FIRST SEMESTER of B.E I

CVL1101: FUNDAMENTALS OF CIVIL ENGINEERING

(Civil, Mech., Elec., Chem. ,Met. & Mats., Electronics , IWM,

Comp. Sc. & Engg., Text.Engg.,Text.Tech.)

L – 3 Hrs + Tutorial 1 Hr + Practical 3 Hrs

Theory : 100 Marks & Pract. & T.W. 50 Marks

Academic Audit

(a) Objectives of the course: Civil Engineering is a core and perhaps oldest branch of engineering. It, in its name itself specifies a field devoted to serve the civic society. Basic knowledge of Civil Engineering is highly necessary for engineer of any other discipline. The subject is designed to impart brief fundamental concept related to various materials, measurement techniques, constructional procedure and environmental pollution comprehensively. A better understanding of the various fundamental concepts of measurements, plotting, materials along with awareness about pollution, climate and environment will lead an engineering graduate of any discipline to become "A complete Engineer".

(b) Outcome of the course: After learning this subject students will know concept of linear and angular measurements, which is one of the fundamental requirement in any engineering discipline. They will be aware of various constructional practices and pollution aspect.

(c) Course content and its breakup of 40 lectures:

Chapter No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1.	**Stone -** Introduction to stone, Uses of stone Classification of rock	1	
	Characteristics of good building stone, Availability ,suitability and property of different stone	1	

	Bricks - Comparison between stone work & brick work, Advantages of bricks, Chemical composition of brick & harmful elements of brick	1	5
	Characteristics of good brick, Classification of bricks	1	
	Standard test for brick along with field test for brick, Special types of brick	1	
2.	**Lime** classification of Lime – characteristics of good lime – slaking process of lime – I.S. Specification of lime.	2	5
	Cement Basic ingredient of ordinary cement	1	
	Physical properties of cement – field examinations of cement – storing of cement	1	
	Varieties of cement and its uses – I.S. Specification of ordinary cement	1	
3.	**Mortar and concrete** specifications of ingredients for mortar and concrete – classification of mortar and concrete – selection of mortar and its uses – precaution in using mortar	2	5
	Production and quality control of concrete – physical properties of concrete	2	
	Plastic-Properties of plastics, Types and uses of plastic.	1	

4.	**Timber -** Introduction to timber, Characteristics of good timber, Importance of seasoning	1	5
	Wood base product, Requirements of good preservatives for timber	1	
	Steel - Introduction, Properties of mild steel Use of different form of steel	1	
	Marketable forms of steel **Glass –** Introduction, Composition of glass	1	
	Classification, Properties of glass, Use of glass	1	
5.	**Surveying -** Introduction – Principle – Roll of survey – classification	2	5
	Basic instruments of linear and angular measurements – chain, tape, compass – uses – field work and notes – survey drawings – conventional symbols – scale.	3	
6.	**Levelling** – Temporary adjustments – field work –	1	5
	computation of levels – Arithmetic checks	2	
	Profiles and contours – area measurements by field measurements from drawings.	2	
7.	**Building Construction :** Types of constructions – Typical details of load bearing & framed structures – Brief discussion and illustrations sketches of typical important building components	1	6
	light and medium type foundations – functions, spread footing, slope footing, isolated column footing	2	
	Lintels – function, types, lintel with weathershed	1	
	flooring, roofing	1	
	Different types of doors & windows	1	
8.	**Introductory Environmental Engineering** Terminology— Introduction to various types of pollution, water and land pollution and remedial for control,	2	
	water and wastewater quality criteria – Disposal of wastes.	1	

	Air pollution and remedial for control – Ecology, Environmental Protection and legislation –	1	4
		40	40

TEXT/REFERENCES

1. Arora S.P. and Bindra S.P. (2012), A text book of Building Construction, Dhanpatai and Sons, Publishers.
2. Rangwala S.C. (2012), A text book of Building Construction, Charotar Publishing House, India.
3. Gilbert M Masters,(2006), Introduction to Environmental Engineering & Science , Prentia Hall of India Pvt. Ltd. New Delhi.
4. Deshpande P.D., (2009) ,Basic Civil Engineering, Nirali Prakashan Pune.
5. G.S.Birdie, Water supply & Sanitary Engg.,Dhanpatrai & Sons.
6. S.C.Rangwala, Engg. Materials., Charotal Books Staff, Anand.
7. Janardan Jha Building Material
8. Surendra Singh, Building Material, Vikas Pub. Pvt. New Delhi.
9. D.N.Ghose, Material of Construction, Tata McGraw Hill Pub. Co. Ltd. New Delhi
10. Surveying & Levelling – Kanetkar & Kulkarni Vol-I A.V.G. Prakashan, Puna.
11. Elementary Survey – B.C.Punmia Vol-I. Laxmi Pub. Dariya Gunj, New Delhi.
12. Surveying & Levelling – S.C.Rangwala, Charotar Pub. House, Anand.

SECOND SEMESTER of B.E I

CVL1201: BUILDING DRAWING

(Civil & IWM)

L – 3 Hrs + Tutorial 1 Hr + Practicals 3 Hrs

Theory : 100 Marks & Pract. & T.W. 50 Marks

Academic Audit

(d) Objectives of the course:

Drawing is the universal graphic language of engineers. Since, it can be used to communicate the technical information both within and between any two countries among engineer's community. When new project comes up for consideration the civil engineer/architect initially requires some firsthand knowledge of the locality in which the work is to be carried out, preliminary investigation are made, sketches are drawn and discuss before final design is made. The users like the owner, architect, consulting engineer, quantity surveyor, specialist firms, contractor, material suppliers have keen interest in building drawings. A Civil Engineer has to be conversant with Building planning and their development controls, skill of preparing drawings of various types like, orthographic, perspective, working drawings etc. The objectives of this course are to enable the student to learn principles of planning and architecture for buildings, the drawing various types of views, the development controls covered by building bye laws and national building code for buildings, towns, neighborhood colonies.

(e) Outcome of the course:

Engineers are directly connected with the creation of work and hence they need help of drawing at every stage. Drawing saves labour and time required to explain to the persons concerned with the proposed creation. Drawings prepared for the construction of works are known as civil engineering drawings. These drawings are useful to all the branch of civil engineering works such as buildings, structures, roads, railways, harbours, air ports, hospitals, schools, etc. With the help of knowledge of Building Drawing, it is possible to prepare plans for residential & public building keeping in view the prevailing bye- laws of the localities. Further it helps in overall planning of any infrastructure project. It helps interactions with clients in renovation, extension and newly proposed construction projects.Real life outcomes of this course are preliminary plans, presentation drawings, approval of the owner, submission drawings, approval of sanctioning authority like municipal corporation, preparation of working and detailed drawings by architect, structural drawings by structural engineers, supervision by architect, structural engineer, consulting engineer, completion certificate by the architect and by the plan sanctioning authority, preparation of estimates & tender documents.

(f) Course content and its breakup of 40 lectures:

Chapter .No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1.	Introduction to the subject of building drawing	1	5
	standard Conventional signs. Abbreviations. Architectural symbols	1	
	ISI Nomenclature: Size of scale. Standard method of dimensions	1	

	Significance of human and other natural factors and its effect on buildings and planning and relation to drawing	1	
	Introduction of municipal bye-laws and I.S.Codes provisions w.r.t. subject	1	
2.	Sketches of various important components of building	1	5
	Load bearing and frames structures: Partition walls. Lintels. Footings. R.C.C.slab. Beam and Column. Foundation, Schedule classification, Sun-sheds, Floorings, Numerical values along with control factors.	2	
	Design of Dog legged staircase, Site plan, Layout and key plan.	2	
3.	Introduction to basic principles of planning	3	10
	Orientation aspects, prospects, furniture requirements, roominess	2	
	Grouping, circulation, privacy, climate, economy, sanitation considerations.	3	
	Significance of human and other natural factors, Design of sweet dream house.	2	
4.	**Preparation of drawing based on plan**	2	10
	Layout design, section at various level	2	
	Design of building plan, elevation & sections	3	
	Detailed enlarged section at	3	

	particular location		
5.	**Perspective drawing**	2	7
	Necessity of perspective drawing	2	
	Classification of perspective drawing	2	
	Important terms	1	
6.	**Auto CAD**		3
	Introduction to software	1	
	Different command and their function	1	
	Draw menu and their basic command	1	
	Modify menu and their basic command		
	Total	40	40

TEXT/REFERENCES

13. Building drawing and detailing :Dr.Balgopal, T.S. Prabhu. Dr.K.VincentPoul, SPADES, K D F A Building Calicut.
14. Building planning and services (part-I) A.D.Joshi, Mrs. M.A.Joshi Publishers.
15. Civil Engineering drawing – R.J.Malik, G.S.Med, New Asian Pub. Delhi-6.
16. Planning and designing buildings – Y.S.Sane, Allied Book Stall, Pune-4 and Engineering book pub. Co.Pune-16.
17. working drawing – Kaith styles.
18. Graphic details for architects – Carl Kemmerich.
19. General architectural drafting – W.E.Wyatt.
20. Practical perspective drawing – P.J.Lawson.
21. Mannual of graphic techniques – Tom Portar
22. National building code- I.S.Publisher
23. Indian Standard 962 and 2332 I.S.Publisher.

SECOND SEMESTER of B.E I

CVL1202: SURVEYING-I

(Civil & IWM)

L – 3 Hrs + Tutorial 1 Hr + Practical 4 Hrs

Theory : 100 Marks & Pract. & T.W. 50 Marks

Academic Audit

(a) Objectives of the course:

The subject of surveying has a very special place in engineering education or in other word we can say it is idiom of civil engineer. For any Civil engineer, basic knowledge of area and volume computation, concepts clarity for theodolite and tacheometer use is of prime importance. Surveying-I also contains plane table instrument complete theory, which is of importance in area computation. It governs the ability of engineer to visualize the contemplated schemes and plan their execution accordingly. It is imperative, therefore, that the students grasp the principles of surveying and also their applications to problems in everyday life. This course contains theory and numerical based on the theory. Numerical procedures have a special significance in surveying like in all other subjects of engineering. Further, this course provides platform for students to better understand successor subject of Surveying-II upcoming in second semester of B.E.-II.

(b) Outcome of the course: After learning this subject students will know various concepts related to leveling and contouring. Students will be able to carry area and volume calculation with respect to civil engineering, which is one of the fundamental requirements in any engineering discipline. They will be more familiar with actual field use of theodolite and tacheometer along with computation skill of both the instruments. Students will be able to understand successor Surveying-II subject with thorough concepts of plane surveying.

(c) Course content and its breakup of 40 lectures:

Chapter No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1.	Different methods of leveling: LS and CS, , ,	3	8
	Contouring	1	
	sources of error	1	
	curvature and refraction correction	2	
	permanent adjustment of level.	1	

2.	Plane table and accessories: Adjustments, Different plotting methods, errors in plane table survey, two point and three point problem.	2	2
3.	Computation of areas and volumes : Boundary area, trapezoidal and Simpsons rule, ,	4	10
	Planimeter	2	
	Area by coordinates and LMD volume computation by LS,CS	3	
	Contour maps and spot levels.	1	
4	Study of Transit and optical Theodolite	1	10
	Adjustment	1	
	Transit survey	1	
	Latitude and departure	1	
	Gale"s Traverse table	1	
	Permanent Adjustments	1	
	Numerical based on above	4	
5	Tacheometry: Principle	1	10
	Determination of constants	2	
	computation of distance and levels	2	
	Inclined sights	2	
	Auto reduction tacheometer	1	
	Tangential tacheometry	2	
	TOTAL	40	40

TEXT/REFERENCES

1. Surveying and levelling- vol.I & II, Kanitkar and Kulkarni, Published by A.V.G. Prakashan, Pune-2
2. Surveying: - Vol.-I & II Dr. B.C.Punmia, Pub: Laxmi Publisher,New Delhi
3. Elementary Surveying : - S.K.Mahajan , pub: Dhanpatrai and sons, New Delhi.
4. Surveying : - Vol: I, Dr. K.R.Arrora,Standard Book House, Delhi-6.

FIRST SEMESTER of B.E II (Civil &IWM)

CVL 1302: BUILDING PLANNING AND DESIGN

L – 4 Hrs **Theory : 100 Marks**

Total : 100 Marks

Academic Audit

(g) Objectives of the course:

To understand the principles of town planning , to understand the planning criteria of public buildings, to draw plan, elevation and section of public buildings, to have knowledge of various Acts in building planning and town planning. To understand the Sun shading devices, Solar data and its applications.

Outcome of the course:

On completion of the course, the students will be able to:

- Apply the principles of planning for public building planning .
- Design the plan, elevation and section for various types of building.
- Explain the principles of town planning.
- Design sun-shading devices for various buildings.
- Classify the types of sun-shading devices.
- State the various Acts in building planning.

(h) Course content and its breakup of 40 lectures:

Chapter .No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1.	Preliminary Introduction to Historical review of classical styles of Building	1	3
	Ancient Building	1	
	Modern Building	1	
2.	Principles of Town Planning :- Urban development plan- Regional plan	2	6
	History and Growth of Indian towns Developments of sub-urban , satellite town etc.	2	
	Town planning for Hot climate. Provision of Road Layout -City layout-Green Belt.	2	
3.	Town planning and Building Planning Acts	2	6

	Gujarat Town Planning Act.	2	
	Factory Act, Land Aquisition act. etc.	2	
4.	Design of Public Buildings	1	6
	Consideration in planning of schools, Colleges & Libraries	2	
	Consideration in planning of Hospitals, Hotels	1	
	Consideration in planning of Cinema Theatres, office buildings	1	
	Consideration in planning of markets, High rise Buildings etc.	1	
5.	Design of Road side Amenities, Swimming pools,Bus Terminals etc.	2	4
	Special considerations in planning of low cost Houses, Pre-fabricated Houses. Slum improvement proposals.	2	
6.	Principles of composition for 2-D plans- Repetitions, Contrast, Emphasis, Transition, Balance Axial Arrangement.	3	5
	Principles of composition for 3-D volumes : Rhythm, Proportion and scale, character,Harmony, Balance , Contrast, Axial arrangement	2	
7.	Land scaping and home gardening	2	5
	Selection of Building site for various occupation.	1	
	Day lighting of Building and calculations, Artificial lighting	1	
	Elementary water supply and drainage scheme for a small bulilding. Elementary colour schemes for a Bunglow.	1	
8.	Design of sun shading system	2	5
	Overhang, louvers	1	
	Solar data	1	
	Application of solar data to design louver system	1	
	Total	40	40

TEXT/REFERENCES

1. Building drawing and detailing : Dr. Balgonal, T.S.Prabhu Dr. K. Vinanat Paul, Spader, KDFA Building, Calicut.
2. Building Planning and Services : A. D. Joshi, Mrs. M. A. Desai Pub. (Part-I)
3. Civil Engg. Drawing : R.J.Malik, G.S.Med, New Asia Pub. Delhi-6
4. Planning & Desigining Building : Y.S.Sane, Allies Book Store, Pune –4 & Engg. Book Pub. Co. Pune-16
5. Working drawing – Keith Stypes
6. Graphic details for architects – Carl Kemmerkh
7. Generall Architectural Drafting – W.E.Wyatt
8. Practical perspective drawing – P.J.Lawson
9. Manual of Graphic techniques – Tom Porter
10. National Building code – I.S.Publisher
11. Indian Standard 962 – 2332 – I.S.Publisher

FIRST SEMESTER of B.E-II (CIVIL)

FLUID MECHANICS – I (CVL 1301)

L – 3 Hrs + 1 Tutorial + 2 Practical Theory : 100 Marks + 50 marks T.W. incl. viva

Academic Audit

(a) Objectives of the course : To make students aware about properties and behavior of fluids in static as well as moving conditions along-with measurement of rate of flow and pressure. To acknowledge them applications of fundamental laws of mechanics like conservation of mass, momentum and energy and to derive new concept with special reference to incompressible fluids.

(b) Outcome of the course : After learning this subject student will be able to understand concepts of hydrology and water resources engineering in general, able to deign water supply / distribution system.

(c) Course content and its breakup of 40 lectures:

Chapter No.	Topics	Teaching Hrs. Topic-wise	Total Teaching hours
1	Introduction to Fluid Mechanics and its role in Engineering Fluids – definition and types.	1	

	Fluid properties and types. Fluid properties and unit of measurements.	1	5
	Fluid pressure – hydrostatic pressure and distribution.	1	
	Measurement of pressure – gauges and manometers.	2	
2	Hydrostatic forces on submerged surface areas – plane and curved.	1	3
	Total pressure curved. Resultant pressure and center pressure and their computations.	2	
3	Hydrostatic forces on closed surfaces – Buoyance –stability of floating and submerged bodies, metacentre and its determination.	1	4
	Relative equilibrium – motion with linear uniform acceleration and uniform rotation.	3	
4	Fluid flow - Continuum concept. Fluid particle and flow description. Types and classes of flow.	3	10
	Kinematics of flow – flow velocity. Description of flow field-streamlines, path line, streamline; streamline flow patter-steam function.	3	
	Flow acceleration. Translation, rotation and deformation of fluid element. Circulation.	2	
	Vorticity. Ir-rotational flow – velocity potential function, flow net. Equation of continuity.	2	

5	Dynamics of flow : Fluid forces stress and strain. Equations of motion. Euler's equation.	2	7
	Bernoulli's theorem and its modifications and applications. Kinetic energy correction factor.	3	
	Cavitation phenomena. Vertex flow free and forced.	2	
6	Fluid flow (incompressible) through closed conduits : Laminar & turbulent flow – Reynold's Experiment, Resistance to flow – Froude's Experiment	1	4
	Laminar flow through pipes and between parallel plates, velocity distribution and loss of head.	1	
	Turbulent flow through pipes. Friction factor for smooth and rough pipes. Moody's diagram and it's use.	2	
7	Minor loss of head in flow through pipe at expansion, etc. energy gradient and Hydraulic gradient – siphon pipe flow through uniform pipe between two – reservoirs.	2	3
	Compass pipe-equivalent length. Pipes in parallel. Branching pipes. Pipe line with laterals. Power transmission by pipes.	1	
8	Flow measurements - Flow through orifices and mouth piece various types – coefficient of discharge and velocity. Flow notch / weir – rectangular triangular, cippoletti.	2	4
	Pipe flow measurements – Venturimeter, orifice meter, nozzlemeter, elbow meter, rotameter, pitot tube.	2	

TEXT BOOK / REFERENCES

1. Dave R.M., Fluid Mechanics Part I
2. Jain A.K., Fluid Mechanics
3. Mody P.N. & Sheth S.M., Hydraulics & Fluid Mechanics, Standard Book House.
4. Ramamritham S., Hydraulics, Fluid Mechanics and fluid machines, Dhanpat Rai Publishing Company, New Delhi.
5. Bansal R.K., Fluid Mechanics and Hydraulic Machines, Laxmi Publications.
6. Vallentine H.R., Applied Hydrodynamics
7. Streeter V.L., Fluid Machine
8. Garde R.J. & Mirajgaokar A.J., Engineering Fluid,
9. Garde R.J., Fluid Mechanics through Problems, New Age International Publishers.

S.S. **B.E. II (C, IWM)**

SECOND SEMESTER of B.E (CIVIL & IWM)

FLUID MECHANICS – II

L – 3 Hrs + 1 Tutorial + 2 Practical Theory : 100 Marks + 50 marks T.W. incl. viva

Academic Audit

(a) Objectives of the course : This subject is more oriented towards applications of concepts related to fluid mechanics and hydraulics. The prime objective of this subject is to make students aware about gravity flow (open channel flow) and complex flow conditions like gradually and spatially varied flow, concept of flow around solid boundaries and analysis of complex flow phenomena by Model studies.

(b) Outcome of the course : After learning this subject student will be able to understand concepts of Open Channel flow, Complex and Special flow conditions and their analysis. This knowledge will be helpful to them at later stage and in field for designing canals, spillways and other hydraulic structures..

(c) Course content and its breakup of 40 lectures:

Chapter No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1	Flow around submerged bodies and boundary layer theory : Forces due to fluid flow-viscous drag, pressure drag and lift, Boundary layer theory Laminar and Turbulent Boundary layer Boundary layer, Thickness, Displacement thickness, momentum thickness.	3	8
	Boundary layer equation. Momentum equation for laminar Boundary layer on flat plate. Turbulent and transitional boundary layer over flat plate.	2	
	Boundary layer separation and its control stream lined bodies. Drag and lift for flow around cylinder, sphere and flat plate, Free fall of a body through fluid	3	
2	Dimensional and model analysis: Physical quantities and their dimensions. Dimensional homogeneity.	1	
	Rayleigh's method. Buckingham's II theorem method. Utility of model analysis.	2	

	Hydraulic similitude. Model laws. Scale effect, ship-model testing. Distorted models.	2	5
3	Open Channel Flow:- Types and characteristics. Steady uniform flow through open channels.	2	13
	Chezy's Manning's- Bazin's-Kutter's equations. Determination of normal depth.	2	
	Most economical sections.	2	
	Specific energy and specific concepts, Critical flow- critical depth and velocity.	3	
	Types of slopes. Specific energy in nonrectangular channels. Velocity distribution in open channels.	2	
	Velocity and discharge measurement in open channels- Channel transitions. Use of Pitot tube, Current meters, Pitot tube, Weirs and flumes.	2	
4	Steady non uniform flow, Flow through open channels:- Gradually varied flow- differential equation, free surface profiles, Backwater and drawdown curves, Length of G.W. flow.	3	7
	Rapidly varied flow- hydraulic jump in rectangular channels, sequential depths, loss of energy	3	
	Transient flow- surges in open channels.	1	
5	Pipe Flow:- Pipe line with pump/turbine, pipe network. Water hammer in pipes-its effects,	1	3
	Rigid water columns theory, elastic water column theory- sequence of events, pressure water and its velocity.	1	
	Surge tank- uses and types	1	
6	Impact of jets on vanes- Stationary and moving, Flat and curves, flow over radial vane, applications	2	4
	compressible fluid continuity, momentum and energy equations, isothermal and adiabatic process, velocity of pressure wave, Mach number	2	

TEXT BOOK / REFERENCES :

1. Dave R.M., Fluid Mechanics part II
2. Kumar K.L., Engineering Fluid Mechanics
3. Mody P.N. & Sheth S.M., Hydraulics & Fluid Mechanics, Standard Book House.

4. Ramamritham S., Hydraulics, Fluid Mechanics and fluid machines, Dhanpat Rai Publishing Company, New Delhi.
5. Bansal R.K., Fluid Mechanics and Hydraulic Machines, Laxmi Publications.
6. Chow Ven Te, Open channel Hydraulics
7. Massary, Fluid Mechanics
8. Garde R.J. & Mirajgaokar A.J., Engineering Fluid,
9. Garde R.J., Fluid Mechanics through Problems, New Age International Publishers.

FIRST SEMESTER of B.E II (Civil &IWM)

CVL 1403: CONSTRUCTION TECHNOLOGY- I

L – 4 Hrs **Theory : 100 Marks**

Total : 100 Marks

Academic Audit

(i) Objectives of the course:
To understand the types of foundations. To understand the components of a building. To study the aspects of Acoustics, thermal insulation, refuse disposal, drainage and water supply in buildings.

Outcome of the course:
On completion of the course, the students will be able to:

.

- Describe the types of foundations in building.
- Identify different elements of a building
- Understand the aspects of ventilation, Acoustics, termite proofing, fire protection in building.

(j) Course content and its breakup of 40 lectures:

Chapter .No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1.	Shallow foundations :- Depth of footing, strip footing, pad footing	2	5
	Grillage foundation, combined footing	2	
	Cantilever footing, raft foundation	1	
2.	Foundation on black cotton soil, adjacent footing, machine foundation.	2	6
	Vertical Circulation :- (3) Stairs – Technical terms,	3	6

	requirements of good stairs, dimensions of a step, classification of stairs.		
	(b) Lift :- Technical Terms, information to be provided by engineer, handling capacity, design considerations, types of lifts.	3	
3.	Thermal insulation :- Technical Terms, thermal insulating materials,	1	4
	General methods, thermal insulation of roofs walls, exposed doors and windows.	1	
	Acoustics :- Technical Terms, nature of sound, unit of measurement, effects of noise, behaviour of sound in enclosures	2	
4.	Absorbants, acoustic materials, common acoustic defects, sound insulation.	2	5
	Water distribution System :- Tech. Terms, materials, for pipes, conveyance and distribution of water within premises	3	
5.	General requirements for pipe works, prohibited connections, laying of service pipes, storage of water.	2	
	Drainage :- The. Terms, principles of house drainage, economical planning	2	
	Inspection chamber, traps, etc. systems of plumbing, septic tank.	2	
6.	Refuse disposal in multistoreyed buildings.	2	6
	High-rise buildings :- Economics and advantages, orientation and planning, essential services-parking, illumination, etc. protection against earth quake.	2	
	Ventilation and air conditioning :- Need for ventilation, effective temp., systems of ventilation, air-conditioning.	1	
	Damp-proofing :- Causes of dampness, effects, methods of damp – proofing, materials used for damp-proofing, DPC treatment	1	
7.	Termite proofing :- Types of termites, antitermite treatment, site preparation, soil treatment, physical structural barriers, post-construction treatment.	2	5

	Fire protection :- Fire hazards, fire load, grading of structural elements, grading of buildings,	3	
8.	Characteristic of fire-proofing materials, fire-resisting properties of common building materials, general fire safety requirements of buildings, fire resistant construction, fire alarms, fire extinguishing equipments.	3	3
	Total	40	

TEXT/REFERENCES

References :-

1) Shushilkumar, Building construction
2) Sharma and Kaul, Building Construction
3) B.C.Punamia, Building Construction
4) Bindra and Arora, Building Construction

FIRST SEMESTER of B.E II (Civil &IWM)

SURVEYING- II CVL 1402

L – 4 Hrs **Theory : 100 Marks**

Total : 100 Marks

Academic Audit

(k) Objectives of the course:

To understand the geometry of Curves, types of curves.

Outcome of the course:

On completion of the course, the students will be able to:

.

- Describe the types of curves.
- Identify different types of survey.
  Understand the principles of Astronomy, Aerial survey

- Solve examples of surveying

(l) Course content and its breakup of 40 lectures:

Chapter .No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1.	Geometry of circular curves- degree of curve layout of curves by chain and tape-	2	5
	Rankins method of deflection- obstacles in layout and of circular curves-	2	
	Theodolite method, numericals.	1	
2.	Geometry of compound and reverse curves, -. Ideal transition curve- Cubic parabola and field layout- numerical based on the same.	2	4
	Layout of the same in field- vertical curves	2	
3.	Computation of levels for vertical curves	1	5
	Transition curves-theory- superelevation- Length of the transition curve	2	
	Ideal transition curve- Cubic parabola and field layout- numerical based on the same.	2	
4.	Geodetic survey:- Triangulation and precise traversing,.	2	5
	Principles,Classificaiton, Stations and signals	2	
	Water visibility-Measurment of angles- Satellite station	1	
5.	Base line measurment-Reconnaissance survey and planning of subsequent operations.	3	6

	Brief description of the theory of errors applied in adjustment of angles-computation.	3	
6.	Astronomy- Latitude, Longitude- true bearing of a survey lines-	1	4
	Celestial sphere and coordinate system for locating a celestial object Z.P.S. triangle,	1	
	Time -Siderial and solar time- Equation of time- Greenwich and local time- Simple methods of determining latitude, longitude and true bearing of x line.	2	
7	Aerial surveys and photogrammetric mapping. Phototheodolite and terestrial photogrametry	2	5
	Arial compass-scale-flight planning overlaps-photometry- rectification of areial photographs for tilt. Height distorsion in aerial photographs.	3	
8.	Stereoscopy-parallax measurement and height determination from the same vertical exaggration.	2	6
	Ground control for aerial surveys- g.	2	
	Extension of ground control by Arunadels method and slotted templet preparation form of photographs map by sketchmaster-different stereoplotting instruments-economics of aerial survey and photo mappin	2	
	Total	40	

TEXT/REFERENCES

References :-

1) Shushilkumar, Building construction
2) Sharma and Kaul, Building Construction
3) B.C.Punamia, Building Construction
4) Bindra and Arora, Building Construction

FIRST SEMESTER OF B.E.III (CIVIL)

CVL 1511 : ESTIMATION, VALUATION AND PROFESSIONAL PRACTICE (CIVIL)

L-4 Hrs — Paper(3 Hours) : 100 marks

TW/ DR-2 Hrs — PR/TW/VV/PROJ : 50 marks

Total : 150 marks

Academic Audit

(a) Objectives of the course: The construction industry is one of the single largest private businesses in the world. The progress of developing and under developing country widely depends upon construction industry. Since independence the government of India has implemented the Five year plan for infrastructure development. Every year government allocating large amount of fund for infrastructure development of country. Therefore logically it is necessary that the amount of allocated fund should be utilized properly and economically for the benefit of society. The implementation of any construction project involves stages of planning, designing and execution of construction activity. The subject of estimation, valuation and professional practice includes the basic procedure and formalities to be followed for handling all the activities of execution of construction project.

(b) Outcome of the course: This subject is useful to all the persons associated with the civil engineering construction project. This subject describes the suitability, advantages, and limitations of different types of contract and tendering procedure. With the help of knowledge of this subject, a civil engineer can able to handle the execution of different types of civil engineering structures.

(c) Course content and its breakup of 40 lectures:

Chapter .No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1.	Types of Estimate – Approximate and Detailed– Estimate of Civil Engineering Work	3	4
	Standard mode and units of measurements	1	
2.	Estimate of Buildings – Residential	2	3
	Estimate of Buildings –Public	1	
3.	Estimate of RCC works , Column, Beam and Slab, Retaining wall	2	5
	Estimate of Culvert, Road	1	
	Estimate of Water Supply and Sanitary works, Irrigation works.	1	
	Estimate of steel structures	1	
4.	Task work of Labours, Material and Labour schedule	2	5
	Framing Rate analysis S.O.R.	3	
5.	Tendering and contract procedures - Types and relative merits	4	8

	Contract documents –Conditions of Contract – Subcontract and Engineers – Duties and Responsibilities	4	

6.	Specification – Writing principles	1	5
	Technical Specification for Earthwork, Brickwork, RCC	2	
	P.W.D. System of administration accounts and Technical sanctions – Billing and Extra item works organization.	2	
7.	Valuation – Terms related to the Valuation of Real property	2	6
	Factors affecting Valuation of Land and Building	1	
	Depreciations methods, Sinking fund, Cash flow diagram.	3	
8.	Methods of Valuation of Real property-Valuation tables– Valuation reports.	2	4
	Fixation of standard rent	1	
	Arbitration procedure.	1	
	Total	40	40

TEXT/REFERENCES

(1) Elements of Estimating and costing (Professional practice-S.C.Rangwala pub., Charotar Book stall.
(2) Estimating and costing – B.N.Dutta Pub. : S.Dutta and Co.Lucknow.
(3) Estimating and costing – S.P.Chandola and Vazirani Pub. Khanna Pub.
(4) Textbook of Estimates and costing (Civil Engg. PG.S.Birdi Pub., Dhanpatrai and sons.
(5) Estimating, costing, specification and valuation in Civil Engg. principles and applications and M.Chakraborti pub., M. Chakraborty 10th edition.
(6) Valuation of Real properties – S.C.Rangwala pub. Charator book stall.
(7) Civil Engineering contracts and estimates – Patil (Pub. Orient Longman).
(8) Fundamentals of Public works procedure and Account – K.N.Pandya – pub. P.R.Mehta.
(9) Quantity Survey (Estimation & CE Work – PLBHasin (Pub. S.C.Chand & Co.)
(10) Mode of Measurements of Civil Engineering Works – I.S.1200.

SECOND SEMESTER of B.E III (CIVIL)

CVL 1609: ENVIRONMENTAL ENGINEERING I

L – 4 Hrs **Theory : 100 Marks**

Total : 100 Marks

Academic Audit

(a)Objectives of the course:

(1)To understand sources of water, water requirements, and methods to estimate water and wastewater quantities

(2)To learn various characteristics of drinking water and domestic wastewater and the methods to determine these characteristics

(3)To design water transmission and distribution systems

(b)Outcome of the course:

After learning this subject students will be able to:

1. **Estimate quantity of drinking water and domestic wastewater for a given locality**
2. **Know the characteristics which defines quality of drinking water and sewage**
3. **Preliminary design systems for water transmission and distribution**

(c) Course content and its breakup of 40 lectures:

Chapter No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1	**Water Requirements**		
	Per capita demand, recommendations for per capita demand, various types of water demand- domestic, institutional and industrial, public use. UFW- recommended values	1	
	Fire demand – types of system- fire hydrant and static tank, factors influencing water requirement, recommended values, Factors influencing per capita demand	1	
	Variations in water demand- Seasonal, monthly, daily and hourly variations, coincident draft, design flow for various components of water supply scheme- Numerical example	1	
	Design period, Factors governing length of design period, recommended values	1	
	Methods of population forecasting-suitable application of each method, numerical examples on population forecasting and water requirement	1 1	
	Water conservation in buildings- Use of water saving devices and fixtures, dual plumbing system Water quantity for public supply	1	
	Water quantity From Different Sources,Raw water intakes, Functions, site selection, types of intakes, design criteria, design Problems	1	

2	**Quantity of Waste** **Quantity of Sanitary Sewage, Variation in Sewage Flow, Types of sewerage System**	**2**	**10**
3	**Water Transmission**		
	Introduction to water transmission systems, hydraulics of transmission systems, methods to find head loss		
	Darcy-Weisbach (Coolbroke-White, Slitcher, Nickuradse, and Swamee-Jain equations for f), Manning's, and Hazen-William's equations for head loss.	1	
	Pipe line systems (series, parallel, and branched) and example	1	
	Structural requirements of transmission lines	1	
	Thrust blocks	1	
	Pipe materials	1	
4	**Water Distribution**	1	
	Distribution systems, basic requirements of capacity and pressure		
	house connections, distribution reservoirs	1	
	Network analysis by equivalent pipe method	1	
	Network analysis by Hardy-Cross method	1	
5	**Development of Water supplies**	1	
	Surface Water supplies and Ground Water Supplies With qualities and quantity in general		
6	**Water and Wastewater Qualities** **Water Qualities Criteria for Drinking purpose,Physical water quality parameters,Turbidity,colour,Taste & odour,Temperature.**	1	**10**
	Suspended solids	3	

	Chemical water quality parameters ,pH,Hardness ,Dissolve Gases **Fluoride ,Chloride ,Toxic Metals,Nitrates,Alkalinity , Acidity , Iron &Mangenes, Residual Chlorine & chlorine Demand, Types of chlorinations**	3	
	Bacteriological Qualities , Total count of Bacteria, M.P.N., Membrane Filter Technique		
	Wastewater Characteristics ,Physical., Chemical & Bacteriological	**1**	
	Characteristics , (B.O.D., C.O.D., Oil & Grease , Numerical Example on B.O.D.	**2**	
7	**Environmental Sanitation**		
	Water borne diseases ,water washed diseases , Related micro organisms and its Signification in water , air sanitation ,Ventilation , Terms Used in air pllution ,factors affecting quality of indoor air , Extent of Ventilation , Calculations , Methods of Ventilation	**4**	**10**
8	**Occupational Health** **Terms used , Influencing factors ,Occupational diseases , Engineering Control methods ,Vital statics**		
	Refuse,Classifications, Characteristics ,Quantity Estimation, Collection & transportation system, Methods of refuse disposal , Excreaa disposal arthropod borne diseases , Rodent Control	**2** **4**	**10**

TEXT/REFERENCES

1. G.S.Birdie , Water supply and Sanitary Engineering (Including Environmental Engineering)
2. B. C. Punamia , Water Supply Engineerg (Volume I)
3. B. C. Punamia , Wastewater Engineerg (Volume II)
4. Santoshkumar K. Garg, Water Supply Engineerg
5. Santoshkumar K. Garg, Sewage Disposal & Air pollution Engineering
6. Vinayak K. Gharpure, A text Book of Water supply Engineering Theory,Design & Practice
7. Vinayak K. Gharpure, A text Book of Sanitary Engineering (Theory,Design & Practice)
8. Euhlers and steel , Municipal and Rural Sanitation
9. J.E.Perk, K.Perk , Preventive and social medicine

FIRST SEMESTER of B.E III (Civil)

CVL1504: CONSTRUCTION TECHNOLOGY II

L – 4 Hrs **Theory : 100 Marks**

Total : 100 Marks

Academic Audit

(m) Objectives of the course:

The overall aim of the subject is to develop understanding of contemporary construction methods and processes associated with substructure, superstructure, drainage system and vertical transportation system elements in medium to large scale construction projects. The subject also aims to provide insight to the current themes that are driving developments in construction technology.

Objectives are:

1. To identify and understand the range of advance technologies that is available and appropriate for the construction of contemporary buildings.
2. To facilitate an understanding of the centrality of technological decision making in the context of the wider construction process.
3. To provide the necessary skills to allow the evaluation of a range of technologies towards the adoption of an appropriate design and construction decision.

(n) Outcome of the course:

In today's times the construction activities is undergoing lots of changes/developments due to internal and globalised market demands of quality and

faster completion of project works using modern techniques, use of modern construction materials and through mechanized construction. Upon successful completion of the program, graduates are prepared to work in residential, commercial and institutional construction; construction materials and equipment field.

On completion of the subject the students should have acquired the ability to:-

1. Possess knowledge of processes and methods for the development of construction projects.
2. Use the knowledge and methods for different types of construction.
3. Solve the identified technological problems occurred during construction projects' processes.

(o) Course content and its breakup of 40 lectures:

Chapter .No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1	**Tunnel engineering**. - introduction, scope various bye passing alternatives, topographical & geological investigations in tunneling	1	5
	General terms associated with tunnel engineering ,History of tunnels, classification : tunnels and uses	1	
	Surveying for tunnels, tunnels through different stratus	1	
	Tunnels through soft soils , Various methods of tunneling in soft stratus	1	
	Economics -design of tunnel cross sections	1	
2.	**Tunneling operations in soft rock**-problems of temporary supports in soft rocks-shield tunneling , permanent supports-rockbolts.	1	5
	Tunneling in hard-rock-drilling by different methods - blasting and blasting materials-blasting techniques-steel ribs-concrete lining-	1	

	Short- crete and grouting - Requirement of tunnels for High ways/railways water supply sewage lines.	1	
	Mucking operations-haulage equipments used in tunneling.	1	
	Drainage , dewatering ventilation. Electrification, Safety in tunnels, Miscellaneous	1	
3.	**Shallow and deep foundations -** Spread footing-combined footing - grillage and raft foundations different types of piles and pile foundations, Function – classification of piles – Factors governing choice of pile foundation – Load transfer principles - load evaluation of piles and pile groups , Static method – Dynamic method –pile load test , Under reamed piles	2	5
	Deep foundation with open well foundations , tilts and tilt correction in open well foundation, Caissons types – Stability of caissons – Loads - principles of analysis and design - IRC Guidelines- Construction aspects.	2	
	box caisson- pneumatic caisson, caisson disease and precautions.	1	
4.	**Dewatering in foundations** - cofferdams-different types and their merits	3	5
	Dewatering by open pumping deep well system-under water construction - artificial freezing - under water concreting	2	

5.	**Building Drainage:** Introduction, Aims, Principals of Building	1	10
	Soil pipe, Waste pipe, Vent pipe, Anti-Siphonage pipe, Rain water pipe,Traps and its functions in Building drainage system	1	
	Types of traps, Nahni trap(floor trap), ' P ', ' Q ', and ' S ' traps, Gulley trap,Bottle trap	1	
	Oil & Grease Trap, Intercepting trap (sewer trap)	1	
	Mica flap Valve, Ventilation system Of building system	1	
	System of plumbing for building drainage, one pipe system, two pipes system	1	
	Single stack system, Single stack partially ventilated system.	1	
	Lifts: General discussion, Technical terms used in lift, Design of lift, Escalator	1	
	Refuse collection system in High rise building: Vertical pipe, Inlet Hopper, Refuse Collection chamber, Refuse collection bins	1	
	Design considerations for vertical pipe, Inlet Hopper, Refuse Collection chamber	1	
6.	Development of different construction materials - light weight concrete Plain cement concrete- Introduction, batching of materials,	2	5

	mixing of concrete materials, transportation and placing of concrete, compaction of concrete, curing of concrete. properties of fresh and hardened concrete		
	Reinforced cement concrete	1	
	workability, factors effecting workability, methods of determination of workability,	1	
	fiber reinforcements concrete, Vibrated Concrete	1	
	Precast and prestressed concrete units-Epoxy resins-properties of cement concrete-	2	5
	concrete mix design methods- Design of concrete mixes by ISI method and ACI method. Design of high strength concrete mixes. Design of concrete mix for flexural strength.	2	
	Repair, Rehabilitation and strengthening of existing R.C.C. components	1	
	Total	40	40

TEXT/REFERENCES

24. J.V.Bartlet, “Tunnels - Planning, design and construction” Vol.I & II - Mc-Grow-publication -Ellis Hardward Ltd. (Div. Johnwiley & Sons) New York.
25. N.J. Tomlinson , “Foundation Design and Construction” Pitman publication
26. Subash Sexena , “Tunnel Engg”. Dhanpatrai and Sohns, Hai Sarak Delhi 6
27. Rangwala S.C. , “Building Construction”, Charotar Pub. Co. Anand
28. Sushi Kumar , “ Building Construction”
29. Sharma and Kaul , “ Building Construction”
30. Bindra S. P. & Arora S. P., “Building Construction”, Dhanpatrai and sons. - Naisarak Delhi - 6
31. B. C. Punmia, “Building Construction”, Laxmi Publications.
32. W. B. Mckay, “Building Construction Metric” Vol. I to IV, Orient Longman.
33. M. M. Goyal, “Handbook of building construction: The Essential Source of Construction Practice”, Amrendiya Consultancy
34. National Building Code.
35. US Concrete technology - Navella

SECOND SEMESTER of B.E III

CVL 1611: TRANSPORTATION ENGINEERING - I

(Civil)

L – 4 Hrs Theory: 100 Marks

Total: 100 Marks

Academic Audit

(p) Objectives of the course:

Transportation becomes the fundamental need of human being. Broadly transportation system is based on land, water, air and pipe networks to transport passengers and goods of different nature. This subject enable students to understand railway engineering, harbor engineering and bridge engineering.

(q) Outcome of the course:

With the help of knowledge of railway engineering, design of railway track in different conditions is possible. The control of trains can be achieved and managements of railway resources become efficient. The contents of bridge engineering give insight of hydraulic aspects of bridge design. Docks and harbor engineering explains students the principles of planning of harbor, dock and port. Also students will able to understand construction of different types of breakwaters along with basic fundamentals as well as the various navigation aids used for the water transportation.

(r) Course content and its breakup of 40 lectures:

Chapter No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1	**(A) RAILWAY ENGINEERING** Permanent Way Cross sectional elements, Types, Selection of Sleepers, Rails and Fixtures and Fastenings, Maintenance programs	9	20
	Railway points. Railway crossing and turnover, their components and layout consideration, Railway signalling, Control systems and Interlocking	6	
	(a) Railway Station Yards, Layouts and Equipments (b) Stresses in Track Structures (c) Modernization of Railway Track, Rapid Transit	5	
2	**(B) BRIDGE ENGINEERING** (a) Bridge Engineering, Structures, Functions of Components, (b) Classification (c) Surface and Sub Surface investigation of Bridge site.	2	10
	Introduction to hydraulic structural, functional, aesthetic, traffic alignment, and economic aspects of bridge design	4	
	(a) Bridge Superstructure for various spans ranges and of different materials (b) Temporary Movable bridges, Culverts and Causeways (c) Bearing for Bridge Structure, Abutment Pier and guide bank construction	4	
3	**(C) HARBOUR ENGINEERING** (i) Classification of harbour-layout functions of each components – Requirements of good harbour	2	10
	(ii) Coastal environmental factors.	1	
	(iii) Navigation aids, type, purpose	1	
	Harbour planning, Principles - on shore and off shore facilities – Port development in India	2	
	Construction features of break waters	2	

	Construction features of piers, wharf, quay, jetty and dock structures	2	

II Termwork- Termwork will be based on the above topics of the syllabus.

Texts / references

1. A text book of Railway Engineering - Saxsena and Arora - publisher : Dhanpatrai and sons.
2. Principles of Railway Engg. - Rangwala SC Publisher - Charator pub.
3. Principles and Practice of Bridge Engg. - S.P. Bindra -pub. Dhanpatrai and sons.
4. Essentials of Bridge Engg. - D Johnson Victor - Pub. Oxford & IBH Pub.Co.
5. Bridge Engg. : S.Ponuswamy - Pub. Tata Mcgraw Hill
6. Docks & Harbour Engg. - Bindra - Pub; Dhanpatrai Sons.
7. Harbour , Dock and Tunnel Engg. – R. Srinivasan – Charotar Pub. house
8. Designand Construction of Ports & Marine structures - Quinn A linzodef - Pub.Mcgrawhill Co.

FIRST SEMESTER of B.E III (Civil)

CVL 1505 : ENGINEERING HYDROLOGY

L – 4 Hrs **Theory : 100 Marks**

Academic Audit

(s) Objectives of the course:

To understand the different hydrologic processes, estimations of water resources, study of hydrologic problems and finding strategies to combat them.

Outcome of the course:

On completion of the course, the students will be able to:

- Describe the hydrologic processes
- Understand the various quantities of rainfall, runoff, etc.
- Estimate the design flood for various structures.
- Know the theory and application of hydrographs.

(t) Course content and its breakup of 40 lectures:

Chapter .No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1.	Introduction Development in hydrology and its role in water resources projects.	1	5
	Hydrologic Cycle. Precipitation: Types and forms of percipitaiton.	2	
	Water losses, evaporation, interception, evapotranspiration etc. runoff hydrometric network, optimum network.	2	
2.	Rainfall Rain gauge Instruments and their installation.	1	5

	Methods of computing average Rainfall, Mean Annual Rainfall.	2	
	Missing data, Depth-Area Curves.	2	
3.	Evaporation Factor affecting evaporation.	2	5
	Methods of measurement, preventive measures.	1	
	Interception, soil evaporation, transpiration, evapo-transpiration and its measurements.	2	
4.	Infiltration : Infiltration Rate, Infiltration indices.	2	5
	Factors affecting infiltration	1	
	Methods of determination, infiltrometers.	2	
5.	Runoff : Factors affecting Runoff.	1	5
	Estimation of runoff, runoff coefficient.	2	
	Empirical formula, infiltration method and dependable yield.	2	
6.	Hydrograph Analysis : components of Hydrograph, base flow separation.	1	5
	Unit Hydrograph, Definition, assumptions, uses, and limitations, derivation of Unit Hydrograph	2	
	Complex storm Hydrograph.	2	
7.	Hydrograph Analysis : Changing the duration of unit hydrograph.	4	5
	Bernard's percentage distribution graph and uses.	1	
8.	Flood Estimation : Flood estimation by hydrograph.	1	5
	Other methods of flood estimation.	2	
	Flood frequency, probable maximum flood, mass curve.	2	
	Total	40	40

TEXT/REFERENCES

References :-

1. Engineering Hydrology- K Subramanya (Tata McGraw Hill Pub.)
2. Engineering Hydrology H.M. Raghunath(Wiley Eastern Pub.)
3. Engineering Hydrology Jayarami Reddy (Laxmi pub)
4. Ground Water Hydrology D.K.Todd (John Wiley and Sons)
5. Hydrology and water Resources Engineering S.K. Garg (Khanna Pub.)
6. A Text Book of Hydrology & Water Resources Engineering by R.K. Sharma, T.K.Sharma (Dhanpatrai Publication)

SECOND SEMESTER of B.E III (Civil)

CVL 1605 : GROUND WATER HYDRAULICS

L – 4 Hrs **Theory : 100 Marks**

Academic Audit

(u) Objectives of the course:

To study occurrence, distribution, movement and quality of Ground Water and to study of ground water flow hydraulics and methods to develop and manage groundwater problems.

Outcome of the course:

On completion of the course, the students will be able to:

- Describe the details ground water flow processes.
- Design the tubewells and suggest the pumps.
- Suggest the strategies for management of groundwater.
- Prescribe the preventive measures for water quality and salt water intrusion.

(v) Course content and its breakup of 40 lectures:

Chapter .No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1.	Ground Water Importance, Origin.	1	5
	Occurrence – Aquifers, Zones of underground water, types of Aquifers.	1	
	Specific Yield, Storage Coefficient, Recharge of Ground Water-Artificial methods Ground Water investigations methods-Introduction.	3	
2.	Ground Water Movement : Confined and unconfined flow; Darcy's Law and its validity.	1	5
	coefficient of permeability & its measurement, intrinsic permeability.	1	
	Transmissibility steady unidirectional flow – confined and unconfined (Dupuit's theory); its applications.	3	
3.	Ground Water flow principles : Hydrodynamic equation – Generalised Darcy's law. General equation of continuity – Laplace equation.	2	5
	Two dimensioned flow – flow net, horizontal confined flow with uniform thickness. Flow equation for unconfined equifer – two dimensional flow.	2	
	Anisotropic media – equivalent equifer – two dimensional flow. Anisotropicmedia equivalent permeability, refrection of flow lines. Elastic properties of confined aquifers.	1	
4.	Well – Hydraulics : Steady radial flow to a well in a confined equifer and well in an unconfined aquifer.	2	5

	Determination of transmissibility. Design of tubewell, construction and development of the tube well.	3	
5.	Unsteady radial flow to a well in confined aquifer – Thies method, Jacob's method.	2	5
	Unsteady radial flow in anunconfined aquifer well losses. Specific capacity of wells. Well efficiency. Gravel packs.	1	
	Infiltration gallaries, collactor wells, multiple well system (Interference among wells).	2	
6.	Ground Water withdrawal : Various types of pumps. Reciprocating pumps – classification, components, working, types, work done indicator diagrams, use of air vessels.	2	5
	Centrifugal pumps – components, working, types, work done, head, power, efficiencies, specific speed, characteristic curves, cavitation, properfier pump.	2	
	Jet pump. Air lift pump, gear pump, vertical turbine pump, submersible pump. Selection of pumps and power requirements, series and parallel pump connection, multistage pump specific speed of the pump.	1	
7.	Salt water intrusion : Occurance, Ghyben Harzberg relation shape and structure of interface.	4	5
	Upconing, methods of control.	1	
8.	Ground water Management Introduction of Ground Water Modelling,	1	5
	Types of models, porous media models, etc.	2	
	Ground water quality and ground water budget.	2	
	Total	40	40

TEXT/REFERENCES

References :-

1. Ground Water Hydrology : D.K.Todd, John Wiley and sons.
   Engineering Hydrology : E.M.Wilson, Elbs and Macmillon.
2. Hydrology / Geohydrology : David and Dewiest
   Ground Water and Seapage : M.G.Ham, McGraw Hill Book Co.
3. A text book of Hydrology and Water Resources.
   R.K.Sharma, Dhanpet rai and sons.
4. Fluid Mechanics Part II : R.M.Dave, Acharya Book Depot.
5. Hydraulics and Fluid Mechanics : Modi and Seth, Standard Book House.

6. Ground Water by H.M. Raghunath – Wirley Eastern Publication.
7. Water Wells and Pump Engineering – Michael & Khepar.

FIRST SEMESTER of B.E IV

CVL1703: ENVIRONMENTAL ENGINEERING-II

(Civil)

L – 3 Hrs + Tutorial 1 Hr + Practicals 2 Hrs

Theory : 100 Marks & Pract. & T.W. 50 Marks

Academic Audit

(a) Objectives of the course:

1. To understand basic concepts and unit processes of water and sewage treatment
2. To learn design of conventional water and sewage treatment plants
3. To understand sewerage system and learn its design
4. To understand basic aspects of air pollution and municipal solid waste

(b) Outcome of the course:

After learning this subject students will be able to:

1. Understand various unit processes and operation used for water and domestic wastewater treatment
2. Design conventional water and sewage treatment plants

(c) Course content and its breakup of 40 lectures:

Chapter No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1	**Sewage Treatment**: Objectives, Unit operations- Dry well, Wet well	1	1
2	Filtration- Actions in filter, Types, Comparison, Criteria for design, Operations & Maintenance	1	4

	issues & Remedies		
	Screening	1	
	Grit removal	1	
	Primary Settling Tanks	1	
3	**Water Treatment:** Objectives, Line flow-Various options, Slow Mixing Devices & Rapid Mixing Devices- Hydraulic & Mechanical operations	1	5
		1	
		1	
	Theory of Settling-Objectives, Design Concepts, Criteria & components of Settling tank design	1	
		1	
4	**Biological unit process and disposal of treated sewage:** Basic concepts of biodegradation (electron donor and electron acceptor)	1	2
	Basic concepts of biodegradation (aerobic, facultative, and anaerobic processes)	1	
5	Waste stabilization ponds: principle of action, construction and operation	1	8
	Onsite sewage treatment systems: Septic tank, principle of action, construction and operation	1	
	Design of septic tank and soak pit	1	
	Basics of anaerobic digestion, process biochemistry	1	
	Products of anaerobic digestion, types of anaerobic digesters	1	
	Products of anaerobic digestion, types of anaerobic digesters	1	
	Design examples of anaerobic digesters	2	
6	**Design of sewers, sewer appurtenances, air pollution:** Hydraulic design of sewers- Flow estimation- Quantity of sanitary sewage, variations in sewage flow, peak factors, Storm water flow estimation- Rational formula, rainfall intensity, time of concentration	1	6
	Flow equations, pressurized flow, open channel flow- Manning's formula, charts and nomograms,	1	

	shapes of sewer		
	Velocity considerations- Self cleansing and non-scouring velocity	1	
	Partial flow condition, hydraulic elements of circular sewer	1	
	Numerical examples based on sewer design	1	
	Sewer material and Sewer appurtenances	1	
7	Disposal of treated sewage, receiving water bodies and their effluent standards, stream pollution and DO sag curve	1	2
	Disposal of treated sewage on land for irrigation	1	
8	Air pollution- Definition and classification of air pollutants- Primary-Secondary, Particulates-aerosols classification as per size and mode of formation	1	12
	Effects of air pollutants- on human, plants and vegetation,	1	
	Global effects- Enhanced GHE, Ozone layer depletion, Acid rains	1	
	Meteorology- Atmospheric variables affecting dispersion- wind, Environmental and adiabatic lapse rate, Atmospheric stability, Automobile pollution	1	
	Microbial growth requirement, Biological growth curve, mixed culture and types of microbes	1	
	Attached growth processes: basic concepts, construction and operation of Trickling filter	1	
	Trickling filter problems and maintenance, Design examples of Trickling filter	1	
	Design examples of Trickling filter	1	
	Suspended growth processes: basic concepts, construction and operation of Activated sludge process	1	
	Design and operational parameters of ASP, types of	1	

	aeration systems		
	Modifications of ASP	1	
	Examples on Design and operation of ASP	1	
	TOTAL	**40**	**40**

TEXT / REFERENCES :

1. Metcalf & Eddy : Waste-water Engg. treatment, disposal

2. M.N.Rao & H.V.N.Rao – 'Air pollution'

3. G.S.Birdi, 'Water supply and sanitary Engg.'

4. V.N.Gharpure "A Text book of Water supply Engg. Theory, design and practice.

5. Santosh kumar Gar, 'Water Supply Engg.'

6. Santosh kumar Gar, 'Sanitary Engg.'

7. Manual on water supply and treatment. Ministry of works and Housing, New Delhi.

8. Manual on 'Sanitary Engg. and Sewage treatment, Ministry of works & Housing, New Delhi.

9. E.W.Steel & T.J.McGhee, 'Water Supply & Sewerage'.

SECOND SEMESTER of B.E IV

CVL1811 : Advanced Water Supply Engg. (Elective-II)

(Civil)

L – 3 Hrs + Tutorial 1 Hr + Practicals 2 Hrs

Theory : 100 Marks & Pract. & T.W. 50 Marks

Academic Audit

Objectives of Advanced Water Supply Engineering (Elective-II)

5. To know various sources of water and their respective qualities.
6. To obtain in-depth understanding of unit processes and operations involved in water treatment
7. To understand various advanced methods of water treatment such as desalination, reverse osmosis, and softening.

Outcomes of Advanced Water Supply Engineering (Elective-II)

After learning this subject students will be able to:

3. Obtain in-depth understanding of various unit processes and operations used for water treatment and design them
4. Understand various sources of water and learn advanced/non-conventional methods of water treatment

Chapter No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1-4	Water sources and feasibility of using them	1	20
	Quality of water from various sources and water quality standards	1	
	Water treatment schemes for various sources	1	
	Coagulation: basic concepts, colloid chemistry, mechanisms	1	
	Coagulants and coagulant chemistry, alkalinity-turbidity relationships	1	
	Equipment for coagulation: hydraulic, pneumatic, and mechanical mixers, design concepts and parameters	1	
	Design of rapid mix units	1	
	Flocculation: basic concepts and models	1	
	Design of flocculation basins	1	
	Principle and types of Sedimentation, analysis of discrete particle settling	1	
	Examples on settling velocity of particles	1	
	Concepts of continuous flow settling basins, design parameters for settling basins, components of a settling basin	1	
	Design of sedimentation basins, non-ideal behavior of settling basins	1	
	Inclined plate and tube settlers, design of tube settler	1	
	Granular media filtration, types of granular media filters, principle of working	1	
	Construction and operation of filter units	1	
	Filter hydraulics and design of sand filters	1	
	Disinfection: principle of action, types of disinfectants, chemistry of chlorination	1	
	Kinetics of chlorination, forms of chlorination, factors affecting chlorination	1	
	Examples on chlorination chemistry, chlorine demand	1	
5-8	Softening: General discussion about Water Treatment Processes	1	20
	Lime Soda Process	1	
	Excess lime treatment Process	1	

	Zeolite Process (cation Exchange Process)	2	
	Desalination: Reverse Osmosis Process, Osmosis Process	1	
	Cellulose acetate and Polyamide Membrane	1	
	Membrane Foulings	1	
	Reverse osmosis Modules Spiral wound module, Hollow fine fiber module, Tubular module, Plate & frame module Electro dialyses process demineralization process	4	
	Solar distillation, Thermal distillation-multistage flash distillation & Thin film multiple effect Evaporation process	3	
	House Plumbing: Capacity of under-ground tank, overhead tank, design of down take water supply pipe etc. Building drainage, traps, types of traps, types of plumbing in building drainage, external drainage system	3	
	Rural water supply: Per capita water demand, Disinfection methods for well rural water Supply etc.	2	
	TOTAL	40	40

TEXT & REFERENCES :

(i) Water supply & Sanitary Engg. by G.S.Birdie

(ii) Water supply Engg. by Prof. V.N.Gharpure

(iii) Water Supply Engg. by Santoshkumar Garg.

(iv) Manual on Water Supply and Treatment by Ministry of works and housing, New Delhi.

FIRST SEMESTER of B.E IV (Civil)

CVL 1711 : WATER RESOURCES ENGINEERING

L – 4 Hrs **Theory : 100 Marks**

Total : 100 Marks

Academic Audit

(w) Objectives of the course:

To understand the types irrigation schemes, to know the design concepts for dams, diversion structures, canals and canal structures.

Outcome of the course:

On completion of the course, the students will be able to:

- Describe the types of irrigation schemes.
- Identify appropriate types of structures or canal to be proposed
- Design the structures and canal system

(x) Course content and its breakup of 40 lectures:

Chapter .No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1.	Introduction : Water resources-importance, scope of water, water resources engineering, history and future.	2	5
	Development in India, Irrigation-advantages and disadvantages.	2	
	Types of Irrigation schemes-diversion head works and storage head works.	1	
2.	Diversion head works : layout, functions and components.	1	5
	Types of weirs – structural elements and functions and selection of site, design principles for weirs on permeable foundations-surface flow theory.	2	
	Bligh's theory, Khosla's theory, silt excluder and silt ejector; causes of failure of weirs.	2	
3.	Storage head works : Selection of dam site, types of dams and their selection.	1	5
	Investigations for reservoir projects; reservoir storage zones.	1	
	Fixing height of dam, sedimentation in reservoirs, flood control measures.	3	
4.	Earth dams : Types of earth dams – components and their functions, earth dam foundations.	1	5
	Causes of failure; design criteria; design of slope protection.	1	
	Seepage control for the embankment and the foundation-cutoff, rock toe, filters etc. slope stability analysis.	3	
5.	Gravity dams : Selection of gravity dam, forces acting on dams.	1	5
	Causes of failure and safety criteria, stability analysis-design by single step method, step by step method.	3	
	Elementary profile, low and high dam.	1	
6.	Spillway : Types of spillways and their suitability; factor affecting design.	1	5
	Overflow spillway-discharging capacity, purpose of ogee crest, factors affecting crest profile.	2	
	Energy dissipators, necessity, types, factors effecting selection.	2	

7.	Canals : Canal network, command areas; canal cross-section – elements and functions.	1	5
	Design of unlined canal sections-Kannedy's and Lacey's theories.	3	
	Lining of canals-benefits and types of lining, design of lined canal sections; alignment of canals.	1	
8.	Canal structures : Regulation works – Head regulator, cross regulator.	1	5
	Escapes, outlets, canal falls-functions and types.	2	
	Cross drainage works-types, selection. Hydropower generation : Types of hydropower plants-functions of various components, power estimates.	2	
	Total	40	40

TEXT/REFERENCES

References :-

1. Theory & Design of irrigation structures : R.S.Varshney, S.C.Gupta and R.L.Gupta.
2. Irrigation and water power Engg. B.C.Punamia, Pande B.B.Lal
3. Irrigation Engg. & Hydraulic structures S.K.Garg.
4. Water resources Engg. : Linsley and Franzini
5. Engg. for dams Vol-I to III : Creager, Justin & Kinds.
6. The Engg. of Large dams : H.H.Thomas
7. Design of small dams U.S.B.R.
8. Irrigation Engg. – Principles and Practice Vol.I to VIII : K.B.Khushalani
9. Irrigation, Water Power and Water Power Engineering by K. R. Arora
10. Irrigation by G. L. Asawa
11. Water Resources Engg. by Larry W. Mays.

SECOND SEMESTER of B.E IV (Civil)

CVL 1804 : IRRIGATION ENGINEERING

L – 4 Hrs **Theory : 100 Marks**

Total : 100 Marks

Academic Audit

(y) Objectives of the course:

To study the importance of irrigation in fields, crop water requirements and design and evaluation of different irrigation methods for on-farm water distribution.

Outcome of the course:

On completion of the course, the students will be able to:

- Estimate the crop water requirements in fields.
- Understand the irrigation methods and know-how maximum irrigation efficiencies.
- Select and design the irrigation systems in the field.

(z) Course content and its breakup of 40 lectures:

Chapter .No.	Topics	Teaching Hrs. Topic- wise	Total Teaching hours
1.	Introduction Definition, objective, role of water in plant life, root zone development stages, root zone, effective root zone depth.	1	5
	Water holding capacities of soil, field capacity, available water to plant, management allowable deficiency.	1	
	Wilting point, consumptive use of water. Relation of moisture content of soil and yield of crop, irrigation depth, frequency, scheduling, soil reservoir concept, leaching requirement of soil.	3	
2.	Crop Water Requirement Water requirement of Crops, Crops and Crop seasons, duty and delta of water.	1	5
	Consumptive use approach, evapotranspiration including methods suggested by FAO and ASCE.	2	
	Measurement of evapotranspiration, crop coefficients, computation of NIR and discharges, Integrated command area development.	2	
3.	Infiltration Definition, different methods of measurement, factors influencing measurement of infiltration.	1	5
	single cylinder, double, cylinder, blocked furrow	3	
	Inflow-outflow method, etc.	1	
4.	Furrow Irrigation Method General – types of Irrigation methods, selection of method incl. Sub-surface method, etc.	1	5

	Furrows, different types of furrows, suitability of different types of furrows for different crops grown. Characteristics of flow in furrow irrigation, parameters influencing furrow irrigation incl. Factors affecting furrow design	2	
	Evaluation of furrow irrigation i.e. phases of water profile development, data and analysis, equations of advance and recession curves, time of ponding, irrigation efficiencies.	2	
5.	Border Irrigation Method General introduction, their adoptability for different crops grown, advantages.	1	5
	Types of borders, limitations, factors affecting shape and size of border	2	
	Design of border irrigation system, design assumptions, hydraulics of border irrigation.	2	
6.	Basin Irrigation Method General description of check basin, types of check basin irrigation based on size and shape.	1	5
	Their adaptability for different crops grown, limitations, factors affecting shape and size of basin.	2	
	Design of basin irrigation system, hydraulics of basin irrigation.	2	
7.	Sprinkler Irrigation Method Definition, conditions favouring sprinkler irrigation, limitations, types of sprinkler systems, components of the sprinkler system.	1	5
	Moisture distribution pattern of individual and combined sprinkler, effect of wind on distribution pattern	2	
	Design of sprinkler irrigation system, evaluation of sprindler, catch can tests, coefficient of uniformity.	2	
8.	Drip Irrigation Method Principles, advantages and disadvantages,.	2	5
	Components, types of emitters, emitter hydraulics, emitter uniformity, lateral hydraulics.	3	
	Total	40	40

TEXT/REFERENCES

References :-

1. Theory & Practice of surface irrigation – W.R.Walker
2. Irrigation : Theory & Practice : A.M.Michael, Vikas Pub. House,

New Delhi.

3. Principles of Agricultural Engineering Vol.II : A.M. Michel and T.P.Ojha Jahi Bros, New Delhi.
4. National Engineering Handbook section 15 – Irrigation USDA SCS
5. Cuenca, R.H., "Irrigation System Design – An Engineering Approach" Prantics Hall.
6. Asawa, G.L. "Irrigation Engineering" Wiley Eastern Limited.
7. Crop Water Requirement, F.A.O.

Elective-II-Pavement Design and Construction

Civil Engineering Department

Faculty of Technology & Engineering

The Maharaja Sayajirao University of Baroda

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Subject Code:	Subject: Elective-II-Pavement Design and Construction
Branch: Civil	

Teaching Scheme:	**Examination Scheme:**	Page : 1 of 2
Lectures : 3 Hours per Week	Theory Paper : 100 Marks	Semester : Second
Tutorials : 1 Hours per Week	PR/TW/Viva : 50 Marks	Year : B. E. IV
Practicals: 2 Hours per Week	Total : 150 Marks	

(a)Objectives of the course:
Pavement construction has taken up pace in the country after adoption of free economy by government. The density of road construction per hundred square kilometers has increased in leaps and bound. The main objective of this elective course is to acquaint the students about the basics of highway materials with their engineering properties, use of new materials in road construction, design of flexible and rigid pavements, mix design parameters of bituminous and concrete pavements and construction procedure of low, intermediate and high categories of roads.
(b) Outcome of the course:
On completion of this course it is expected that student will be familiar with commonly used materials in highway construction including their laboratory test as well their significance in the

quality aspect of pavement construction. The students will appreciate design of bituminous mix in the laboratory with hand on experience. They are further expected to understand various equipments and machineries used in construction of bituminous and concrete pavements. They will also understand significance of road maintenance procedure and quality control measures to be taken care during construction.

(c)Course content and its breakup of 40 lectures:

Chap. No.			
1	Introduction to Pavement: Pavement types, Structures,	1	5

	Pavement Layers and Their characteristics, Pavement components and their function; behavior under sustained and repeated loading	2	
	Field tests, Factors affecting design and performance of Highway pavements	2	
2	Pavement Materials (Soil, Aggregate and Bitumen): Fundamental concepts, Source of pavement material Particle size distribution, Engineering soil classification methods, Sampling of aggregate	2	4
	Classification of Bitumen, Modified Bitumen,	1	
	Field and laboratory tests, Significance and application of test results, Site investigation	1	
3	Pavement Mix design : Objectives of Mix Design,	1	8
	Blending of aggregate	3	
	Properties of various mixes	1	
	Mix design method:- Marshal mix design	3	
4	Pavement (Flexible and Rigid) design methods for Highway: different approaches of pavement design	2	6
	Design of flexible pavement	2	
	Design of rigid pavement	2	

5	Rigid Pavement Joints: Types of joints,	1	4
	Spacing and joint details for longitudinal joints,	1	
	Construction and expansion joints, design of dowel bar and tie bar.	2	
6	Construction Methods: Different types of low,	1	4
	Intermediate and high type pavements,	1	
	Bituminous road, Cement concrete pavements	2	
7	Equipments: Machineries used in road construction	2	6
	Use of machinery	1	
	Owning and operating cost per hour	3	
8	Maintenance and Quality Control: Periodic and routine maintenance for different types of pavements	2	3
	Quality control chart, frequency of test for quality control	1	

Term Work:

Term work will be based on the above topics

References

1. Codes-IRC-37,IRC-58, IRC-SP-17
2. IRC – Hand book of Quality control for construct ion of Roads and runways
3. MORT&H(13^{TH} Revision) – Specifications for Road and Bridges
4. Khanna & Justo, Highway Engineering, NemChand & Bros, Roorke
5. Chakroborty & Das, Principles of Transporatiopn Enginering, PHI learning Pvt. Ltd.
6. S. K. Sharma, Principles Practice and Design of highway Engineering, S Chand Pvt. LTd.
7. Principles of pavement design: by Yoder and Witezak (Second edition)- Publisher: john Wiley and sons.
8. Pavements and surfacing for Highway and airports: by Michel Sargious (1975) – Publisher: Applied science publishers ltd.
9. Pavement management systems: by Hose and Hudson- Publisher: McGraw Hill
10. Thickness design – asphalt pavement structures for Highway and streets – Publisher: Asphalt Institute (US)