatory requirements, site planning & landscaping, acoustic and thermal planning/design of buildings, Electrical & plumbing systems, HVAC systems. [12]

Preparing architectural and working drawings of residential buildings, simple public buildings/ Industrial buildings. [05]

Introduction to computer aided drafting & editing of building drawings [04]

Use of National Building Code guide lines for building services, electrification, plumbing etc. Basic Principles [04]

TERM WORK:
Term work shall be based on the course under Planning & Architecture.
Preparation of at least 5 A2 drawings covering all the aspects

	Title	Publisher	Author of the Book
Text Book 1	**Planning & Designing of Buildings**	**Engineering Book Publishers, Pune**	**Y.S.Sane**
Reference Books 1	**Building Drawing & Detailing**	**Khanna Publishers**	**Dr.B.T.S.Prabhu/Dr.K.V.Paul/Dr.C.Vijayan**
2	**Building Drawings**	**Tata McGraw Hill**	**Shah-Kale-Patki**
3	**Building Planning & Drawing**	**Charotar Publications**	**Dr.Kumar Swami/A Kamleshwar Rao.**
4	**Civil Engineering Drawing**	**Chand Publications**	**Gurucharan singh**

CL 509 -WATER RESOURCES ENGINEERING

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	0	3	60	40	0	0	100

1. INTRODUCTION: [02]
The hydrologic cycle; History of hydrology; scope and application of hydrology; Hydrologic Equation.

2. PRECIPITATION: **[05]**
Forms of precipitation; Types of precipitation; Measurement of Precipitation; Adjustment of Precipitation data: Double mass curve analysis; Measurement of average depth over area; Optimum Rain-Gauge Network Design; depth - Area - Duration analysis; Geographical Distribution, Time Distribution & Variability of Precipitation; Graphical Representation of Precipitation; Analysis of Rainfall Data.

3. WATER LOSSES: **[06]**
(a) Evaporation: Factors affecting evaporation; Measurement of evaporation; Evaporation in reservoirs; Methods of computation; Methods of reducing Evaporation.

(b) Infiltration: Factors affecting Infiltration; Horton's Infiltration Curve; Methods of Determining Infiltration; Infiltration Indices.

4. RUNOFF: [05]
Runoff process; Relation of storm period; Rainfall to Runoff; Factors affecting runoff; Methods of computation; Gauging of stream; Stage Discharge relationships; Interpretation of stream flow records.

5. HYDROGRAPH ANALYSIS: [08]
Definition; Components of stream flow, hydrograph; Separation of hydrograph components; Factors affecting shape of Hydrograph; Unit hydrograph: Propositions of Unit Hydrograph; Derivation of Unit Hydrograph from flood Hydrograph; Altering Duration of Unit Hydrograph; Unit Hydrograph from complex storms. S - hydrograph; Instantaneous Unit Hydrograph; Synthetic Unit Hydrograph.

6. **SUBSURFACE HYDROLOGY** **[05]**
Techniques of artificial recharge, solution to transient problems of ground water mounds, theory of subsurface drainage, stream aquifer system, groundwater quality, seawater intrusion into coastal aquifers, approximate solutions, multiple well systems, hydrogeologic systems analysis, digital and analog models for evaluations of aquifer response, groundwater development and management.

7. FLOODS: **[03]**
Causes of floods; Factors affecting Flood Flow; Methods of estimation of peak flood: flood frequency studies, Envelope Curves, Rational Method, Gumbel's Method, **Flood Control**

8. Reservoir Planning and Operations, Drought Management. **[04]**

9. COMPUTER APPLICATIONS TO SPECIFIED PROBLEMS. **[02]**

	Title	Publisher	Author of the Book
Text Book	**Hydrology**	**H.M. Raghunath**	**New Age international**
Reference Books 1	**Hydrology**	**K.Subramanium**	**Tata McGraw Hill**
2	**Applied Hydrology**	**V.T. Chow**	**Tata McGraw Hill**
3	**Applied Hydrology**	**Linsley, Kohler,Peulhas**	**Tata McGraw Hill**

CL 510 - DESIGN OF STRUCTURES-I

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	0	1	3	60	40	25	25	150

Each part shall have equal weightage.

(A) DESIGN OF REINFORCED CONCRETE STRUCTURES

1. INTRODUCTION: **[03]**
Introduction to various design methods i.e. Working Stress Method, Ultimate Load Method and limit State Method - Brief History and Comparison.

2. WORKING STRESS METHOD: **[03]**
As applied to Singly Reinforced Rectangular Beams for Flexure only.

3. LIMIT STATE METHOD:
Design of Rectangular Beams, Tee Beams, One-way and Two-way slabs (all simply supported),Axially loaded Short Columns and Isolated Footings, Staircase.
[19]

4. JOINT DETAILING – RCC ELEMENT
[02]

(B) DESIGN OF STEEL STRUCTURES

1. TENSION MEMBERS & COMPRESSION MEMBERS: **[05]**
Members made up of single and built-up sections, choice of sections, connections (riveted, bolted & welded), splices.

2. SIMPLE ROOF TRUSSES: [04]
Spacing, form, rise ,camber and support conditions.

3. BEAMS: **[05]**
Laterally Restrained and Unrestrained including deflection check.

4. CONNECTIONS:
Beam to Beam, beam to column (stiffened and unstiffened), column to base without moment.
Semi Rigid Connections – Structural Steel Elements [05]

5. AXIALLY LOADED COLUMNS:
Single and built-up sections, choice of sections, lacing and battening.
[06]

6. FOUNDATIONS: [02]
Slab base, gusseted base.

Termwork:
Minimum 25 Problems covering all the topics under the course Design of Structures - I.

Practical:
Practical shall consist of Oral and Sketching based on the topics given under Term-work.

		Title	Publisher	Author of the Book
Text Book	**1**	**Reinforced Concrete Design**	**Tata McGraw Hill**	**S. Unnikrishna Pillai & Devdas Menon**
	2	**Design of Steel Structures**	**S.Chand & Company Ltd.**	**T. Dayaratnam**
Reference Books	**1**	**R.C. Design**	**TMH – Pub**	**S.N. Sinha**
	2	**R.C. Design**	**Nemchand & Bros.**	**A.K. Jain**
	3	**Reinforced Concrete Design**	**Charotar Publication**	**H.J. Shah**
	4	**Design of Steel Structures**	**Tata-McGraw Hill**	**Duggal S. K.**
	5	**Design of Steel Structures Vol 1 & 2**	**Standard Publishers**	**RamChandra**

B.E. SEM VI (CIVIL)

CL601 - SOIL MECHANICS

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	3	60	40	25	25	150

1. INTRODUCTION: [06]

Stresses due to self weight, Boussinesq's equation for concentrated load acting on ground surface, Isobars, vertical pressure distribution on a horizontal plane and vertical plane due to vertical point load, pressure bulb Boussinesq's equation for vertical pressure distribution under uniformly loaded circular area and rectangular area, Newmarks Influence chart.

2. CONSOLIDATION OF SOILS:

Compressibility of Soils. Definition and Mechanism of Soil, Consolidation, Spring Analogy, Compression Index, Coefficient of Compressibility, Coefficient of volume change. Derivation of Terazagi's One Dimensional consolidation Equation. Time factor and consolidation ratio. calculation of consolidation settlement for uniform pressure increment in clay layer. one Dimensional consolidation test, Laboratory and theoretical time curves.

[07]

3. COMPACTION:

Definition, theory of compaction, Laboratory compaction tests, Factors affecting compaction in the field, Effect of compaction on soil properties, Placement water content, Placement layer thickness, Field control of compaction.

[06]

4. SHEARING RESISTANCE AND STRENGTH:

Mohr's strength theory, Mohr-Coulomb strength theory, Types of tri-axial tests-UU, CU, CD Direct shear test, Unconfined compression test, Introduction to triaxial compression test, Vane shear Test, Effective Stress principle.

[04]

5. EARTH PRESSURE:

Active and passive earth pressure due to level backfill, Earth Pressure at rest, Rankine's earth pressure theory (only level backfill). Difference between Rankine and theories.

6. STABILITY OF SLOPES:

Idealized Condition used in the analysis, factor of safety, Infinite and finite slopes, Stability of Infinite slopes, Introduction to Swedish Circle Method of Analysis, Taylor's Stability Number. earth pressure all general cases, slope stability analysis using Swedish circle method, Bishop's method and use of Janbu's method.

[05]

7. PERMEABILITY AND SEEPAGE:

Darcy's Law and its validity, factors affecting permeability, Laboratory determination of permeability, permeability of stratified soil masses, Seepage pressure Quick sand condition, Laplace equation, Flow Net and its characteristics.

[08]

Term work shall be based on the course under Soil Mechanics.

		Title	Publisher	Author of the Book
Text Book	**1**	**Soil Mechanics & Foundations**	**Laxmi Publishers**	**B.C. Punmia**
Reference Books	**1**	**Soil Mechanics & Foundation Engineering**	**UBS Publisher**	**V.N.S.Murthy**
	2	**Basic Soil Mechanics**	**Construction Press**	**Whitlow**
	3	**Advanced Soil Mechanics**	**McGraw Hill**	**B.M.Das**

CL603 - ENVIRONMENTAL ENGINEERING - II

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	2	3	60	40	25	25	150

1. INTRODUCTION: **[02]**
Sources of Environmental Contaminants, water supply, sewerage, interrelationships of environmental problems.

2. QUANITITY OF WATER & SEWAGE:
Relation of quantity & population, water use for different purposes, factors affecting water use, design periods, Sources of wastewaters, relation to water use, infiltration & inflow, Fluctuations in sewage flow, Design periods for sewerage system components.
[03]

3. QUALITY OF WATER:
Water & its impurities, common constituents of natural waters, water chemistry, Water Analysis, Determination of physical, chemical & bacteriological characteristics of water, IS standards for potable water.
[03]

4. WATER TREATMENT:
Conventional water treatment & its objectives, physical & chemical unit processes, screening, grit removal, sedimentation, coagulation-flocculation, filtration, disinfection, miscellaneous water treatment techniques.
[05]

5. COLLECTION & DISTRIBUTION OF WATER:
Intakes, distribution systems, elevated service reservoirs, valves, design of water distribution system.
[04]

6. SEWERAGE:
General considerations, terminology, separate versus combined system of sewerage.
[03]

7. SEWERAGE SYSTEM:
Sewer materials, sewer appurtenances, design of sewer systems, construction & maintenance.
[03]

8. CHARACTERISTICS OF WASTEWATER:
Variability of wastewater & water analysis, physical characteristics, chemical characteristics, biochemical oxygen demand, chemical oxygen demand, microbiology of sewage & sewage treatment, sampling, typical characteristics.
[05]

9. WASTEWATER TREATMENT:
Objectives, preliminary treatment, Physical Unit Processes: screening, grit removal, sedimentation Physico - treatment process: Flocculation-Coagulation Biological Unit Processes: Theory, Principles & Design of Activated sludge process, ASP & its modifications, operational difficulties in ASP, SVI, SDI, Attached growth processes- trickling filters, operational difficulties, design using NRC equations, waste stabilization ponds, Rotating Biological Contactors.
[08]

10. SLUDGE TREATMENT & ITS DISPOSAL:
Importance of sludge management, quantity & quality of sludge, major sludge treatment processes, hazardous constituents of sewage sludge, management & disposal of residues.
[02]

11. SEWAGE DISPOSAL:
Disposal techniques, water quality management in rivers, water quality-modeling, application of analysis techniques.
[02]

Term work shall be based on the lab/practical and tutorials under the subject Environmental Engineering – II

		Title	Publisher	Author of the Book
Text Book	**1**	**Water & Waste Water Engineering**	**McGraw Hill Publication**	**Steel & McZee**
	2	**Water Supply & Sanitary Engineering**	**Dhanpat rai**	**G. S. Birdie & J. S. Birdie**
Reference Books	**1**	**Waste Water Engineering - Treatment & Disposal**	**MGH**	**Metro Lab**
	2	**Industrial Water Pollution**	**TMH**	**Eckenfelder**

CL612 - CONSTRUCTION TECHNOLOGY- II

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	1	3	60	40	25	25	150

1. CONSTRUCTION EQUIPMENTS:

1.1 INTRODUCTION **[08]**

Role of Construction equipments in Engineering Projects. Standard equipment and special equipment.
Cost Analysis of Construction Equipment. Replacement analysis. Record of equipment on worksite.

1.2 EARTH MOVING EQUIPMENT **[13]**

Engineering fundamentals of earth moving equipments. Rolling and Grade resistance. Coefficient of Traction. Effect of altitude and temperature on performance. Rim pull and Drawbar pull. Wheel and Crawler mounted tractors and its operations. Bulldozers – types, use and operation, out put of bulldozer. Scraper – types size, operation and special usage. Dragline-power shovel, Excavator (Hoe) Trencher etc. Performance and output analysis of earth moving equipments. Material handling equipments, Compaction Equipments

1.3 CONCRETE EQUIPMENTS **[03]**

Mixers and Batching plants – classification, use and operation. Transportation equipment., Vibrating equipment, concreting pumps. Equipment for ready mixed concrete.

2. COFFERDAM **[04]**

Type, Use and Selection of Coffer Dam. Forces acting on a coffer dam. Economical height, leakage problems, Mobile Coffer Dam.

3. CAISSON **[04]**

Classification, use and selection criteria of caissons. Transportation, launching and sinking of various caissons. Construction problems

4. GROUND WATER CONTROL DURING EXCAVATION

Importance, selection of methods, well point system etc. Grouting-preparation of grouting, material and equipment used. Guniting procedures.

5. FORM WORK

Types, features and joint details of formwork. Formwork for pre-cast concrete works. Modern Construction Typical formwork - sketches for footing and columns, silo and bridges, domes etc.

[05]

Term work shall be based on the course under the subject Construction - II

		Title	Publisher	Author of the Book
Text Book	**1**	**Construction, Planning, Equipment and Methods**	**McGraw-Hill Publishing Company**	**Peurifoy R. L et al**
Reference Books	**1**	**Foundation Design and Construction.**	**ELBS Publications**	**Tomlinson M. J.**
	2	**Construction Equipments, Planning & Application**	**Metropolitan Book Company**	**Dr. Mahesh Verma**

CL 608 - CONCRETE TECHNOLOGY

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	Exam	Theory	Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	2	3	60	40	25	25	150

1. RAW MATERIAL **[13]**

1.1 CEMENT: History of cementing materials, manufacture of Portland Cement, chemical composition and hydration mechanism of OPC, properties of cement hydrates, composition, properties and use of various cements, physical properties and testing of cement.

1.2 **AGGREGATES :** Classification of aggregates based on source, shape and texture.
Physical properties of aggregate-specific gravity, Bulk Density, porosity & absorption, moisture content, strength & soundness of aggregate, alkali-aggregate reaction. Grading of aggregate, grading requirements and practical grading, gap graded aggregates.

2. FRESH CONCRETE-WORKABILITY **[10]**

WORKABLITY: factors affecting workability, measurement of workability, segregation and bleeding of concrete. Mixing time, vibrations/compaction of concrete.

STRENGTH OF CONCRETE: factors influencing strength, water/cement ratio, gel-space ratio, maturity concept of concrete, compressive and tensile strength of concrete.

ADMIXTURES: Air entraining agents, accelerators, retarders, superplasticizers, water proofing agents etc. Effect of various admixtures on concrete properties.

3. ELASTICITY, CREEP AND SHRINKAGE: Elastic properties of concrete, factors affecting modulus of elasticity, dynamic and static modulus, creep of concrete, mechanism of concrete, factors affecting creep. Classification, reasons and mechanism of various shrinkages in concrete, mosisture movement in concrete. [04]

4. DURABLITY OF CONCRETE: Permeability of concrete, sulphate attack and its control, sea-water attack, corrosion, thermal properties of concrete, fire resistance, resistance of concrete to freezing and thawing conditions. Resistance to abrasion, erosion and cavitations. Crack in concrete and its control. [04]

5. TESTING OF CONCRETE: Compression test-cube and cylinder, tensile strength testing, non-destructive testing of concrete – rebound hammer, ultrasonic pulse test, pull-out test etc. Variation in test results. [04]

6. MIX DESIGN: Statistical quality control of concrete, concept of mix design, specification of mix design, IS Method and ACI Method for concrete mix design. [03]

7. SPECIAL CONCRETES: Classification, raw material and application of special concretes. Light weight concrete, polymer concrete, vaccum concrete, fibre reinforced concrete, ferrocement etc. [02]

		Title	Publisher	Author of the Book
Text Book	**1**	**Concrete Technology**	**ELBS Publication**	**A.N.Neville**
Reference Books	**1**	**Concrete Technology**	**ELBS Publication**	**A.N.Neville & J.J.Brooks**
	2	**Concrete Technology**	**McGraw Hill**	**M.L.Gambhir**
	3	**Concrete Technology**	**S.Chand**	**M.S.Shetty**
	4	**Design of Concrete Mixes**	**CBS Publishers**	**Dr.S.Krishnaraju**

CL 609 - DESIGN OF STRUCTURES-II

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	3	60	40	25	25	150

Each part shall have equal weightage.

(A) DESIGN OF REINFORCED CONCRETE STRUCTURES

1. LOADS: **[01]**
Loading Standards as per BIS, Distribution of Loads, Computation of Wind Load and Earthquake Forces, Combination of Loads, Introduction to loading standards of Bridges.

2. STRUCTURAL LAYOUT FOR BUILDINGS: **[04]**
Continuous Beam, Typical Floor Design including Two ways Continuous Slab, T-Beam Floor.

3. COLUMNS: **[04]**
Slender Columns with Uniaxial and Biaxial Bending.

4. FOOTINGS:
Combined Footing and Raft.

5. STRUCTURES:
Canopy, Cantilever Shed, Portal, Buildings, Rectangular Water Tanks, Retaining wall

[14]

(B) DESIGN OF STEEL STRUCTURES

1. CONNECTIONS: **[03]**
Unstiffened, Moment and Shear resisting Structural Connections. Design and detailing of connection between Roof Truss to Column, Column to Beam, Beam to Beam and Truss to Bed Block.

2 DESIGN OF ROOF TRUSSES:
Various types of Trusses and their selection in Industrial Structures. Effect of Wind & EQ or other loads on Trusses , Structural Detailing. Monitored and Knee-Braced Trusses.

[06]

3. STRUCTURAL DESIGN OF COLUMNS WITH ECCENTIRIC LOADS INCLUDING BASE.

[02]

4. DESIGN OF PORTAL FRAMES USING ELASTIC AND PLASTIC APPROACH.

[03]

5. DESIGN OF STEEL STRUCTURES:
Cantilever Shed, Plate Girder, Industrial Building (Rolled/Tubular) including Gantry Girder, Through and Deck Type Bridges.

[13]

TERM WORK:
Termwork shall consist of not less than 3 Designs suitably selected from topics of the Course under Design of Structures -II. The report shall consist of full analytical treatment, Design Procedure, References and all necessary drawings in form of neat dimensioned sketches. In addition, one Detailed Working Drawing shall be prepared on full imperial size drawing sheet.

Practical Examination shall consist of Oral and Sketching based on topics given under the subject.

		Title	Publisher	Author of the Book
Text Book	**1**	**Design of Steel Structures.**	**S.Chand & Co. Ltd**	**P. Dayaratnam**
	2	**Reinforced Concrete Design**	**Tata McGraw Hill**	**S Unnikrishna Pillai & Devdas Menon**
Reference Books	**1**	**Design of Steel Structures Vol-I &II**	**Standard Publishers**	**Ramchandra**
	2	**Design of Steel Structures**	**Tata McGraw Hill**	**Duggal**
	3	**Design of RCC Structures Vol-II**	**Charotar**	**H. J. Shah**
	4	**Design of RCC Structures Vol-II**	**PHI**	**P.C. Verghese**

ELECTIVE-I

1.Finite Element Methods in Civil Engineering
2.Building Repairs & Rehabilitation
3.Prestressed Concrete
4.Design of Hydraulic Structures

1. FINITE ELEMENT METHODS IN CIVIL ENGINEERING

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	1	3	60	40	25	25	150

Elements of Theory of Elasticity, concept of stress, strain, elastic constants, plane stress, plane strain, axi-symmetric element [04]

Principles of discretization; direct stiffness method, variational formulation and weighted residual techniques [04]

Element stiffness matrix formulation based on displacement formulation for triangular element: plane stress, plane strain and axi-symmetric cases. shape functions for r and numerical integrations, convergence: displacement formulations for rectangular, triangular and isoparametric elements for two dimensional and axi-symmetric stress analysis: thin and thick plates and shells: Application to plate/shells, bridge, roof, nuclear and offshore structure. [10]

Displacement formulations for rectangular and isoparametric elements for two dimensional and axi-symmetric stress analysis: thin and thick plates and shells: Application to plate/shells, bridge, roof, nuclear and offshore structure. [18]

Hybrid stress and Mixed approaches [04]

	Title	Publisher	Author of the Book
Text Book 1	**Finite Element Analysis: Theory &Programming**	**Tata -McGraw Hill**	**C.S.Krishnamoorthy**
Reference Books 1	**Introduction to Finite Element Method**	**Van Nostrand Reinhold**	**Desai C.S.and Ables J.F.**
2	**Introduction to Finite Elements in Engineering**	**Prentice-Hall (India)**	**Chandraputla & Belegundu**
3	**Finite Element Procedures in Engineering Analysis**	**Prentice-Hall (India)**	**Klaus-Jürgen Bathe**
4	**Concepts and Applications of Finite Element Analysis**	**Wiley**	**Cook R.D.**

2. BUILDING REPAIRS AND REHABILITATION

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	1	3	60	40	25	25	150

Durability of buildings: **[10]**
Life expectancy of buildings serviceability and Durability, Maintenance and Repair strategies, Estimation of building strength and durability, Effects of environmental elements on buildings.

Maintenance of Building: **[10]**
Preventive and corrective maintenance, scheduled and contingency maintenance planning, Maintenance standards, Maintenance cost, Prevention of Dampness, fire and termites, Maintenance and repair of construction joints.

Failure and Repair of Building: **[10]**
Type of failure, Investigation of failure, Testing methods, Material for repair, Techniques for repair, Repair of concrete and masonry elements, Repair and strengthening of foundations, Flooring and roofs

Rehabilitation of Buildings: **[10]**
Analysis, Planning, cost estimates, Rehabilitation methods

	Title	Publisher	Author of the Book
Reference Books 1	**Concrete Structures: Materials, Maintenance and Repair**	**Longman Scientific and Technical UK**	**Denison Campbell, Allen and Harold Roper**
2	**Deterioration and maintenance and repair of building**	**McGraw Hill Publishers**	**S.M.Johnson,**

3. PRESTRESSED CONCRETE

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	1	3	60	40	25	25	150

Prestressing concepts, materials, systems of prestressing and losses. [10]

Introduction to working stress method [10]

Limit state analysis and design of members for bending. Shear torsion and axial forces. [10]

End block design. [05]

Deflections. [05]

		Title	Publisher	Author of the Book
Text Book	**1**	**Pre stressed Concrete Design**	**Tata-McGraw Hill**	**N Krishna Raju**
Reference Books	**1**	**Design of Prestressed Concrete Structures**	**Willey Publication**	**Lin & Burns**
	2	**Prestressed Concrete Design**	**S.Chand Publication**	**Pandit and Gupta**

4. DESIGN OF HYDRAULIC STRUCTURES

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	1	3	60	40	25	25	150

Fluid elasticity, fundamental and engineering aspects of fluid-structure interaction, static and dynamic response of under streamlined elastic structures [10]

Hydraulic and structural design of storage reservoirs, spillways, outlet works. [10]

River training and regulation, conduit systems, transition structures, fluid elasticity, fundamental and engineering aspects of fluid-structure interaction, static and dynamic response of under streamlined elastic structures [20]

		Title	Publisher	Author of the Book
Text Book	**1**	**Water Resources Engineering**	**Khanna Publishers**	**Dr.K.R.Arora**
	2	**Ground Water Hydrology**	**CBS Publishers**	**Dr.H.M.Raghunath**
Reference Books	**1**	**Water Resources Engineering**	**Laxmi Publication**	**B.C.Punmia**
	2	**Water Resources Engineering**	**Eastern Publication**	**S.K.Garg**

B.E. SEM VII (CIVIL)

CL701 - IRRIGATION AND HYDRAULIC STRUCTURES

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	0	1	3	60	40	25	25	150

1. DAMS:

(a) Introduction: Definition; Types, merits and demerits, suitability of dams; Factors Governing the selection of a particular type of a Dam; site selection and foundations for dam.

(b) Gravity Dams: Forces acting on a Gravity Dam; Modes of failure: stability requirements; Principal and Shear Stresses; Stability analysis; Elementary Profile of a Gravity Dam; low and high dams; Practical Profile of a Gravity Dam; Design of High and Low Gravity Dam; Galleries, Joints, Keys and Water Seals.

(c) Earthen Dams: Types; Causes of failure; Design criteria; Line of seepage or Phreatic Line; Seepage analysis; Seepage Control Measures: Filter Design Criteria; Stability of slopes; Rock fill dams.

(d) Spillways: Necessity and types; Energy dissipation and scour protection devices; I.S.I. criteria for design of hydraulic jump type stilling basins with horizontal and sloping aprons; Crest Gates; Outlet Works.

[20]

2. IRRIGATION :

Necessity, Scope and benefits of irrigation, Water requirement of crops, Duty and Delta, Different irrigation methods, Water logging problems.

[04]

3. DIVERSION HEADWORKS :

(a) Introduction; Purpose; Component Parts; Weirs and barrages types; suitability and causes of failures; Bligh's and Khosala's theories.

(b) Appurtenances: Fish ladder; Divide wall; Under Sluices; Canal Head Regulator and Cross Regulator; Silt control, Location of Headwork ; Retrogression.

[06]

4. CANALS :

a) Design Criteria: Alignment and types of canals; Idea Lacey's and Kennedy's Theories; Design of canal on alluvial soils and non-alluvial soils; Use of Garret's Diagrams; Use of Lacey's Regime Diagrams; Cross section of an irrigation channel. Canal lining.

(b) Canal Regulation Works:

1. Canal Falls: Definition; Necessity and Location; Types; Design Principles.
2. Canal Escapes: Definition; Types.
3. Canal Outlets: Types; Requirements of a good canal outlet; Criteria for judging performance of the outlet; Design Aspects
4. Cross Drainage Works: Definition; Types; Selection of suitable type of cross drainage work;
   Design Considerations.

[06]

5. COMPUTER APPLICATIONS TO SPECIFIED DESIGNS.

[02]

Term Work shall be based on the above syllabus.

		Title	Publisher	Author of the Book
Text Book	**1**	**Irrigation Engineering & Hydraulic Structures**	**Khanna Publishers**	**S.K.Garg**
Reference Books	**1**	**Theory & Design of Hydraulic Structures**	**NemChand & Bros Roorkee**	**Varshney, Gupta, Gupta**
	2	**Irrigation Water Power & Water Resources Engineering**	**Standard Publishers**	**K.R.Arrora**
	3	**Irrigation ,Water Resources & Water Power Engineering**	**Standard Publishers**	**P.N.Modi & Seth**

CL703 - PROFESSIONAL PRACTICE AND VALUATION

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	3	3	60	40	25	25	150

1. ESTIMATES:
Necessity and types, Approximate and detailed estimates, Methods & uses.
[10]

2. SPECIFICATIONS:
Definition, Objects & Importance, Requisites of good specifications, Classification of specifications, Standard specifications, Specifications of some important typical items.
[03]

3. RATE ANALYSIS:
Purpose, factors affecting rate analysis, SOR, Task works per day, rate of material and labour, rate analysis of typical items.
[04]

4. CONDITIONS OF CONTRACT:
Definition, Object, Importance, General provisions, typical conditions of contract. [03]

5. CONTRACTS:
Meaning and importance, Essential requirements of a contract, Types of contract - Labour contract, Negotiated contract, SOR contracts - Contract documents, Termination
of contract, Responsibilities of the Engineer, The contractor and the client, Earnest money and security deposits.
[07]

6. TENDER:
Meaning, Opening, Scrutiny and acceptance of tenders, Revocation of tender, unbalanced tender, liquidated damages.
[02]

7. ARBITRATION:
Definition, Arbitrator and referee, Types of arbitration, Powers of an arbitrator, Process of arbitration, Advantages of arbitration.
[02]

8. EASEMENTS:
Definition, Essential characteristics, Creation of easements, Extinguishment of easements.

9. VALUATION:
Purposes, Cost - price - value, Different forms of value, Freehold and leasehold properties, Sinking fund, Amortization, depreciation and obsolescence, Capitalized value and year's purchase, Interest rates, Ideal investment, Mortgage, Annuity, Methods of valuation.
[04]

10. WORKS AND STORES ACCOUNTING:
Stores, Vouchers and receipts, Capital works and repair works, Administrative approval and technical sanction, Measurement book, Muster roll, Daily reports, Imp rest, Advance payments, Work-charged establishments, Inventory.
[05]

TERMWORK: - Term work shall be based on above topics.

	Title	Publisher	Author of the Book
Text Book 1	**Estimation and Costing**	**Charotar Publications**	**Rangwala**
Reference Books 1	**Estimation, Costing and Accounts**	**S Chand & Co**	**D. D. Kholi**

CL-704 FOUNDATION ENGINEERING

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	0	3	3	60	40	25	25	150

1 BEARING CAPACITY OF SHALLOW FOUNDATIONS: [18]

Introduction, Types of failures, Design criteria, Bearing capacity theories - Brandt, Rankine, Terzaghi, Meyerhoff, I.S. Method, B.C. on sands and clays, Effect of water table, Bearing capacity from standard penetration test data, Correction to SPT values, Bearing capacity from plate load tests, Perimeter shear concept, Foundation settlement - immediate, Consolidation, Differential, - Allowable bearing pressure to satisfy shear and settlement criteria, Allowable bearing pressure for mat or raft foundations, Floating foundation, Methods to reduce foundation settlement.

Significant characteristics of sands and non-plastic silt deposits, Footing on sands, Raft on sands, Critical Void Ratio, Liquefaction. Significant characteristics of clays and plastic silt deposits, Footing on clays, Raft on clays. Planning subsurface explorations, contact pressure, foundations subjected to eccentric and inclined loads, bearing capacity, settlement from SCPT, differential settlement

2 FOOTING ON COLLAPSIBLE SOILS: [02]

General consideration, significant characteristics of collapsible soils, Design of foundation on un-wetted collapsible soils and soils subjected to wetting.

3 FOOTINGS ON EXPANSIVE SOILS: [02]

General consideration, Significant characteristics of expansive soils, Design of foundation on such soils, Under reamed piles, Methods to reduce expansive nature of the soil.

4 PILE FOUNDATIONS:

Introduction, types of piles according to their composition, Method of installation and load carrying behavior, Condition requiring use of piles, Bearing capacity of a single pile subjected to vertical loads-from theories, from standard penetration test data and static cone test data-from pile load tests, from dynamic pile driving formulae(ENR and Hiley) Pile groups, Group efficiency, Bearing capacity of pile groups in sands and clays, Settlement of pile foundation, Negative skin friction.

[10]

5 CAISSON FOUNDATION FOR BRIDGES [04]

6 GROUND IMPROVEMENT TECHNIQUES: [04]

Necessity, various techniques such as vibroflotation, sand drains, electro-osmosis, dynamic considerations etc...

TERMWORK:-

Term work shall be based on above topics.

		Title	Publisher	Author of the Book
Text Book	**1**	**Soil Mechanics & Foundations**	**Laxmi Publishers**	**B.C. Punmia**
Reference Books	**1**	**Soil Mechanics & Foundation Engineering**	**UBS Publishers**	**V.N.S.Murthy**
	2	**Foundation Design and Construction**	**ELBS Publishers**	**Tomlinson**
	3	**Foundation Engineering**	**Asia Publishers**	**Peck et al**

CL705 - CONSTRUCTION MANAGEMENT

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	1	3	60	40	25	25	150

1. GENERAL: **[02]**

Construction Industry in India:
Construction & Economy - Requisites for successful contractor. Requisites for profitable construction business.

2. ORGANISATION & MANAGEMENT: **[02]**

Organization: Types, Principles, Suitability. Management: Principles, Functions, Benefits. Management Information Systems and Techniques.

3. CONSTRUCTION PLANNING: **[10]**

Necessity, factors points to be taken care of- Mobilization - Resources planning-scheduling phasing of work, cpm procedures, calculation for floats-updating of network time-grid diagram time-cost optimization. Resources allocation - Resources leveling.

4. PROGRAM EVALUATON & REVIEW TECHNIQUE PERT: **[03]**

Time concept, Calculations-frequency distribution curves.

5. FINANCIAL ANALYSIS: **[07]**

Financial comparisons of alternatives & Different cost-its implications, decision making Benefits of financial analysis.

6. CONSTRUCTION LABOUR MANAGEMENT: **[07]**

Welfare-efficiency-Training-System of wages-Incentive plans.

7. CONSTRUCTION MATERIAL MANAGEMENT: **[05]**

Material planning-storage - inventory control systems advantages material accounting - order quantity- Different concept of analysis - Determination of safety stock level.

8. Management Information Systems in Construction [02]

9. Safety in Construction [02]

TERMWORK: - Term work shall be based on above topics.

		Title	Publisher	Author of the Book
Text Book	**1**	**Construction Project Management**	**Tata McGraw-Hill**	**K K Chitkara**
Reference Books	**1**	**Construction Planning, Equipment and Methods**	**McGraw-Hill**	**Robert Peurifoy, William Ledbetter & Clifford Schexnayder**

CL 707 - HIGHWAY ENGINEERING

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	3	60	40	25	25	150

1. GENERAL: **[03]**

The Social Role of Highways, History, Highways and Highway Classifications.

2. MAIN ELEMENTS OF HIGHWAY: **[10]**

* Topography and Physical features, Horizontal and Vertical Curvature, Grades, Alignment, Roadway surface drainage facilities.
* Road Tyre interaction characteristics, Riding stability on Horizontal curves, Design Speed, Geometric features on sharp curves, Sight Distance, Pavement & Lane widths.
* Highway Capacity, Speed of vehicles, Safety requirements.

3. HIGHWAY SUBGRADE: **[02]**

Soils and its types, Important Characteristics and Classification tests.

4. HIGHWAY MATERIALS:

Aggregates and its types, Physical and Chemical properties, Tests for Aggregates, Filler Bitumen, Characteristics and tests, Emulsions, Cutbacks.

[12]

5. PAVEMENTS:

Classifications, Its functions, Factors affecting Pavement Performance and Design, Traffic Factors, Moisture and Climatic factors.

[02]

6. FLEXIBLE PAVEMENT DESIGN:

Design criteria, Design parameters, Design methods-Empirical, Semi empirical and Theoretical methods, Bituminous Mix Desirable properties, design concepts, design methods, IRC recommendations.

[06]

7. RIGID PAVEMENT DESIGN:

Design criteria, Design parameters, Critical regions, Wheel load stresses, Temperature stresses, Critical combination of stresses, Design methods, Joints in cement concrete pavements and their design, joint filler and sealer, Reinforced and prestressed cement concrete pavements, IRC recommendations.

[05]

Term work shall be based on the course under the Highway Engineering.

		Title	Publisher	Author of the Book
Text Book	**1**	**Highway Engineering**	**Khanna Publishers**	**S.K. Khanna & C.E.G. Justo**
Reference Books	**1**	**Principles, Practices & Design of Highway Engineering**	**S.Chand & Co.**	**S.K. Sharma**
	2	**Principles of Highway Engineering**	**Khanna Publishers**	**L.R.Kadiyali**

ELECTIVE-2

1. EARTH QUAKE ENGINERING
2. PROJECT PLANNING AND CONTROL
3. ADVANCED CONCRETE TECHNOLOGY
4. DESIGN OF SPECIAL STRUCTURES

1. EARTHQUAKE ENGINEERING

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	1	3	60	40	25	25	150

1. INTRODUCTION TO EARTHQUAKE: - [04]
Geology of earth, configuration of tectonic plates in a globe, influence on geology on earthquake. Behavior of plates, their motion and effects. Causes of earthquake and their characteristics. Earthquake parameters, magnitude, intensity, scales. Seismic zoning of India, Seismic coefficients for different zones. Natural disaster, mitigation and social aspects.

2. LESSONS FROM PAST EARTHQUAKES:-
Study of damages caused due to past earthquakes in/outside India. [06]

3. THEORIES OF VIBRATION:
Vibration, definition, causes, classifications, Introduction to single degree of freedom vibrations. Response of structure to different types of system like free, forced, damped, undamped vibrations. MDOF forced undamped vibrations, derivation of related equations and solution of problems. Response of structure due to earthquake ground motion. Mode shapes 3 degree of system of vibration. Lateral force analysis of building, floor diaphragm action. Torsionally uncoupled and coupled system. Moment resisting frame and shear wall.
[10]

4. SEISMIC DESIGN OF MASONARY STRUCTURES-provisions of IS: 4326: [06]

5. SEISMIC DESIGNS OF RC STRUCTURES: [10]
Effect of earthquake on RC structures, Indian code provisions. Introduction to seismic coefficient method. Basic requirements, estimation of story shears. Effect of unsymmetrical geometry and masses, mass control and stiffness center. Estimation of story shears and torsional moments for unsymmetrical buildings. Introduction to Response spectrum, IS code provisions. Modal analysis for a RCC frame. Design of a multistoried frame building. Concept of ductile detailing. IS: 13920 code provisions for different RCC elements.

6. SEISMIC FOUNDATION DESIGN: [04]
Types of forces generated due to earthquake and their effects on different type of foundations, selection of foundation type. Design of RC isolated footing for earthquake loading, base isolation. Liquefaction causes and its remedial measures.

TERM WORK shall consist of at least 25 problems based on the course under earthquake engineering.

		Title	Publisher	Author of the Book
TextBook	**1**	**Earthquake Resistant Design of Structures**	**Prentice-Hall of India Pvt. Ltd**	**Pankaj Agarwal and Manish Shrikhande**
	2	**Earthquake Resistant Design of Structures**	**Oxford University Press**	**S.K.Duggal**
	3	**Dynamics of Structures: Theory and Applications to EQ Engineering-2nd Editon**	**Pearson Publishers Asia**	**Anil K. Chopra**
Reference Books	**1**	**Structural Vibrations: Theory & Computations**	**CBS Publishers**	**Mario Paz**
	2	**Structural Dynamics**	**McGraw Hill Int.**	**Clough & Peinzin**
	3	**The Seismic Design Handbook**	**Springer**	**Farzad Naeim**

2. PROJECT PLANNING AND CONTROL

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	1	3	60	40	25	25	150

INTRODUCTION **[04]**

Construction industry and macroeconomics

Project feasibility and viability **[14]**

Project feasibility studies, Life cycle concepts, cost engineering principles, project costs(Material, labor, equipment, fixed, variable, direct, indirect, recurring, non-recurring, etc.,) Economic considerations(interest rate tax, escalation, inflations), Implications of contractual obligations on costs, Economic and financial feasibility analysis, Analysis of risk and uncertainty.

Project financing **[10]**

Project cash flow, Financing models and trends, Modeling capital projects for Successful funding. PPP financial models.

Project scheduling and control **[12]**

Project scope, project team, subcontract planning and control, Scheduling techniques, application software for project scheduling, Technical performance and monitoring, Accounting, Cost control, learning curve, and variances, PMIS.

		Title	Publisher	Author of the Book
TextBook	**1**	**Project planning, Analysis and Implementation and review**	**Tata McGraw Hill Publishers**	**Prasanna Chandra**
Reference Books	**1**	**Construction Project Management**	**Tata McGraw Hill**	**Clough and Sears, John Wiley and Sons 1991**
	2	**Total Construction Project Management**	**Tata McGraw Hill**	**Ritz and George J.**
	3	**Construction Project Management**	**Tata McGraw-Hill**	**K K Chitkara**

3. ADVANCED CONCRETE TECHNOLOGY

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	1	3	60	40	25	25	150

Cement **[04]**
Hydration, chemistry and microstructure of cement paste, special cement

Microstructures of concrete **[06]**
Interfacial transition zone, Structure-property relationships.

Chemical and mineral admixtures in concrete **[04]**
Types, Mechanism, Application.

Properties of hardened concrete **[06]**
Strength, stress-strain behaviour, Dimensional stability, Fracture mechanics and concrete failure mechanisum.

Mix Design **[06]**
Concrete mix design (IS,ACI, BS)

Concrete Durability **[02]**
Physical deterioration(abrasion, erosion, cracking) Chemical attack (sulfates/seawater/acid), Corrosion, Durability improvement measures.

Testing and quality assurance of concrete **[04]**
Testing of fresh concrete, Destructive and non-destructive evaluation of hardened concrete, statistical quality control.

Special concrete **[06]**
Cement and polymer concrete compositions, Self-compacting concrete, Ready mixed concrete, High performance concrete.

	Title	Publisher	Author of the Book
Reference Books 1	**Properties of Concrete**	**ELBS Edition (4th) Longman Ltd. London**	**Neville A.M.**
2	**Concrete Technology**	**Special student edition by Indian concrete institure chennai**	**P.K.Mehta, P.J.M Monterio**
3	**Concrete Technology**	**ELBS Edition (4th) Longman Ltd. London**	**Neville and Brooks**
4	**Fracture Mechanics of Concrete: Applications of Fracture Mechanics to Concrete and other qusai brittle materials.**	**Wiley, New York**	**Shah S.P.,Swaets,S.E., and Ouyang,C.(1995)**

4. DESIGN OF SPECIAL STRUCTURES

Teaching Scheme			Examination Scheme					
Lectures	Tutorial	Lab/Prac	ExamTheory		Sessional	Prac/Viva	Term Work	Total
Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	Marks
3	0	1	3	60	40	25	25	150

Complete design and structural detailing for industrial, public utility and recreational purposes structures; Storage vessels, underground structures in

(I) concrete [20]

(II) steel. [20]

		Title	Publisher	Author of the Book
Reference Books	**1**	**Hand book of Concrete Engineering**	**VWR Co. New York**	**Mark Fintel**
	2	**Hand book of Civil Engineering**		**Merrit, Gaylord,Kamp**
	3	**Relevant BIS Codes of Practice**		
	4	**Design of Steel Structures**	**Mc Graw Hill**	**Gaylord, Gaylord & Stallemyer**
	5	**Steel Designers Manual**	**Blackwell, London**	**Devison Brick, Owen G,W**