VISION AND MISSION OF INSTITUTE

Vision:

- To emerge as a comprehensive Institute that provides quality technical education and research thereby building up precious human resource for the industry and society.

Mission:

- To provide a learner-centered environment that challenges individuals to actively participate in the education process.
- To empower the faculty to excel in teaching while engaging in research, creativity and public service.
- To develop effective skills enabling learners to pick up critical thinking thus crafting them to be professionally fit and ethically strong.
- To reach out industries, schools and public agencies to partner and share human and academic resources.

VISION AND MISSION OF CIVIL ENGINEERING DEPARTMENT

Vision:

- To promote excellence in civil engineering education, enrich research and provide quality professional service to the society in all areas of civil engineering.

Mission:

- To provide a learner-centered environment for students to gain comprehensive knowledge in civil engineering.
- To provide a learning experience that fosters an aptitude for research.
- To provide graduates with contemporary skills and tools required to excel in civil engineering profession or alternate fields. To produce graduates to serve within the constraints of complex needs of the society with high integrity.

PROGRAMME EDUCATIONAL OBJECTIVES OF THE DEPARTMENT

PEO 1: Graduates will be proficient in the fundamental knowledge of basic science, engineering science including mathematical and computational skills appropriate for civil engineering.

PEO 2: Graduates will be successful practicing engineers in civil engineering and allied fields or alternate careers using their technical knowledge, teamwork, communication skills and leadership qualities.

PEO 3: Graduates will be innovative problem solvers within the realistic constraints of economic, environmental, social, political, health, safety and sustainability impacts, and serve the society as responsible professionals with integrity

PEO 4: Graduates will engage in lifelong learning within the profession or through higher studies.

PROGRAMME OUTCOMES OF THE DEPARTMENT

The programme outcomes are the skills and knowledge which the graduates have at the time of graduation:

a. An ability to apply knowledge of mathematics, science, and engineering.
b. An ability to design and conduct experiments, as well as to analyze and interpret data
c. An ability to design an engineering system, component, or process
d. An ability to identify, formulate, and solve engineering problems
e. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
f. A knowledge of contemporary issues.
g. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
h. An understanding of professional and ethical responsibility
i. An ability to function on multi-disciplinary teams
j. An ability to communicate effectively
k. To embark on a career as an entrepreneur or civil engineering project manager/ consultants thereby playing a very important role in society.
l. A recognition of the need to be successful in competitive examinations, and an ability to engage in lifelong learning

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY :: VIDYANAGAR

(AUTONOMOUS)

CIVIL ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the batch admitted in the academic year 2013-2014)

I YEAR OF FOUR YEAR B.TECH. DEGREE COURSE

S.No.	Course Code	Course Title	Contact Hours/ Week			Credits	Evaluation									
							Sessional Test-I		Sessional Test-II		Sessional Test-III		Total Sessional Marks (Max. 40)	Semester End Examination		Max. Total Marks
		THEORY	L	P	T		Duration In Hours	Max. Marks	Duration In Hours	Max. Marks	Duration In Hours	Max. Marks		Duration In Hours	Max. Marks	100
1	13SH1001	English	2	-	-	4	2	40	2	40	2	40	0.4*Best mid+ 0.4*Better mid+0.2* other	3	60	100
2	13SH1002	Engineering Mathematics – I	3	-	1	8	2	40	2	40	2	40		3	60	100
3	13SH1003	Engineering Mathematics – II	3	-	1	8	2	40	2	40	2	40		3	60	100
4	13SH1004	Engineering Physics	2	-	-	4	2	40	2	40	2	40		3	60	100
5	13SH1005	Engineering .Chemistry	2	-	-	4	2	40	2	40	2	40		3	60	100
6	13CS1001	C Programming & Data Structures	4	-	-	8	2	40	2	40	2	40		3	60	100
7	13ME1001	Engineering Graphics	1	3	-	6	2	40	2	40	2	40		3	60	100
8	13SH10P1	English Language Laboratory	-	3	-	4	-	-	-	-	-	40	Day-to-day Evaluation and a test	3	60	100
9	13ME101P	Workshop	-	3	-	4	-	-	-	-	-	40		3	60	100
10	13CS10P1	Programming Laboratory	-	3	-	4	-	-	-	-	-	40		3	60	100
		TOTAL	**17**	**12**	**02**	**54**	**-**	**-**			**-**	**400**		**-**	**600**	**1000**

13SH1001 ENGLISH

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 0 - 0
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Correct the error of the sentence; improve language proficiency and face competitive exams; GATE, GRE, TOEFL, GMAT etc
	CO2	Comprehend the advanced level of reading comprehensions
	CO3	Write clear and coherent passages for social and professional contexts
	CO4	Write proposals, business letters
	CO5	Acquire considerable flair in using broad range of vocabulary.

Course Content

UNIT-I

'Humour' from 'Using English' Biography –(Homi Jehangir Bhabha) from "New Horizons" R- Reading Strategies- Skimming and Scanning. G- Parts of Speech- Noun-number, pronoun-personal pronoun, -Subject verb& Pronoun agreement.

UNIT-II

'Inspiration' from "Using English" 'Biography-(My Struggle for an Education)' form "New Horizons" R- Note making strategies W- Paragraph- types- topic sentences, unity, coherence, length, linking devices G- Articles-Prepositions-Tenses- Present tense, Past tense and Future tense

UNIT-III

'Sustainable Development' from 'Using English' Short Story- (The Happy Prince) from "New Horizons" G .Non-finite verbs, Auxiliary verbs and question tags V- Word formation and One-Word Substitutes

UNIT-IV

W- Writing Strategies- Sentence structures-Letter Writing-Dialogue Writing- Public Speaking

G- Transformation of Sentences (Direct and Indirect/ Active and Passive)

V- Affixes-prefix and suffix, root words, derivatives

	UNIT-V W- Technical Report writing-strategies, formats-types-technical report writing G- Conditional clauses, Transformation of Sentences (Degrees of Comparison/Connectives) V- Collocations and Technical Vocabulary and using words appropriately- Synonyms-antonyms, homonyms, homophones, homographs, words often confused.
Text Books and reference Books:	**TEXT BOOKS:** 1. Using English published by Orient Black Swan 2. New Horizons published by Pearson **REFERENCES:** 1. Raymond Murphy's English Grammar with CD, Murphy, Cambridge University Press, 2012. 2. English Conversation Practice- Grant Taylor, Tata McGraw Hill, 2009. 3. Communication skills, Sanjay Kumar & Pushpalatha Oxford University Press, 2012. 4. Techniques of Teaching English: A.L. Kohli 5. A Textbook of English Phonetics: For Indian Students: T Balasubramanian., MacMillan India Limited

13SH1002 ENGINEERING MATHEMATICS-I

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 – 0
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Understand the concepts of rank of the matrices, linear and non-linear system of equations, eigen-values and eigen-vectors, apply Caley-Hamilton theorem, diagonalizable of symmetric matrices and demonstrate the nature of quadratic forms.
	CO2	Understand effectively the mean value theorems and Maxima and Minima of a function of two variables – Lagrange's method of multipliers.
	CO3	Understand effectively the geometrical aspects of curvature, involutes and evolutes of plane curves, essential concepts for an engineer, as elegant applications of differential calculus.
	CO4	Demonstrate knowledge and understanding the evaluate of double integration and triple integration using Cartesian, polar co-ordinates and also understand effectively areas and volumes.
	CO5	Apply Green's theorem, Gauss' theorem and Stokes' theorem.

Course Content

UNIT I

MATRICES

Rank of Matrix:-Echelon Form and Normal Form - Consistency of system of linear equations- Eigen values and Eigen vectors- Cayley – Hamilton's theorem- Diagonalization of matrix- Quadratic forms.

UNIT II

DIFFERENTIAL CALCULUS

Rolle's, Lagranges and Cauchy's mean value theorems (without proofs) - Taylor's and Maclaurin's series (only one variable) - Maxima and Minima of a function of two variables – Lagrange's method of multipliers.

UNIT III

Radius of curvature, involutes and evolutes. Beta and Gamma functions. Curve tracing (only Cartesian form)

UNIT IV

INTEGRAL CALCULUS

Double and Triple Integrals- Change of order of integration- Change of variables- Simple applications to areas and volumes.

	UNIT V (VECTOR CALCULUS) Gradient, Divergence, Curl - Laplacian and Second Order Operators- Line, Surface and Volume integrals- Potential function- Green's theorem, Stoke's theorem and Gauss Divergence theorem (without proof)- Verification of Green's , Stoke's and Gauss Divergence theorem.
Text Books and reference Books:	**TEXT BOOKS** 1. Higher Engineering Mathematics – B S Grewal 2. Engineering Mathematics- B V Ramana 3. Elementary Engineering Mathematics – B S Grewal **REFERENCE BOOKS** 1. Higher Engineering Mathematics- H K Das et al 2. Advanced Engineering Mathematics- N P Bali & M Goya 3. Engineering Mathematics-I S. Chand & Co.

13SH1003 ENGINEERING MATHEMATICS-II

Course category:	Program core	**Credits:**	8
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0 - 1
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Students will be able to understand the basic theories and methods of differential equations, and to apply the fundamental techniques of differential equations to perform analysis and computation of solutions to various differential equations.
	CO2	Understanding effectively the Laplace Transformations of standard functions and their properties.
	CO3	Understanding effectively the unit step function, dirac's delta function, convolution theorem and also the applications of Laplace transforms to differential equations.
	CO4	Understanding effectively Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
	CO5	The definition of the Fourier transform and how to compute it for standard examples and also understand effectively the fourier integral in complex form, finite and infinite fourier transforms, fourier sine and cosine transforms.
Course Content	**UNIT – I** **Ordinary Differential Equations:** Linear Differential Equations of second and higher order with constant coefficients- Method of variation of parameters- Equations reducible to linear equations with constant Coefficients- Cauchy's linear equations –Legendre's linear equation. **UNIT – II** **Laplace Transformation:** Laplace Transformations of standard functions- Properties of Laplace Transformation- Transformation of derivatives and integrals- Initial and Final value theorems- Transforms of unit step function and impulse function – Transform of periodic functions. **UNIT – III** **Inverse Laplace Transformation:** Inverse transforms- Unit step function- Dirac's delta function- Convolution theorem- Transforms of periodic functions- Application to solutions of Ordinary Differential Equations. **UNIT-1V** **Fourier series:** Determination of Fourier coefficients- Fourier series- Even and Odd functions- Change of intervals- Half Range Sine and Cosine Series- Complex form of Fourier series-	

	Parseval's formula. **UNIT-V** **Fourier Transforms:** Fourier Integral Theorem- Fourier Sine and Cosine integral- Fourier integral in complex form – Finite and Infinite Fourier Transforms- Fourier Sine and Cosine transforms properties- Inverse transforms.
Text Books and reference Books:	**TEXT BOOKS** 1. Higher Engineering Mathematics –B S Grewal 2. Engineering Mathematics- B V Ramana **REFERENCE BOOKS** 1. Higher Engineering Mathematics- H K Das et al 2. Advanced Engineering Mathematics- N P Bali and M Goyal

13SH1004 ENGINEERING PHYSICS

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 0 - 0
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Understanding the wave particle behaviour of matter Schrodinger wave equation and electronic behaviour in metals.
	CO2	Understand the structure of crystalline solids and their applications in X-ray diffraction
	CO3	Know the properties of semiconductor materials by projecting the view of energy bands and know the concept of magnetization and applications of magnets in various disciplines.
	CO4	Understand the utilization of laser technology in various disciplines. Basic Understands of Acoustics.
	CO5	Understand the concept of optical fiber and its applications. Basic ideas about super conductor and their uses in different fields.

Course Content

UNIT – I

QUANTUM MECHANICS AND FREE ELECTRON THEORY :

Quantum Mechanics : Wave – Particle duality - de'Broglie hypothesis of Matter waves – Properties of matter waves Heisenberg's uncertainty principle and its applications– Schrodinger's time independent and time dependent wave equation –Significance of wave function –Particle in a one dimensional infinite potential well.

Free Electron Theory: Classical free electron theory- Sources of electrical resistance – Equation for electrical conductivity – Quantum free electron theory- Fermi level and Fermi – Dirac distribution– Bloch theorem -Kronig – Penny model (qualitative) Origin of bands in solids –Classification of solids into conductors, semiconductors and insulators.

UNIT – II

SEMI CONDUCTORS AND MAGNETIC MATERIALS :

Semiconductor Physics: Introduction – Intrinsic and extrinsic semiconductors carrier concentration in intrinsic and extrinsic semi conductors - Drift and diffusion currents Einstein's equation–Continuity equation-Hall effect-direct and indirect bandgap semiconductors.

Magnetic Materials : Introduction and basic definitions –Origin of magnetic moments –Bohr

magneton –Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials –Hysteresis –Soft and hard magnetic materials and applications

UNIT – III

CRYSTALLOGRAPHY AND X-RAY DIFFRACTION AND DEFECTS IN CRYSTALS:

Crystallography : Introduction–Space lattice–Unit cell–Lattice parameters–Bravias lattice crystal systems–Packing fractions of SC,BCC and FCC structures–Structures of NaCl and Diamond –Directions and planes in crystals–Miller indices –interplanar spacing in cubic crystals

X-ray diffraction and defects in crystals : X-ray diffraction–Bragg's law–Laue and Powder methods –Defects in solids : point defects, line defects (qualitative)-screw and edge dislocation, burgers vector.

UNIT – IV

LASERS AND ULTRASONICS

Lasers : Introduction – Characteristics of laser –Spontaneous and simulated emission of radiation-Einstein's coefficients–Population inversion–Excitation mechanisms and optical resonator–Ruby laser –He Ne laser–Semi conductor laser-Applications of lasers.

Ultrasonics : Introduction Production of ultrasonics by piezoelectric method and magneto striction method – Detection and Applications of Ultrasonics .

UNIT – V

FIBER OPTICS AND SUPERCONDUCTIVITY

Fiber Optics : Introduction-Construction and working principle of optical fiber–Numerical aperture and acceptance angle–Types of optical fibers–Attenuation and losses in fibers–Optical fiber communication system–Applications of optical fibers in communications, sensors and medicine

Superconductivity: Introduction–Meissner effect–properties of superconductors–Type I and II superconductors–Flux quantization–London penetration depth–ac and dc Josephson effects–BCS theory (qualitative)-–Applications of superconductors

Text Books and reference Books:

TEXT BOOKS

1.Engineering Physics	:	P. K. Palaniswamy	Scietech Publications
2. Engineering Physics	:	V.Rajendran and K.Tyagarajan	Tata Mc Graw Hill Publications – III Edition
3.Engineering Physics	:	R.K. Gaur and G.L.Guptha	Danapati Rai Publications

REFERENCE BOOKS

	1. Solid State Physics	:	A.J.Dekkar	Mcmillan Publications –Latest Edition 2012
	2.Engineering Physics	:	M.Arumugam	Anuradha Publications II Edition
	3.Applied Physics	:	Rama Chandra B & SubramanyamSV	Hitech Publications
	4. Solid State Physics	:	S.O.Pillai	New age International Publications
	5. Solid State Physics	:	Puri RK and Babbar VK	Chand & Co Publications
	6.Engineering Physics	:	M.N.Aaravindhanulu and P.G.Krishi sagar	Chand & CO Publications Revised Edition 2013

13SH1005 ENGINEERING CHEMISTRY

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 0 - 0
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Understand the electrochemical sources of energy
	CO2	Understand industrially based engineering materials
	CO3	Differentiate between soft and hard water
	CO4	Understand the disadvantages of using hard water and apply suitable treatments
	CO5	Understand the basics of polymers and their uses in engineering field

Course Content

UNIT – I ELECTRO CHEMISTRY

Single electrode potential – explanation and measurement-Reference electrodes: Hydrogen gas electrode-calomel electrode-glass electrode

Electrochemical cells-Numerical calculations-Batteries: Rechargeable cells and batteries (Lead-Acid storage cells, Al-Air Batteries)-Fuel Cells : Hydrogen - Oxygen fuel cell

Corrosion: Definition-classification-Factors affecting the corrosion-Prevention methods of corrosion – metallic coatings (Electroplating) and cathodic protection.

UNIT-II CHEMISTRY OF ENGINEERING MATERIALS

Electrical insulators: Definition-classification-Characteristics-Application of electrical insulating materials (solid, liquid and gaseous insulators)

Refractories: Classification-properties and applications

Lubricants: Lubricant -Lubrication-Theory of lubrication-Properties and applications of lubricants.

UNIT – III FUEL TECHNOLOGY

Classifications of Fuels -Characteristics of fuels -Calorific value – determination – Bomb calorimeter - Boys gas calorimeter - Theoretical calculation of calorific value.

Solid fuels-coal-analysis of coal - metallurgical coke

Liquid fuels: Petroleum – refining of petroleum - Synthetic petrol – Fischer Tropch's synthesis

Gaseous fuel – Flue gas analysis by Orsat's apparatus

	UNIT – IV WATER TREATMENT Impurities in water-Hardness of water-disadvantages of water-Estimation of hardness by EDTA method-Estimation of dissolved oxygen-alkalinity-chlorides in water Industrial use of water: For steam generation-troubles of boilers-scale and sludge-priming and foaming-caustic embrittlement-boiler corrosion Softening methods of hard water: Lime-soda process- Zeolite process-Ion exchange method **UNIT-V POYMERS** Introduction to polymers-Polymerization process-types of polymerization Elastomers: natural rubber – volcanization of rubber – compounding of rubber-Synthetic rubbers: preparation, properties and engineering applications of Buna – N, Neoprene, Thiokol and silicon rubbers Plastomers: Thermosetting and thermoplastics-Moulding constituents of plastics-Preparation, properties and engineering applications of PVC, Bakelite, Nylons and Urea-Formaldehyde.
Text Books and reference Books:	**TEXT BOOKS** **1.** Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, Foruth Edition, New Delhi **2.** A Text book of Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi **REFERENCES** 1. A Text Book of Enigneering Chemistry, Jain and Jain, DhanapathiRai Publications, New Delhi 2. Engineering Chemistry by K.B.ChandraSekhar, UN.Das and Sujatha Mishra, SCITECH Pubblications India Pvt Limited. 3. Concepts of Engineering Chemistry- AshimaSrivastavaf and N.N. Janhavi 4. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu 5. Chemistry of Engineering Materials, C.V.Agarwal, C.Parameswaramurthy and Andranaidu 6. Text Book of Engineering Chemistry, Shashichawla, Dhanapathirai Publications

13CS1001 C PROGRAMMING & DATA STRUCTURES

Course category:	Program core	**Credits:**	8
Course Type:	Theory	**Lecture - Tutorial - Practical:**	4 - 0 - 0
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Describe fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
	CO2	Analyze and solve programming problems using a procedural and algorithmic approach with functional decomposition.
	CO3	Apply knowledge of computing and mathematics using simple data structures.
	CO4	Develop skill to use pointers, memory allocation and data handling through files in 'C'.
	CO5	Understand the process of compiling, linking, and running a program using a computing tool.

Course Content

UNIT – I

Algorithms, flow charts, Program Development Steps, **Introduction To C Language**: Basic Structure of C Program, Identifiers, Basic data types, Variables, Operators. Operator Precedence and Associativity, Expression Evaluation, Type conversions.

Selection Statements: Various forms of if statements, switch statement, **Iteration**: while, do-while, for statements, other control altering statements– break, continue, goto and exit.

UNIT – II

Arrays: Declaration, initialization, accessing elements, storing elements, two-dimensional and multi-dimensional arrays, applications of arrays.

Strings– Declaration, initialization, Built-in and user-defined String handling Functions

Functions: Basics, call by value and reference, recursive functions, Scope rules.

UNIT – III

	Storage Classes: auto, register, static, extern. Type qualifiers, Pre-processor Directives. **Pointers**: Initialization of pointers, Address Arithmetic, Dynamic memory allocation functions, array of pointers, pointers to functions, command–line arguments. **Structures**: Declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, pointers to structures, self-referential structures, unions, bitfields. **UNIT – IV** **Data Structures**: Overview of Data Structures, Linked lists – implementation of Operations in singly linked list, **Stacks & Queues**: Basic Operations, representations of stacks and queues using arrays and linked lists, Applications. **UNIT –V** **Graphs And Trees**: Representation and Traversals. **Searching And Sorting**: Sorting- selection sort, bubble sort, insertion sort, quick sort, merge sort. Searching – linear and binary search methods.
Text Books and reference Books:	**TEXT BOOKS** 1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning. 2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Ed. **REFERENCE BOOKS** 1. The C programming language: Kernighan B W and Ritchie D M. 2. An Introduction to Data structures with applications: Tremblay J P and Sorenson P G.

13ME1001-ENGINEERING GRAPHICS

Course category:	Program core	**Credits:**	6
Course Type:	Theory	**Lecture - Tutorial - Practical:**	1 - 0 - 3
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Ability to create geometric constructions, conics with hand tools to draw lines,polygons,circle,tangencies,conic sections and irregular arcs
	CO2	Ability to sketch the solutions to the problems on projection of points, line and planes ,traces and make auxiliary view sketches
	CO3	Ability to sketch the solutions to the problems on projection of solids and make sectional view sketches.
	CO4	Ability to sketch the solution to the problems on development of solids and intepenetration of solids.
	CO5	Able to sketch the isometric views and converting 2D objects to 3D objects

Course Content

UNIT – I

Conics: General Methods- Ellipse, Parabola and Hyperbola- Ellipse: Special methodsConcentric Circles method, Oblong method and Foci method-Parabola: Tangent method , Rectangle method-Hyperbola.
Cycloidal Curves: Cycloids, Epi and Hypo Cycloids- Involute.

UNIT – II

Projections: Principles of Projection- First angle Projection, Projection of points and Lines.
Projections of Planes: Projections of Planes, Projection on Auxiliary vertical and inclined planes.

UNIT – III

Projections of Solids: Projections of simple Solids such as Prisms, Pyramids, Cylinders and Cones with varying positions of their Axes.
Sections of Solids: Sections of Solids such as Cubes, Prisms, TetraHedron, Pyramids, Cylinders and Cones resting on their bases on H.P only- true shape of Sections.

UNIT-1V

Development of Surfaces: Development of Laternal Surfaces of Right regular Solids such as

	Prisms, Pyramids, Cylinders and Cones which are cut by a plane inclined to H.P only. **Interpenetration of Solids:** Square Prism in a Square Prism and Cylinder in a Cylinder. **UNIT-V** **Isometric Projections:** Isometric Projections and views of objects. (treatment to only Isometric Lines). **Orthographic Projections:** Conversion of Pictorial views into Orthographic views.
Text Books and reference Books:	**Text Books:** 1. P Kannaiah and K L Narayana " A text book on Engineering Drawing" Scitech Publications Pvt Ltd 2. N D Bhatt and V M Panchal "A text book on Engineering Drawing" , Charotar Publishing house Ltd. **Reference Books:** 1. K Venu Gopal "A text book on Engineering Drawing and Graphics + Auto CAD"

13SH10P1 ENGLISH LANGUAGE LABORATORY

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	0 - 0 - 3
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Comprehends confidently and respond appropriately to the speech of multiple speakers
	CO2	Express ideas and views without any hesitation
	CO3	Communicate and converse with general clarity using proper pronunciation which allow for overall intelligibility.
	CO4	Narrate with ease logically and gracefully
	CO5	Comprehend information in data and represent in pictorial format and graphs

Course Content

I. Listening Skills:
- Listening for Pleasure
- Listening for Details
- Listening for Information

II. Speaking Skills:
- Introducing Themselves
- Phonetics
    1. Introduction of Sounds- Vowels & Consonants
    2. Syllables
    3. Inflections
    4. Stress & Intonation
- Jam
- Extempore
- Role Plays/ Situational Dialogues & Telephonic Conversations
- Presentations
- Debates

III. Reading Skills:
- News Paper Reading

IV. Writing Skills:
- Story Writing
- Description
    1. Object

	2. Place 3. Person 4. Situation • Information Transfer • Giving Directions & Instructions • Email Writing

13ME101P WORKSHOP

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	0 - 0 - 3
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Able to explain the different tools of usage in carpentry and fitting sections.
	CO2	Able to gain the basic knowledge in the manufacturing process of metal forming ,casting process & usage of tools in their respective sections.
	CO3	Able to make the circuits of household wiring.
	CO4	Able to explain the different tools which are using in machine shop, welding shop and black smithy.
	CO5	Students are expected to learn the physical recognition of different electrical components like Resistances, Inductances, Capacitances and their ratings. And, gain the knowledge of computer peripherals working, sharing& power point presentation.

Course Content

CARPENTRY

1. Planning sawing and grooving
2. Half lap joint
3. Half Lap Dovetail Joint
4. Mitre Faced Bridle Joint
5. Mortise and Tenon Joint

FITTING

Straight fitting

1. V-fitting
2. Square fitting
3. Semi-circular fitting
4. Dovetail fitting

FOUNDRY

1. Stepped block
2. Dumb bell
3. Flanged pipe

TINSMITHY

1. Square tin
2. Circular tin
3. Funnel

DEMO

(a) Metal cutting

	(b) Welding (c) Black smithy ELECTRICAL WIRING 1. (a) One lamp controlled by one switch (b) Two lamps controlled by one switch in Series and Parallel (c) Two lamps controlled by one switch in Series and Parallel combinedly 2. (a) Two lamps controlled by two switches independently (b) One lamp controlled by two two-way switched (staircase connection) IT WORK SHOP 1. Assembling a desk top computer 2. Connecting two computers using wire and without wire 3. Preparation of a power point presentation ELECTRONICS 1. (a) Identification of components (b) Calculation of values of components like (i) Resistance (ii) Capacitance (iii) Inductance 2. Soldering Practice 3. Operation of CRO (a) Measurements of Parameters (b) Lijjajous Figure

13CS10P1 PROGRAMMING LABORATORY

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	0 - 0 - 3
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	C is widely used for "system programming",
	CO2	Is used for implementing operating systems applications
	CO3	Is used for implementing embedded system applications
	CO4	C is sometimes can be used as an intermediate language by implementations of other languages
	CO5	C has also been widely used to implement end-user applications

Course Content

1) Write a C program to implement the following
   i) Convert Centigrade to Fahrenheit and vice versa (f=(9/5)*c+32)
   ii) Sum of the n natural numbers ((n(n+1))/2)
   iii) Sum of the squares of the n natural numbers ((n(n+1)(2n+1))/6)
   iv) Slope and midpoint of line using its end points (slope = (y2-y1)/(x2-x1),midpoint -> x=x1+x2/2, y=y1+y2/2)
   v) Quotient and remainder based on two integers i and j. (q = i/j, r = i-q*j)
   vi) Area and circumference of a circle (πr2& 2πr)
2) Compute all possible roots of a quadratic equation of the form ax2+bx+c=0.
3) Write a C program to arrange three numbers in ascending order using
   i) Ternary operator
   ii) if statement .
4) Write a C program to
   i) Find the grade of a student by reading marks
   ii) Convert the given digit into word.
5) Write a C program to implement the arithmetic operations (+,-,*, %) using switch case statement.

	6) Write a C program to find the i) Factorial of a number ii) G.C.D of two numbers. 7) Write a C program to i) To find the sum of individual digits of a given number ii) Reduce the number to a single digit. 8) Write a C program to print i) Prime numbers from 1 to n ii) Pascal triangle. 9) Write a C program to find i) The largest and smallest number in a list of integers ii) Sum of 1! +2! +3! +-----+n! using while loop. 10) Write a C program to evaluate 1-1/2! +1/3!-1/4! +-----+1/n! using for loop. 11) Write a C program to implement Fibonacci series using do while loop. 12) Write a C program to evaluate the sum of series $1+x/1! +x^2/2! +x^3/3!...n!$. 13) Write a C program to implement the following i) Length of the given string ii) Reverse of the given string iii) Copy one string into another iv) Comparison of two strings v) Concatenation of strings vi) String handling functions (any five) 14) Write a C program to check whether the given string is a palindrome or not. 15) Write a C program to implement i) Matrix addition ii) Matrix multiplication. 16) Write a C program to implement factorial of a given number using recursion. 17) Write a C program to implement i) Employ salary calculation ii) Student percentage Calculation.

	18) Write a function that returns a union with values of say Basic, DA, HRA etc. at different times based on the argument passed. Compute the salary of the employee in main function after calling the above function repeatedly. 19) Write a C program to implement pointer arithmetic. 20) Write a C program for i) Call by value ii) Call by reference. 21) Write a C program to find minimum and maximum values in a given array using pointers. 22) Write a C program to display i) Five arguments from command line arguments ii) Addition of two numbers using command line arguments. 23) Write a C program to implement stacks using arrays. 24) Write a C program to implement Single Liked List operations. 25) Write a C program to i) Convert infix to postfix expression. ii) Evaluate Postfix expression. 26) Write a C program to implement i) Linear search ii) Binary search. 27) Write a C program to implement i) Bubble sort ii) Selection sort. Write a C program to implement Single Liked List operations.

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY :: VIDYANAGAR

(AUTONOMOUS)

CIVIL ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the batch admitted in the academic year 2013-2014)

II YEAR OF FOUR YEAR B.TECH. DEGREE COURSE – I SEMESTER

S.No.	Course Code	Course Title	Contact Hours/ Week			Cred-its	Evaluation							
							Sessional Test-I		Sessional Test-II		Total Sessional Marks (Max. 40)	Semester End Examination		Max. Total Marks
		THEORY	L	P	T		Duration In Hours	Max. Marks	Duration In Hours	Max. Marks		Duration In Hours	Max. Marks	
1	13SH2102	Computational Techniques, Statistics and Complex Analysis	3	-	1	4	2	40	2	40	0.8(Better of two sessional tests) + 0.2(Other)	3	60	100
2	13CE2101	Engineering Mechanics	3	-	1	4	2	40	2	40		3	60	100
3	13CE2102	Fluid Mechanics - I	3	-	1	4	2	40	2	40		3	60	100
4	13CE2103	Building Technology	4	-	-	4	2	40	2	40		3	60	100
5	13CE2104	Surveying – 1	3	-	1	4	2	40	2	40		3	60	100
6	13CE2105	Engineering Geology	4	-	-	4	2	40	2	40		3	60	100
		PRACTICALS												
7	13CE21P1	Surveying Laboratory – I	-	3	-	2	-	-	-	-	Day-to-day Evaluation and a test	3	60	100
8	13CE21P2	Engineering Geology Laboratory	-	3	-	2	-	-	-	-		3	60	100
		TOTAL	**20**	**06**	**04**	**28**	-	-	-	-		-	-	**800**

VISION AND MISSION OF INSTITUTE

Vision:

- To emerge as a comprehensive Institute that provides quality technical education and research thereby building up precious human resource for the industry and society.

Mission:

- To provide a learner-centered environment that challenges individuals to actively participate in the education process.
- To empower the faculty to excel in teaching while engaging in research, creativity and public service.
- To develop effective skills enabling learners to pick up critical thinking thus crafting them to be professionally fit and ethically strong.
- To reach out industries, schools and public agencies to partner and share human and academic resources.

VISION AND MISSION OF CIVIL ENGINEERING DEPARTMENT

Vision:

- To promote excellence in civil engineering education, enrich research and provide quality professional service to the society in all areas of civil engineering.

Mission:

- To provide a learner-centered environment for students to gain comprehensive knowledge in civil engineering.
- To provide a learning experience that fosters an aptitude for research.
- To provide graduates with contemporary skills and tools required to excel in civil engineering profession or alternate fields. To produce graduates to serve within the constraints of complex needs of the society with high integrity.

PROGRAMME EDUCATIONAL OBJECTIVES OF THE DEPARTMENT

PEO 1: Graduates will be proficient in the fundamental knowledge of basic science, engineering science including mathematical and computational skills appropriate for civil engineering.

PEO 2: Graduates will be successful practicing engineers in civil engineering and allied fields or alternate careers using their technical knowledge, teamwork, communication skills and leadership qualities.

PEO 3: Graduates will be innovative problem solvers within the realistic constraints of economic, environmental, social, political, health, safety and sustainability impacts, and serve the society as responsible professionals with integrity

PEO 4: Graduates will engage in lifelong learning within the profession or through higher studies.

PROGRAMME OUTCOMES OF THE DEPARTMENT

The programme outcomes are the skills and knowledge which the graduates have at the time of graduation:

a. An ability to apply knowledge of mathematics, science, and engineering.
b. An ability to design and conduct experiments, as well as to analyze and interpret data
c. An ability to design an engineering system, component, or process
d. An ability to identify, formulate, and solve engineering problems
e. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
f. A knowledge of contemporary issues.
g. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
h. An understanding of professional and ethical responsibility
i. An ability to function on multi-disciplinary teams
j. An ability to communicate effectively
k. To embark on a career as an entrepreneur or civil engineering project manager/ consultants thereby playing a very important role in society.
l. A recognition of the need to be successful in competitive examinations, and an ability to engage in lifelong learning

13SH2102-COMPUTATIONAL TECHNIQUES, STATISTICS AND COMPLEX ANALYSIS

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	Mathematics	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Students will be able to understand the applications to the solution of partial differential equations, one dimensional wave equation, one dimensional heat equation and two dimensional Laplace equation to solve initial and boundary value problems in a physical situations satisfying the conditions.
	CO2	We are studying series solutions of differential equation because we want to study linear differential variable coefficients, Bessel functions and Legendre functions are occurring spherical symmetry and cylindrical symmetry.
	CO3	We are studying complex analytical functions because checking for analyticity is done by Cauchy Riemann equations, why these equations are important because their relation to the Laplace equation. Elementary complex functions are studying because their knowledge is useful for practical work.
	CO4	The complex integration is studying by us to evaluate certain integrals of real variable which are not solved by knowledge of integral calculus. Explaining about Cauchy's integral theorem and Cauchy's integral formulas useful because it tells the existence of higher derivatives of an analytic function The topic Taylor's and Laurent's series are useful because we can write every analytic function can be written as power series.
	CO5	Understanding effectively the Z Transformations of standard functions and their properties. Understanding effectively, convolution theorem and also the applications of Z transforms to difference equations.

Course Content

UNIT – I

ROOTS OF NON-LINEAR EQUATIONS: Bisection – False position – Iteration – Newton-Raphson Methods.

INTERPOLATION: Newton's forward and backward interpolation formula and Lagrange's interpolation.

UNIT – II

SOLUTION OF SIMULTANEOUS LINEAR AND NON-LINEAR ALGEBRAIC EQUATIONS: Iteration methods – Gauss Jordon – Gauss Elimination with Pivotal condensation – Triangular Factorization method- Gauss-Seidal method – Newton- Raphson methods.

	UNIT – III **NUMERICAL DIFFERENTIATION AND INTEGRATION:** First and Second Derivatives at given points by Newton's formula – Maxima and Minima of a tabulated function. Trapezoidal rule, Simpson's 1/3 rule and Simpson's 3/8 rule. **UNIT – IV** **PROBABILITY AND STATISTICS:** Introduction – Random experiments - Random variables – Discrete and Continuous distributions – Binomial, Poisson and Normal distributions **UNIT – V** **COMPLEX ANALYSIS:** Analytical functions – Cauchy - Riemann equation – Construction of Analytic function. Complex Integration – Cauchy's theorem – Cauchy's integral formula – Evaluation of integrals – Taylor's theorem and Laurent's theorem (without proof).
Text Books and reference Books:	**TEXT BOOKS:** 1. Higher Engineering Mathematics by B.S.Grewal, Kanna Publishers. 2. Higher Engineering Mathematics by H K Das et al., **REFERENCE BOOKS:** 1. Introductory methods of Numerical Analysis by S. S. Sastry. 2. Numerical Methods by E. Balagurusamy. 3. Engineering Mathematics-III by TKV Iyengar, S.Chand. Statistics – Schuam's Series.

13CE2101 – ENGINEERING MECHANICS

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	Engineering physics, Engineering Mathematics	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Determine the components of force in rectangular or non-rectangular coordinates, the resultant force and moment for a given system of forces
	CO2	Determine the support reactions on structures and analyze systems that include frictional forces.
	CO3	Locate the centroid of an area, calculate the second moment and principal second moment of an area
	CO4	Calculate the motion characteristics of a body subjected to a given force system
	CO5	Determine the deformation of a shaft (simple, tapered and compound) and understand the relationship between different material constants. Determine temperature stresses

Course Content

UNIT-I

STATICS: Introduction - units and dimensions - Law of mechanics, vectors, vectorial representation of forces and moments, vector operations. Coplanar and concurrent forces, resolution and composition of forces - Equilibrium of a particle - Equivalent systems of forces - Principle of transmissibility, single equivalent force, free body diagram- Types of supports and their reactions, equilibrium of rigid bodies in two dimensions.

UNIT – II

PROPERTIES OF SURFACES AND SOLIDS: Determination of areas and volumes - First moment of area and the centroid - second and product moments of plane area - Parallel axis theorems and perpendicular axis theorems - Polar moment of inertia - Principal moments of inertia of plane areas - Principal axes of inertia.

UNIT – III

FRICTION : Types of friction - limiting friction - Laws of friction - Static and dynamic friction - motion of bodies –Bolt drivers, open crossed and compound - length of belt, tension, tight side and slack side initial and centrifugal - Power transmitted and conditions for maximum power.

UNIT – IV

DYNAMICS: Displacement, velocity and acceleration, their relationship - Relative motion - Curvilinear motion - Newton's law of motion - Impact of elastic bodies - Moment of Momentum Equations - Work energy equation, D'Alemberts Principle and its uses, Impulse and Momentum.

	UNIT – V Concept of Stress and Strain - Elasticity and Plasticity - Hooke's law - Stress- Strain diagram - tapered bars, Compound bars - Poison's ratio - Volumetric strain - relation between elastic constants - temperature stresses - factor of safety - ductile and brittle materials under compression- endurance limit.
Text Books and reference Books:	**TEXT BOOKS:** 1. Engineering Mechanics by Timoshenko, Young and Baskar Rao. 2. Engineering Mechanics by Shames & Rao 3. Engineering Mechanics by Bhattacharya. **REFERENCE BOOKS** 1. Engineering Mechanics by F L Singher. 2. Engineering Mechanics by J L Merium. 3. Engineering Mechanics And statistics by PB Beer & E R Jhostan.

13CE2102 - FLUID MECHANICS - I

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	Engineering Mathematics-II	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	To be able to solve problems involving fluid properties and shear forces resulting from Newtonian fluids.
	CO2	To be able to calculate the magnitude and location of hydrostatic forces on flat plates and curved surfaces. Also be able to determine Metra-centric hieght of the floating bodies
	CO3	Be able to describe and interpret the behavior and performance of fluid in motion.
	CO4	To be able to assess the validity of Bernoulli's Equation for various fluid systems. To be able to determine the pertinent fluid properties from measurements taken by a pitot tube and to be able to determine the discharge using flow measuring devices.
	CO5	Be familiar with dimensional analysis of fluid problems. Be able to apply similitude and modelling principles and techniques to solve problems in hydraulics

Course Content

UNIT – I

FLUID PROPERTIES : Definition of a fluid – Density, Specific weight, Specific volume, Specific gravity – Viscosity – Bulk modulus of elasticity – Vapour pressure – Surface tension and capillarity – Continuum.

UNIT – II

FLUID STATICS : Pressure at a point – Absolute and guage pressures – Pascal's and Hydrostatic laws – Pressure measurement – Manometers and mechanical gauges – Hydrostatic thrust on plane and curved surfaces – Buoyancy and flotation –Metacentric height.

UNIT – III

FLUID FLOW CONCEPTS: Flow characteristics – Velocity – acceleration – Types of flow – Streamlines, path lines, streak lines – stream function, velocity potential, flownet – circulation and Vorticity.

UNIT – IV

FUNDAMENTAL EQUATIONS: Continuity equation – Euler's equation of motion along a streamline – Bernoulli's equation –Linear momentum equation – Forces on a bend – Fixed and moving vanes – Moment of momentum equation – Torque on sprinklers.

	UNIT – V **FLOW MEASUREMENT**: Velocity measurement – Pitot tube – Pitot Static tube – Discharge measurement – Orifices and Mouth pieces – Venturimeter, Nozzlemeter, Orificemeter, Notches and Weirs. **DIMENSIONAL ANALYSIS AND SIMILITUDE:** Dimensional homogeneity – Methods of dimensional analysis – Model investigations – Similitude – Dimensionless numbers – Model laws – Undistorted and distorted models – Scale effects.
Text Books and reference Books:	**TEXT BOOKS:** 1. Hydraulics and Fluid Mechanics by P.N.Modi and S.M.Seth. 2. Fluid Mechanics & Hydraulic Machines by A K Jain. 3. Fluid Mechanics & Hydraulic Machines by R.K Bansal. **REFERENCE BOOKS:** 1. Fluid Mechanics by V.L. Streeter and E. Benzamine Wylie. 2. A Text Book of Fluid Mechanics by Rajput R.K. **3.** Engineering Fluid Mechanics by K.L.Kumar.

13CE2103 - BUILDING TECHNOLOGY

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Understand the characteristics of the natural building materials, bricks and tiles.
	CO2	Understand the characteristics of various types of cements of, special material and laboratory testing of common building materials.
	CO3	Understand the terminology in the general building construction and construction practices using stone and brick.
	CO4	Understand and recognize types of frames structures and various building compounds.
	CO5	Understand and apply various types of building finishes.

Course Content

UNIT – I

BUILDING MATERIALS -I: Stones: Uses – Natural bed – Qualities of good building stones – common building stones of India – Bricks: Composition of good brick earth – Harm full ingredients – Manufacture of bricks – Classification of bricks – Size and shape – Aggregate – Sand – Tiles – Wood.

UNIT – II

BUILDING MATERIALS–II: Ordinary and Special Cements – Plain & Reinforced Cement Concrete – Concrete and Mortar Admixtures – I.S.I. Standards and Laboratory Testing of Building Materials – Bricks, Stones, Aggregate, Sand and OPC – Modern renovation materials: Cement bound – polymer cement bound and pure polymer bound materials – their properties & uses.

UNIT – III

BUILDING STRUCTURES–I: Types of foundation – Definitions of terms used in Stone and brick masonry – stone masonry: Classification – Supervision – Dressing – Brick masonry: Types of bonds – Defects in brick masonry– Brick Laying – Damp proof course – plinth beam – types of flooring.

UNIT – IV

BUILDING STRUCTURES–II: Types of Framed Structures – lintels – arches – sunshades – Types of roofs and roof coverings – Staircases – Form works – doors – windows.

UNIT – V

	BUILDING FINISHES: Plastering and Pointing – Color Washing – Distempers – Painting and Varnishing: Characteristics – Ingredients – Types – Painting and Varnishing on Different Surfaces – Water Supply and Sanitary arrangements – Electrification and Weather proof Courses.
Text Books and reference Books:	**TEXT BOOKS:** 1. Building Construction by B.C. Punmia. 2. Building Construction by Sushil Kumar. 3. Materials of construction by RC Smith. **REFERENCE BOOKS:** 1. A Text Book of Building Construction by S.K. Sharma & B.K.Kaul. 2. Building Materials by Gurucharan Singh. 3. Concrete Technology by M. S. Shetty.

13CE2201 – SURVEYING I

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Mathematics**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Understand basic principles of land surveying. Be able to apply chain surveying principles to book observations and make necessary calculations.
	CO2	Understand various methods of angle measurement. Be able calculate bearings, magnetic dip and declination. Be able to plot survey using a prismatic compass. Be able to calculate errors in compass survey.
	CO3	Understand the fundamentals of plane table surveying. Apply various methods of plane tabling and be able plot plane table survey with correction for errors.
	CO4	Understand fundamental principles and techniques of leveling and different types of level instruments. Use leveling principles to draw profiles, longitudinal sections, cross-sections and contours.
	CO5	Be able to calculate areas and volumes form survey data using mathematical principles.

Course Content

UNIT – I

BASIC CONCEPTS: Surveying Definition – Classification – Principles of Surveying – Measurements – Basic Measurements and methods – Plan and map – Scales used for Maps and Plans.

CHAIN SURVEYING: Principles of Chain Surveying – Basic Definitions – Well Conditioned Triangle; Selection of Survey Stations and Survey Lines – Field work – Recording Measurements – Types Cross – Staff – Instruments for setting out right angles – line ranger CrossStaff Survey – Obstacles in Chain Survey .

UNIT – II

COMPASS SURVEYING: Traversing – Meridians – Azimuth – Bearings – Magnetic Dip and Declination – Prismatic compass – Compass Traverse – Local attraction – Plotting of a survey work; Errors in Compass Surveying – Limits of accuracy.

	UNIT – III **PLANE TABLE SURVEYING**: Plane table and its accessories – setting up – Plane tabling – radiation – traversing – intersection and resection methods – Resection by trial and error method – Graphical method – Tracing paper method – Lehmann rules – Errors in plane tabling. **UNIT-IV** **LEVELLING:** Basic definitions – Curvature and Refraction – Different methods of leveling – Classification of direct leveling methods – Levels – Dumpy level – Tilting level – Auto level – Levelling staff – Level field book – Profile leveling – Cross sectioning – Reciprocal leveling – Sources of errors in leveling – Degree of Precision. **CONTOURING**: Methods of representing relief – contouring – contour interval – Characteristics of contours – Methods of locating contours – Direct and indirect methods of contouring – Interpolation and sketching of contours – Location of a contour gradient – Uses of contour maps. **UNIT – V** **AREAS AND VOLUMES:** Computation of areas from field notes and plotted figures.areas of figures at boundaries by Midordinate rule – Trapezoidal rule – Average ordinate rule – Simpson's 1/3 rd rule. Computation of straight volumes of Level Section using Trapezoidal and Prismoidal rules. Computation of volumes of Borrow Pits by Spot Levels and Reservoirs by contours.
Text Books and reference Books:	**TEXTBOOKS:** 1. Surveying by Dr. K. R. Arora. 2. Surveying by Dr. B. C. Punmia. 3. Surveying by Dr. C. Venkatramaiah. **REFERENCE BOOKS:** 1. Surveying and Levelling by S.S.Bhavikatti. 2. Surveying and Levelling by T.P.Kanetkar and S.V.Kulkarni. 3. Plane Surveying by AM Chandra

13CE2105 - ENGINEERING GEOLOGY

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Understand the surface geological processes and importance of geology in Civil engineering.
	CO2	Understand and identify various types of minerals.
	CO3	Understand and identify various types of rocks.
	CO4	Understand the elements of structural geology.
	CO5	Apply the geology concepts in major civil engineering projects and understand general geological disasters.

Course Content

UNIT – I

PHYSICAL GEOLOGY: Introduction to geology and its various branches – Role of Earth Science in Civil Engineering Operations.
Processes acting at the surface of the earth – Volcanism, Geological action of wind, glaciers, rivers and oceans – Rock weathering.

UNIT – II

MINEROALOGY: Study of various properties for the identification of minerals – Study of minerals like Quartz and its varieties. Feldspars, Garnet, Mica, Olivine, Hornblende, Augite, Calcite, Talc, Kyanite, Bauxite and Clay minerals.

UNIT – III

PETROLOGY: Origin and formation of rocks – Classification of rocks – Igneous, Sedimentary and Metamorphic rocks – Their textures and structures – Study of rocks like Granite, Gabbro, Dolerite, Basalt, Breccia, Conglomorate, Sand Stone, Limestone, Laterite, Quartzite, Schist, Gneiss, Marble, Slate.

UNIT – IV

STRUCTURAL GEOLOGY: Elements of structural geology like strike – dip – outcrop – Study of folds – joints – faults and their importance in civil engineering works.

	UNIT – V **APPLIED GEOLOGY:** Geology of dams – reservoirs – tunnels and land slides – Earthquakes – Groundwater exploration – Rock as a construction materials.
Text Books and reference Books:	**TEXT BOOKS:** 1. A Text Book of Engineering and General Geology by Prof P. Parbin Singh 2. A Text book of Geology by Mukherjee P.K. 3. A Text Book of Engineering Geology by N.Chennakesavulu **REFERENCE BOOKS:** 1. Principles of Engineering Geology and Geotechnics by Krynine & Judd 2. Geology for Engineering by Blyth &De Freitaus 3. Fundamentals of Engineering Geology by F.H.Bell 4. Principles of general & engineering Geology by K.N. Bangar. 5. A text book of Geology by G.B. Mahapthra.

13CE21P1 - SURVEYING LABORATORY – 1

Course category:	Program core	**Credits:**	2
Course Type:	Theory	**Lecture - Tutorial - Practical:**	0 - 0 - 3
Prerequisite:	**SURVEYING I**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to measure the Horizontal distances and offsets.
	CO2	Be able to locate topographical features by conducting chain traversing.
	CO3	Be able to calculate the area of given field.
	CO4	Be able to determine the directions of various objects.
	CO5	Be able to determine the elevations of various points & to operate various minor instruments.

Course Content

EXERCISE – 1

A) To measure distance between two points using direct ranging.

B) To set out perpendiculars at various points on given line using cross staff, optical square and tape.

EXERCISE-2

To locate topographic features using chain, cross-staff and tape.

EXERCISE -3

To determine the distance between two inaccessible points using chain/ tape and compass.

EXERCISE -4

Measurement of bearings of the sides of a closed traverse and adjustment of closing error by Bowdich method.

EXERCISE -5

To locate points using radiation and intersection method of plane table.

EXERCISE -6

To determine the distance between inaccessible points using Plane Table.

	EXERCISE- 7 To determine difference in elevation between two points using fly leveling using HI and Rise and fall methods. **EXERCISE -8** To conduct profile leveling for water supply/sewage line and to draw the longitudinal section to determine the depth of cut and depth of filling for a given formation level. **EXERCISE -9** Demonstration of minor instruments – Clinometer. Ceylon ghat tracer. Hand Level; Box sextant, Planimeter and Pantagraph.

13CE21P2 - ENGINEERING GEOLOGY LABORATORY

Course category:	Program core	**Credits:**	2
Course Type:	Theory	**Lecture - Tutorial - Practical:**	0 - 0 - 3
Prerequisite:	Engineering Geology	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

	CO1	Categorize the various landforms of the Earth surface.
	CO2	Identify the minerals and rocks using basic geologic classification systems.
	CO3	Comprehend the elements of structural geology.
	CO4	Study the structural elements of subsurface strata.
	CO5	Interpret various types of geological maps.

Course Content

List of Experiments.

1. Study of(physical) properties of minerals
2. Identification of minerals
3. Identification of Rocks
4. Study of Dipping beds and their thickness
5. Study of true dip, apparent dip and strike direction of beds
6. Three point problem or Borehole problem
7. Study of geological maps of
    - i. Horizontal beds
    - ii. Dipping beds
    - iii. Dipping beds with dyke
    - iv. Folded beds
    - v. Faulted beds
    - vi. Beds with unconformity
    - vii. Completion of out crop
8. Study of geological models
9. Aqua meter- Demonstration

Text Books and reference Books:	**TEXT BOOKS/LAB MANUALS:** 1. A Laboratory manual of Engineering Geology by N.Chennakesavulu 2. Geological Maps. Gokale. **REFERENCE BOOKS:** 1. Fundamentals of Engineering Geology by F.H.Bell 2. Principles of general & engineering Geology by K.M. Bangar.

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY :: VIDYANAGAR

(AUTONOMOUS)

CIVIL ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the batch admitted in the academic year 2013-2014)

II YEAR OF FOUR YEAR B.TECH. DEGREE COURSE – II SEMESTER

S. No.	Course Code	Course Title	Contact Hours/ Week			Cred-its	Evaluation							
							Sessional Test-I		Sessional Test-II		Total Sessional Marks (Max. 40)	Semester End Examination		Max. Total Marks
		THEORY	L	P	T		Duration in Hours	Max. Marks	Duration in Hours	Max. Marks		Duration in Hours	Max. Marks	
1	13CE2201	Strength of materials	3	-	1	4	2	40	2	40	0.8(Better of two sessional tests) + 0.2(Other)	3	60	100
2	13CE2202	Fluid Mechanics - II	3	-	1	4	2	40	2	40		3	60	100
3	13CE2203	Soil Mechanics	3	-	1	4	2	40	2	40		3	60	100
4	13CE2204	Transportation Engineering - I	4	-	-	4	2	40	2	40		3	60	100
5	13CE2205	Building Planning & Drawing	1	3	-	4	2	40	2	40		3	60	100
6	13CE2206	Surveying - II	3	-	1	4	2	40	2	40		3	60	100
		PRACTICALS												
1	13CE22P1	Surveying Laboratory - II	-	3	-	2	-	-	-	-	Day-to-day Evaluation and a test	3	60	100
2	13CE22P2	Fluid Mechanics & Hydraulic Machinery Laboratory	-	3	-	2	-	-	-	-		3	60	100
		TOTAL	**17**	**09**	**04**	**28**								**800**

Note:- *Survey camp for a duration of 10 days to be conducted before the last day of instruction for II B.Tech, II – Sem. This shall be evaluated as part of Survey Laboratory –II.*

13CE2201 – STRENGTH OF MATERIALS

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	Engineering mechanics	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to calculate support reactions, shear forces and bending moments for various types of beams with different types of loading. Understand the relationship between loading, shear force and bending moment.
	CO2	Be able to derive the simple bending equation and use the equation to calculate bending stresses. Be able to calculate shear stresses. Understand the unsymmetrical bending and be able to calculate shear center for simple sections.
	CO3	Be able to calculate combined stresses in dams and retaining walls. Be able calculate load on columns.
	CO4	Be able to derive pure torsion equation and calculate shear stresses and power transmission in a shaft. Be able to design springs for various loading conditions.
	CO5	Be able to calculate hoop and longitudinal stresses in thin thick cylinders. Be able to calculate principal stresses and strains and stresses on any plane. Understand the theories of failure.
Course Content	**UNIT – I** **SHEAR FORCE AND BENDING MOMENT IN BEAMS:** Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads and combination of these loads – Point of contra flexure- Relation between S.F, B.M and rate of loading at a section of a beam. **UNIT – II** **FLEXURAL AND SHEAR STRESSES IN BEAMS**: Theory of simple bending – Distribution of flexural stresses and shear stresses – Resilience due to flexure and shear – Bending in unsymmetrical sections-Shear Centre.	

	UNIT –III **COLUMNS:** Stability of columns – Euler's theory – Various end conditions- Rankine's theory – Eccentrically loaded columns (without initial curvature). **DIRECT AND BENDING STRESSES:** Stresses under the combined action of direct loading and B.M. – Core of a section – Circular, rectangular and triangular (solid and hollow) – Determination of stresses in the case of retaining walls and dams. **UNIT – IV** **TORSION OF CIRCULAR SHAFTS**: Theory of pure torsion in solid and hollow circular shafts – Transmission of power – Combined bending – torsion and end thrust. **SPRINGS:** Types of springs – Close and open coiled helical springs under axial loads and axial couple – springs in series and parallel - Carriage or leaf springs. **UNIT – V** **CYLINDERS:** Thin cylinders subjected to internal fluid pressure – Thick cylinders – Lame's theorem - internal and external pressure – Compound cylinders **PRINCIPAL STRESSES:** Principal stresses and principal strains – Mohr's circle of stresses – Theories of failure
Text Books and reference Books:	**TEXT BOOKS:** 1. Strength of Materials by R.K.Rajput. 2. Strength of Materials by R.K. Bansal. 3. Strength of Materials by B.C Punmia. **REFERENCE BOOKS** 1. Mechanics of Structures Vol.I & Vol.II by S.B.Junnarkar. 2. Strength of Materials by Andrew Pytel and Ferdinand Singer. 3. Strength of Materials Vol.1 & Vol.11 by Timoshenko.

13CE2202 - FLUID MECHANICS – II

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	Fluid Mechanics – I	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Understand the concepts of laminar flow through pipes. Be able to determine velocity and shear profiles.
	CO2	Understand the concepts of turbulent flow through pipes. Be able to design pipe networks.
	CO3	Apply the boundary layer theory in analysis of flow through pipes.
	CO4	Be able to determine the characteristic of turbines.
	CO5	Be able to determine the characteristics of pumps.

Course Content

UNIT – I

FLOW THROUGH PIPES – VISCOUS FLOW: Relation between shear and pressure gradients – Laminar flow through circular pipes – Velocity distribution in laminar flow – Hagen – Poiseuille equation – Flow between parallel plates.

UNIT – II

FLOW THROUGH PIPES – TURBULENT FLOW: Velocity distribution in turbulent flow – Resistance of smooth and roughned pipes – Commercial pipes – Siphons – Pipes in series and parallel, branching pipes – pipe networks – Hardy Cross method.

UNIT – III

BOUNDARY LAYER: Description – Boundary Layer thickness – Formation of boundary layer over a flat plate- Separation of boundary layer – Boundary layer control.

FLOW AROUND SUBMERGED OBJECTS: Drag and lift – types of Drag – Drag on flat plate, Cylinders and airfoils, lift on airfoils, Magnus effect.

UNIT – IV

HYDRAULIC TURBINES : Classification – Work done and efficiency of Pelton Wheel, Francis and Kaplan Turbines – Draft tube – Performance – Unit quantities – Specific speed – Cavitation.

	UNIT – V **CENTRIFUGAL PUMPS:** Classification – Work done and efficiency – Multistage pumps – Specific speed – Characteristics
Text Books and reference Books:	**TEXT BOOKS:** 1. Fluid Mechanics and Hydraulic Machines by Rajput R. K. 2. Hydraulics and Fluid Mechanics by P.N.Modi and S.M.Seth. **REFERENCE BOOKS:** 1. A text book of Fluid Mechanics & Hydraulic Machines by R.K.Bansal. 2. Fluid Mechanics and Fluid Machines – S.K. Som & G.Biswas.

13CE2203 - SOIL MECHANICS

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	Engineering geology, Engineering Mechanics and Hydraulics	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Understand basic concepts of soil mechanics. Be able to make volume and weight calculations and draw phase diagrams. Be able to calculate the index properties. Understand the methods of grain size analysis. Be able to determine atterberg limits. Be able to classify a given soil.
	CO2	Be able to derive equations for permeability. Be able to calculate permeability. Be able to sketch flownets and make calculations from flownets. Understand the effective stress principle and be able to calculate effective stresses under different flow conditions.
	CO3	Understand and apply the concept of compaction for soils. Understand and apply the CBR test. Be able calculate vertical stresses at any point in the soil for various types of loadings. Understand the concept of pressure bulb.
	CO4	Understand the basics of soil consolidation and be able to derive Terzaghi's 1—D equation. Be able to calculate consolidation settlements.
	CO5	Understand Mohr-Coulomb failure criteria for shear strength. Be able to calculate the shear parameters from different types of tests and under different drainage conditions. Be able to calculate Skemptons pore pressure parameters and appreciate its practical relevance.
Course Content		**UNIT – I** **PHYSICAL PROPERTIES OF SOILS:** Soil as a 3-phase system –Fundamental relationships by volume and weight – Index properties of soils – Sieve analysis – Sedimentation analysis – Atterberg limits and density index. **IDENTIFICATION AND CLASSIFICATION OF SOILS**: Tests for field identification and classification of soils – Textural classification, Unified soil classification and Indian Standard classification systems. **UNIT – II**

	PERMEABILITY AND SEEPAGE: Permeability of soil – Laboratory and field determination – Seepage analysis – Elementary principles of flownets – Phreatic line in an Earth dam – Seepage through earth dam – Critical hydraulic gradient – Piping. **EFFECTIVE STRESS PRINCIPLES:** Effective & Neutral pressures. **UNIT – III** **SOIL COMPACTION:** Compaction of cohesive and cohesionless soils – Standard Proctor's test and Modified proctor's test – Field compaction – Compaction control – C.B.R. test and its use. **STRESS DISTRIBUTION IN SOILS:** Boussinesq's equation – Vertical stress due to line load, strip load, and uniformly loaded circular area – Newmark's chart – Westergard's approach – pressure bulb concept – Approximate methods. **UNIT – IV** **CONSOLIDATION**: Pressure – void ratio curve – Compression index – Coefficient of Compressibility – Modulus of volume change – Consolidation process – Consolidation settlement - Terzaghi's theory of one dimensional consolidation – coefficient of consolidation – Preconsolidation pressure – Normally consolidated and over consolidated soils. **UNIT – V** **SHEAR STRENGTH OF SOILS:** Shear strength of soil – Mohr' – Coulomb Failure Criteria – Measurement of shear strength – Direct shear, Unconfined compression and Triaxial compression tests – Vane Shear test - Shear strength parameters – Test conditions – Shear strength of cohesive and cohesionless soils – Drainage conditions – Pore pressure parameters.
Text Books and reference Books:	**TEXT BOOKS**: 1. Soil Mechanics and Foundation Engineering by K.R. Arora 2. Geotechnical Engineering by C. Venkatramaiah. 3. Soil Mechanics and Foundation Engineering by B.C.Punmia. **REFERENCE BOOKS:** 1. Basic and applied soil mechanics by A.S. Rao & Gopal Ranjan. 2. Geo Technical engineering by V.N.S.Murthy. 3. Numerical Problems, Examples and Objective Questions in Geotechnical Engineering by 4. Prof. A.V.Narasimha Rao and Prof. C.Venkatramaiah.

13CE 2204 TRANSPORTATION ENGINEERING – I

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Able to demonstrate the types and importance of transportation and fundamentals of traffic engineering.
	CO2	Able to carry out surveys involved in planning and highway alignment and to select the best alignment out of various alternatives.
	CO3	Able to design cross section elements of road, sight distance, horizontal alignment and vertical curves etc.
	CO4	Able to determine the characteristics of pavement materials.
	CO5	Able to design suitable pavement as per IRC and calculate the quantity as well as quality of materials required.
Course Content		**Unit - I** **HIGHWAY ENGINEERING:** Importance of transportation, modes of transportation, characteristics of road transport, classification of roads, Highway alignment, basic requirements, controlling factors, master plan and its phasing. **Unit - II** **GEOMETRIC DESIGN:** Important elements – cross section elements – pavement surface characteristics, camber, width of pavement, kerbs, road margins, formation width, right of way, sight distance – factors affecting sight distance – different situations Problems included . Horizontal alignment – Design speed, super elevation, extra widening, gradient and types – vertical curves. **Unit - III**

	HIGHWAY MATERIALS: Aggregates and Bitumen – desirable properties, tests and specifications, Desirable properties of bitumen – aggregate mixes **Unit - IV** **PAVEMENT DESIGN**: Types, components and their functions, Design factors, Design of flexible pavements – Group index method and IRC method based on CBR value. **DESIGN OF RIGID PAVEMENTS -** Wester gaard's equations, IRC recommendations for design of concrete pavement slab, Types of joints, joint filler materials, joint sealer materials **Unit - V** **CONSTRUCTION AND MAINTENANCE OF ROADS**: Construction and maintenance of WBM, Bituminous and concrete roads. **HIGHWAY DRAINAGE:** Importance, surface and sub-surface drainage methods
Text Books and reference Books:	**TEXT BOOKS:** 1. Highway Engineering by Khanna, S.K. and Justo C.E.G. 2. Principles and Practice of Highway Engineering by Dr. L.R.Kadiyali. **REFERENCE BOOKS:** 1. Guidelines for the Design of Flexible Pavements, IRC:37-1984. 2. Guidelines for the Design of Rigid Pavements for Highways, IRC:58-1988. 3. Principles, Practice and Design of Highway Engineering by S.K. Sharma. 4. A course in Highway Engineering by S.P. Bindra. **5.** Transportation Engineering, Vol. I by Vazirani and Chandola.

13CE2205 - BUILDING PLANNING AND DRAWING

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	1 - 3 - 0
Prerequisite:	**Building Technology**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Understand the terms in building drawing, and able to apply the NBC standards in building drawing.
	CO2	Be able to plan various types of buildings.
	CO3	Be familiar with plan approval procedure.
	CO4	Be able to draw various components of buildings.
	CO5	Be able to prepare detailed drawings of a two story building.

Course Content

Part-A (Theory)

INTRODUCTION: Terms used in building drawing as per NBC – Factors affecting in selection of site – Functional requirements of a residential building – Minimum size requirements as per NBC - Standard sizes of Door, Windows and ventilators

PLANNING: Principles of planning – Factors to be considered in Planning – Planning of residential , office , school and hospital buildings– Preliminaries of vaastu.
Municipal bye-Law – List of documents to be submitted for building plan approval

Part-B (Drawing)

Standard conventional signs and symbols used in Civil Engineering Drawing – Bonds in brick masonry – Paneled and flush doors – Glazed windows – Steel Roof Truss

Preparation of Plan, Section and Elevation of simple residential buildings with flat roof not exceeding two storeys.

EVALUATION:

1. For University Examination, two out of three questions to be answered from Part–A (Theory) for 30 marks (i.e. 2x15=30). And one compulsory drawing question to be answered from Part-B (Drawing) for 30 marks (i,e.1x30=30)
2. For internal evaluation, a weightage of 20 marks out of a total of 40 marks to be given for day-to-day work.

Text Books and reference Books:	**TEXT BOOKS:** 1. Building Planning and Drawing by Dr. N. Kumara Swamy & A. Kameswara Rao 2. Building Planning Design and Scheduling by Gurucharan Singh & Jagadish Singh **REFERENCE BOOKS:** 1. Building Drawing by Shah M.H and Kale C.M. Civil Engineering Drawing & House planning by B.P.Verma.

13CE2206 - SURVEYING – II

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	Engineering Mathematics-I & II (I-year), Surveying-I (II-I)	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Use a theodolite for measurements in traverse and able to make all computations in traverse
	CO2	Be able to calculate elevation and distances using theodolite.
	CO3	Be able to set various types of curves in field.
	CO4	Be able to use a total station in surveying and understand the basics of GPS.
	CO5	Be able to apply the principles of photogrammetry in surveying.

Course Content

UNIT – I

THEODOLITE SURVEYING: Theodolite-Parts-Definitions-Fundamental Axes-Measurement of Horizontal Angles by Repetition And Reiteration Methods-Measurement of Vertical angles, direct angles and deflection angles-Prolonging a straight line- Traverse survey – Checks in traverse – Errors in theodolite traversing – Traverse Computations – Coordinate systems – Omitted measurements..

UNIT – II

TACHEOMETRY: Principle of stadia method – Tacheometric constants and their determination – Determination of distances and elevations of points by stadia and tangential methods – Tacheometric survey – Errors in stadia surveying.

UNIT – III

CURVES: Principles of simple and compound curves – Curve ranging – Offsets from long chord – Rankine's method one theodolite method–Two theodolite method – Reverse curve between parallel straights – Super elevation – Uses and characteristics of transition curve – Length of transition curve – Principles of compound curve – Types and elements of Vertical curves.

UNIT – IV

AERIAL SURVEY: Introduction – Types of Photographs – Vertical Aerial Photographs – Geometry – Scale – Ground coordinates from a vertical photograph –Photomaps and mosaics.

REMOTE SENSING: Definition – History – Physics of Remote Sensing – Electromagnetic Radiation – Interaction of Electromagnetic Radiation with Atmosphere, Earth Surface Features – Vegetation, Soils, Water

	UNIT – V **TOTAL STATION INSTRUMENT:** Introduction – Functions – performed – Parts – Handling and setting up a Total Station Instrument – Measuring horizontal angles – Deflection angles – Azimuths, Vertical or Zenith angles – Sights and Marks – Adjustments of Total Station Instruments and their accessories – Sources of Error in Total Station work. **GLOBAL POSITIONING SYSTEM:** Introduction – Overview of GPS – Reference Coordinate Systems for GPS – Fundamentals of GPS Positioning – Differential GPS. **GEOGRAPHICAL INFORMATION SYSTEM:** Basic Principles – Definition – Components – Data Structures – Functioning of GIS - Data Input –Data Base Management Systems.
Text Books and reference Books:	**TEXT BOOKS:** 1. Surveying and levelling Vol. II&III by B.C Punmia. 2. Surveying and Levelling Parts 1 & 2 by T.P. Kanetkar and S.V.Kulkarni. **REFERENCE BOOKS:** 1. Elements of Photogrammetry by P.R.Wolf. 2. Plane Surveying by A.M. Chandra. Elements of Geomatics by P.R.Wolf.

13CE22P1 - SURVEYING LABORATORY - II

Course category:	Program core	**Credits:**	2
Course Type:	Theory	**Lecture - Tutorial - Practical:**	0 - 0 - 3
Prerequisite:	Surveying, Surveying Laboratory	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Use the theodolite along with chain/tape, compass on the field.
	CO2	Apply geometric and trigonometric principles of basic surveying calculations.
	CO3	Use the Total station instrument in basic engineering works.
	CO4	Plan a survey, taking accurate measurements, field booking, plotting and adjustment of errors.
	CO5	Apply field procedures in basic types of surveys, as part of a surveying team.

Course Content

EXERCISE – 1

Measurement of horizontal angles by Repetition and Reiteration methods; Measurement of vertical angles.

EXERCISE -2

To determine the distance between two inaccessible points using theodolite.

EXERCISE-3

To determine the elevation of an object (i) when the object and the instrument are in the same plane and (ii) when they are in different planes.

EXERCISE -4

To determine the tacheometric constants.

EXERCISE -5

To determine the distance and gradient between two inaccessible points using stadia tacheometry..

EXERCISE -6

To determine the distance between two inaccessible points using tangential tacheometry

EXERCISE -7

To set out simple curve using linear methods – Perpendicular offsets from long chord.

	EXERCISE -8 To setout simple curve using Rankine's deflection angles method. **EXERCISE -9** Demonstration of Total Station Instrument and GPS Receiver. To determine height of remote object, horizontal distance and co-ordinates of points using Total Station Instruments.

13CE22P2 - FLUID MECHANICS & HYDRAULIC MACHINERY LABORATORY

Course category:	Program core	**Credits:**	2
Course Type:	Theory	**Lecture - Tutorial - Practical:**	0 - 0 - 3
Prerequisite:	Fluid Mechanics	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes		
	CO1	Calibration of Orifice and Mouthpiece
	CO2	Determination of efficiency of Notchs, Venturimeter and Orifice Meter
	CO3	Evaluate the Major and Minor losses in pipe network
	CO4	Evaluate the performance characteristics of pump
	CO5	Evaluate the performance characteristics of Turbine

Course Content

I. EXPERIMENTS ON CALIBRATION OF

a. Orifice
b. Mouth piece
c. Notch
d. Venturimeter
e. Orifice meter
f. Bend meter
g. Friction loss through a pipe
h. Gate valve
i. Bend loss
j. Sudden contraction
k. Sudden Expansion

II. EXPERIMENTS ON PERFORMANCE CHARACTERISTICS OF

a. Turbines
b. Pumps

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY :: VIDYANAGAR

(AUTONOMOUS)

CIVIL ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the batch admitted in the academic year 2013-2014)

III YEAR OF FOUR YEAR B.TECH. DEGREE COURSE – I SEMESTER

S. No.	Course Code	Course Title	Contact Hours/ Week			Credits	Evaluation							
							Sessional Test-I		Sessional Test-II		Total Sessional Marks (Max. 40)	Semester End Examination		Max. Total Marks
		THEORY	L	P	T		Duration in Hours	Max. Marks	Duration in Hours	Max. Marks		Duration in Hours	Max. Marks	
1	13CE3101	Structural Analysis - I	3	-	1	4	2	40	2	40	0.8(Better of two sessional tests) + 0.2(Other)	3	60	100
2	13CE3102	R.C.C. Structural Design – I	3	-	1	4	2	40	2	40		3	60	100
3	13CE3103	Steel Structural Design	3	-	1	4	2	40	2	40		3	60	100
4	13CE3104	Foundation Engineering	3	-	1	4	2	40	2	40		3	60	100
5	13CE3105	Transportation Engineering - II	4	-	-	4	2	40	2	40		3	60	100
6	13CE3106	Advanced Hydraulics	4	-	-	4	2	40	2	40		3	60	100
		PRACTICALS												
1	13CE31P1	Soil Mechanics Laboratory	-	3		2	-	-	-	-	Day-to-day Evaluation and a test	3	60	100
2	13CE31P2	Material Testing Laboratory	-	3		2	-	-	-	-		3	60	100
		TOTAL	**20**	**06**	**04**	**28**								**800**

VISION AND MISSION OF INSTITUTE

Vision:

- To emerge as a comprehensive Institute that provides quality technical education and research thereby building up precious human resource for the industry and society.

Mission:

- To provide a learner-centered environment that challenges individuals to actively participate in the education process.
- To empower the faculty to excel in teaching while engaging in research, creativity and public service.
- To develop effective skills enabling learners to pick up critical thinking thus crafting them to be professionally fit and ethically strong.
- To reach out industries, schools and public agencies to partner and share human and academic resources.

VISION AND MISSION OF CIVIL ENGINEERING DEPARTMENT

Vision:

- To promote excellence in civil engineering education, enrich research and provide quality professional service to the society in all areas of civil engineering.

Mission:

- To provide a learner-centered environment for students to gain comprehensive knowledge in civil engineering.
- To provide a learning experience that fosters an aptitude for research.
- To provide graduates with contemporary skills and tools required to excel in civil engineering profession or alternate fields. To produce graduates to serve within the constraints of complex needs of the society with high integrity.

PROGRAMME EDUCATIONAL OBJECTIVES OF THE DEPARTMENT

PEO 1: Graduates will be proficient in the fundamental knowledge of basic science, engineering science including mathematical and computational skills appropriate for civil engineering.

PEO 2: Graduates will be successful practicing engineers in civil engineering and allied fields or alternate careers using their technical knowledge, teamwork, communication skills and leadership qualities.

PEO 3: Graduates will be innovative problem solvers within the realistic constraints of economic, environmental, social, political, health, safety and sustainability impacts, and serve the society as responsible professionals with integrity

PEO 4: Graduates will engage in lifelong learning within the profession or through higher studies.

PROGRAMME OUTCOMES OF THE DEPARTMENT

The programme outcomes are the skills and knowledge which the graduates have at the time of graduation:

a. An ability to apply knowledge of mathematics, science, and engineering.
b. An ability to design and conduct experiments, as well as to analyze and interpret data
c. An ability to design an engineering system, component, or process
d. An ability to identify, formulate, and solve engineering problems
e. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
f. A knowledge of contemporary issues.
g. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
h. An understanding of professional and ethical responsibility
i. An ability to function on multi-disciplinary teams
j. An ability to communicate effectively
k. To embark on a career as an entrepreneur or civil engineering project manager/ consultants thereby playing a very important role in society.
l. A recognition of the need to be successful in competitive examinations, and an ability to engage in lifelong learning

13CE3101 - STRUCTURAL ANALYSIS –I

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 – 0
Prerequisite:	Engineering Mechanics (II – I) & Strength of Materials (II –II).	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Determine the slope and deflection of determinate beam under various loading conditions.
	CO2	Be able to determine the forces in plane trusses.
	CO3	Be able to calculate and draw SFD and BMD for propped and fixed beams.
	CO4	Be able to calculate and draw SFD and BMD for continuous beams using Clapeyron's theorem.
	CO5	Be able to calculate the deflections in beams and trusses using principles.

Course Content

UNIT – I

DEFLECTIONS: Relationship between curvature, slope and deflection (Differential equation for the elastic line of a beam) Slope and deflection of cantilevers and simply supported beams by integration method, moment area method and conjugate beam method for point loads, uniformly distributed loads.

UNIT – II

STATICALLY DETERMINATE PIN – JOINTED PLANE FRAMES: Computation of forces in simple and compound trusses using method of joints and method of sections – Tension coefficient method.

UNIT – III

STATICALLY INDETERMINATE BEAMS:
(i) Propped Cantilever Beams: Analysis of propped cantilevers for point loads uniformly distributed loads and couple – Shear force and bending moment diagrams.
(ii) Fixed Beams: Analysis of fixed beams with UDL, point loads, uniformly varying load, couple shear force and bending moment diagrams– Effect of sinking of supports.

	UNIT – IV **CONTINUOUS BEAMS**:- Introduction –Clapeyron's theorem of three moments – Analysis of continuous beams with constant moment of inertia with one or both ends fixed – continuous beam with overhang – continuous beam with different moment of inertia for different spans – Effect of sinking of supports – shear force and bending moment diagrams. **UNIT – V** **ENERGY THEOREMS**: Strain energy due to axial load, bending moment and shear force – Maxwell's, Betti's theorems – Castigliano's first theorem and unit load method – Deflection of simple beams and pin -jointed trusses.
Text Books and reference Books:	**TEXT BOOKS:** 1. Strength of Materials by R.K.Rajput. 2. Strength of Materials by R.K. Bansal. 3. Structural Analysis Vol. I & II by S. S. Bhavikatti. **REFERENCE BOOKS**: 1. Theory of Structures – Vol.I by S.P. Gupta, G.S. Pandit & R. Gupta. 2. Comprehensive structural Analysis Vols. I& II by R. Vaidanathan & P. Perumal. 3. Analysis of Structures Vol. I & II by V.N. Vazirani & M.N. Ratwani.

13CE3102 – R.C.C. STRUCTURAL DESIGN – I

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Strength of materials**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Understand the design principles, characteristics strength and loads, stress block concept and various limit states. Be able to design singly and doubly reinforced rectangular and flanged beams.
	CO2	Be able to carry out and present complete design and detailing of beams for shear, torsion and bond. Be able to carry out and present complete design and detailing of different types of slabs.
	CO3	Be able to carry out and present complete design and detailing of columns for various loading conditions.
	CO4	Be able to carry out and present complete design and detailing of different types of footing with axial load.
	CO5	Be able to carry out and present complete design and detailing of different types of stair cases. Be able to calculate the deflections and crack widths of beams**.**

Course content

UNIT – I

DESIGN PRINCIPLES: Basic Design Principles – Stress Strain curves of concrete and steel – Characteristic strengths and loads – Partial safety factors – Stress block – Various limit states.

DESIGN FOR FLEXURE: Limit state of collapse in flexure – Ultimate flexural strength – Balanced, Under and Over - reinforced sections – Design of singly and doubly reinforced rectangular beams – Design of flanged beams.

UNIT – II

DESIGN FOR SHEAR, TORSION AND BOND:Shear – Truss analogy – Design of beams for shear and torsion – Anchorage and development length.

DESIGN OF SLABS AND BEAMS: Design of one way and two way slabs- Design of stair cases – Design of continuous beams and slabs.

UNIT – III

DESIGN OF COMPRESSION MEMBERS: Columns – Reduction factors – Axially loaded, Eccentrically loaded columns – Uniaxial moment – Biaxial moment (Biaxial moment for practice only and not for University Examination).

UNIT – IV

DESIGN OF FOUNDATIONS: Types of footings- Design of Isolated (Square, Rectangular and Circular) footings subjected to axial load.

	UNIT – V **DESIGN OF STAIR CASE:** Types of staircase – specifications - design of doglegged stair case. **LIMIT STATES OF SERVICEABILITY:** Deflection (short and long term) – Cracking.
Text Books and reference Books:	**TEXT BOOKS:** 1. Comprehensive RCC Designs by Dr. B. C. Punmia, A. K. Jain &Arun Kumar Jain. 2. Limit State Design (IS 456: 2000) by N. Krishna Raju& R. N. Pranesh. **REFERENCE BOOKS**: 1. Reinforced Concrete Design by SN Sinha. 2. LSD of Reinforced concrete Structures by Ramchandra. 3. Reinforced concrete Design by Unni Krishna Pillai and DevdasMenon. 4. Limit State Theory and Design of Reinforced Concrete by S. R. Karve& V. L. Shah.

13CE3103 - STEEL STRUCTURAL DESIGN

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	Structural Analysis I,Engineering mechanics, Engineering Mathematics-I&II.	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to design riveted and welded connections.
	CO2	Be able to design tension and compression members.
	CO3	Be able to design laterally supported beams.
	CO4	Be able to design laterally unsupported beams like gantry girders.
	CO5	Be able to design slab bases, gusseted bases and grillage foundations.

Course Content

UNIT – I

INTRODUCTION: Properties of sections – Types of loads – Permissible stresses in tension, compression and shear as per IS code.

RIVETED CONNECTIONS: Types of Riveted Joints – modes of failure of riveted joints – Strength and efficiency of rivet – Strength of lap and butt joints – Design of riveted joints – Design of bracket connections (Beam to column and Beam to beam connections).

WELDED JOINTS: Types of welded joints – Strength of fillet and butt welds – Design of welded joints – Design of bracket connections (Beam to column and beam to beam connections).

UNIT – II

DESIGN OF TENSION AND COMPRESSION MEMBERS: Design of tension members – Lug angles – Tension splice. Design of compression members – Single and built – up columns – Design of lacing and battens – Design of eccentrically loaded columns – Column splicing.

UNIT – III

LATERALLY SUPPORTED BEAMS: Design of simple beams – Design of built up beams- Curtailment of flange plates – Connection of flange plate with flange of beam.

UNIT – IV

LATERALLY UNSUPPORTED BEAMS: Permissible bending compressive stress – Effective length of compression flange – Design of simple beams – Design of Gantry Girders.

	UNIT – V **DESIGN OF COLUMN BASES:** Slab base – Gusseted base – Bases subjected to moment – Grillage foundation.
Text Books and reference Books:	**TEXT BOOKS:** 1. Design of Steel Structures by S.K. Duggel. 2. Design of Steel Structures by S.S. Bhavikatti. **REFERENCE BOOKS:** 1. Design of Steel Structures Vol. I & II by Dr. Rama Chandra. 2. Limit State design Structural steel by M.R. Shiyekar. 5. Design of Steel Structures by N. Subramaniyan.

13CE3104 - FOUNDATION ENGINEERING

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Soil Mechanics**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to analyse finite and infinite slopes
	CO2	Be able to calculate earth pressure in various soils under different types of loadings and able to analyse stability of retaining walls.
	CO3	Be able to calculate bearing capacity of shallow foundations
	CO4	Be able to design pile foundation and able to understand the deign characteristics of well foundation
	CO5	Understand the various methods of site exploration and be able to write investigation reports.

Course Content

UNIT – I

STABILITY OF SLOPES: Stability analysis of infinite slopes – Stability analysis of finite slopes – Swedish circle method – Friction circle method – Tailor's stability number and use of charts – Improving stability of slopes.

UNIT – II

EARTH PRESSURES: Earth pressure theories of lateral earth pressure – Active and passive earth pressures in cohesionless and cohesive soils (with and without surcharge) – Rankine's and Coulumb's earth pressure theories – Graphical methods due to Rebhann and Culmann.

EARTH RETAINING STRUCTURES: Types of Retaining Structures – Stability Consideration of Gravity and Cantilever Retaining Walls – Drainage in retaining walls – Joints in retaining walls.

UNIT – III

BEARING CAPACITY OF SHALLOW FOUNDATIONS : Types of foundations – Depth of foundation – Terzaghi's bearing capacity equation – Bearing capacity of square, circular, rectangular and continuous footings – Meyerhof's theory – Skempton's method – Brinch Hansen's method – Effect of ground water table on bearing capacity – Bearing capacity from building codes – Tolerable settlements – Settlement analysis.

	UNIT – IV **PILE FOUNDATIONS:** Classification of piles – Pile driving – Load carrying capacity of piles – Dynamic formulae – Static formulae – pile load tests – Insitu penetration Tests – Group action of piles – Negative skin friction. **WELL FOUNDATIONS:** Types – Different shapes of wells – Components of wells – functions and Design Criteria – Sinking of wells – Tilts and shifts. **UNIT – V** **SITE INVESTIGATIONS AND SUB-SOIL EXPLORATION:** Site reconnaissance – Depth of exploration – Lateral extent of exploration – Test pits – Auger borings – Wash borings – Soil sampling – Split – spoon sampler – Penetration tests – Geophysical methods – Seismic refraction and electrical resistivity methods – Sub soil investigation reports.
Text Books and reference Books:	**TEXT BOOKS:** 1. Soil Mechanics and Foundation Engineering by K.R.Arora. 2. Geotechnical Engineering by C. Venkatramaiah. 3. Soil Mechanics and foundation Engineering by P.N. Modi 4. Soil Mechanics & Foundation Engineeering by B.C.Punmia **REFERENCE BOOKS:** 1. Analysis and design of foundations and retaining structures by Shamsher Prakash, Gopal Ranjan & Swamisaran. 2. Soil Mechanics & Foundation Engg. by V.N.S.Murthy. 3. Foundation Engineering by Teng **4.** Foundation Engineeing by P.C Varghese.

13CE3105 - TRANSPORTATION ENGINEERING – II

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	Transportation Engineering – I(2-2)	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Understand the basics of traffic engineering.
	CO2	Understand the components of permanent way.
	CO3	Understand types of stations, yards, crossing and turnouts.
	CO4	Understand the elements of airport engineering.
	CO5	Understand the elements of harbour engineering.

Course Content

Unit - I

TRAFFIC ENGINEERING: Road user and vehicular characteristics, Traffic studies (uses, field methods and presentation of data only) – Volume, speed, origin & destination, parking; Traffic control devices – signs and signals, Highway capacity

Unit - II

RAILWAY ENGINEERING I: Comparison of railway and Highway transportation, classification of Indian railways, permanent way – components, gauges, coning of wheels, ballast types and functions.

Unit - III

RAILWAY ENGINEERING II: Classification and layout of different types of stations, station yards, types of crossings, Type of switches, Turnouts – factors affecting speed at turnouts.

Unit - IV

AIRPORT ENGINEERING: Airport planning – Master plan, Regional plan, data for site selection Air craft characteristics

AIRPORT LAYOUT AND TERMINAL AREA: Terminal area, Building area, parking area, Blast considerations, Typical airport layouts and their features.

	Unit - V **DOCKS AND HARBOUR ENGINEERING:** Tides–winds–waves–currents–classification of harbours–site selection classification of ports–Docks – types of docks–Breakwaters–types of Break waters–quays jetties–wharves–dolphins–fender aprons–transit sheds and ware houses–dredging.
Text Books and reference Books:	**TEXT BOOKS**: 1. Traffic Engineering and Transport Planning by L.R. Kadiyali. 2. A text book of Railway Engineering by Saxena S.C. and Arora S.P. 3. Airport Planning and Design by Khanna S.K., Arora M.G. and Jain S.S. 4. Docks and Harbour Engineering by R. Srinivasan. **REFERENCE BOOKS**: 1. Traffic Engineering Vol. I & II by Hobbs F.D. and Richardson P.R. 2. A text book of Railway Engineering by Rangwala. 3. Airport Engineering by Norman J, Ashford, Saleh A. Mumayiz and Paul H Wright. 4. A Course in Docks and Harbour Engineering by S.P.Bindra. 5. Railway Engineering by Satish Chandra, M. M. Agarwal.

13CE3106 – ADVANCED HYDRAULICS

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	Fluid Mechanics	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to analyze the flow characteristics in channels.
	CO2	Be able to design channels for uniform flow.
	CO3	Be able to compute specific energy and critical depth.
	CO4	Be able to analyze GVF and make GVF computations.
	CO5	Be able to analyze RVF and make RVF computations.

Course Content

UNIT – I

INTRODUCTION TO CHANNEL FLOW : Differences between pipe flow and channel flow – classification of flows – Geometric elements of channel section – velocity and pressure distributions – Velocity distribution coefficients – Parallel and curvilinear flows – Pressure correction coefficient.

UNIT – II

UNIFORM FLOW: Uniform flow – Chezy and Manning formulate – Hydraulically efficient channel sections (rectangular, triangular, trapezoidal and circular sections) – Uniform flow computations.

UNIT – III

SPECIFIC ENERGY AND CRITICAL DEPTH: Specific energy and critical depth – Critical flow computations – Applications – Transitions.

UNIT – IV

GRADUALLY VARIED FLOW : Dynamic equation of gradually varied flow – classification of flow profiles – Features of flow profiles – Control sections – Analysis of flow profiles – Gradually varied flow computations – Direct step method.

UNIT – V

RAPIDLY VARIED FLOW: Hydraulic jump – Momentum equation – Characteristics of jump in a horizontal rectangular channel – Rapidly varied unsteady flow – Surges in rectangular channels.

Text Books and reference Books:	**TEXT BOOKS:** 1. Open Channel Hydraulics by Ven Te Chow. **2.** Flow in Open Channels by Subramanya K. **3.** Open channel flow by Madan Mohan Das. **REFERENCE BOOKS:** 1. Flow through Open Channels by K.G.Rangaraju. 2. Hydrology by H.M. Raghunath. 3. Hand Book of Applied hydrology by Ven Te Chow

13CE31P1 - SOIL MECHANICS LABORATORY

Course category:	Program core	**Credits:**	2
Course Type:	Theory	**Lecture - Tutorial - Practical:**	0 - 0 - 3
Prerequisite:	Soil Mechanics	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to determine index properties of soils and classify them.
	CO2	Be able to determine the compaction characteristics
	CO3	Be able to determine the permeability of soils.
	CO4	Be able to determine the California Bearing Ratio value.
	CO5	Be able to determine the shear parameters of the soil.
Course Content	**List of experiments:** 1. (a) Specific Gravity (b) Grain Size Distribution by Sieve Analysis 2. (a) Liquid Limit & Plastic Limit (b) Shrinkage Limit 3. (a)In-Situ density by core cutter method (b) In-Situ density by Sand replacement method 4. I.S. light Compaction Test 5. California Bearing Ratio Test 6. North Dakota Cone Test 7. (a) Free Swell Index Test (b) Direct Shear Test 8. Unconfined Compression Test 9. Coefficient of Permeability by constant Head method 10. Coefficient of Permeability by Falling Head method **Demonstration** 1. Hydrometer Analysis 2. Triaxial Shear Test 3. Consolidation Test	

13CE31P2 - MATERIAL TESTING LABORATORY

Course category:	Program core	**Credits:**	2
Course Type:	Theory	**Lecture - Tutorial - Practical:**	0 - 0 - 3
Prerequisite:	**Strength of materials**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Mild steel for tension, direct shear, hardness and impact load
	CO2	HYSD bar for tension, hardness, torsion and Wood for compression test
	CO3	Springs, and rolled steel joist for bending.
	CO4	Beams for deflection and elastic modulus.
	CO5	Close-coiled helical springs for deflection
Course Content	**LIST OF EXPERIMENTS** 1. Tension test on Mild Steel bar. 2. Tension test on HYSD bar. 3. Compression test on wood. 4. Direct shear test on Mild Steel. 5. Rockwell and Brinell Hardness tests. 6. Charpy and Izod Impact tests. 7. Bending test on Rolled Steel Joist. 8. Bending test on carriage springs. 9. Torsion test-Determination of Rigidity modulus (G). 10. Deflection test on simply supported beam-Determination of Elastic modulus (E). 11. Deflection test on fixed beam- Determination of Elastic modulus (E). 12. Deflection test on close-coiled helical springs. 13. Deflection test on over hanging beam - Determination of Elastic modulus (E).	

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY :: VIDYANAGAR

(AUTONOMOUS)

CIVIL ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the batch admitted in the academic year 2013-2014)

III YEAR OF FOUR YEAR B.TECH. DEGREE COURSE – II SEMESTER

S.No.	Course Code	Course Title	Contact Hours/ Week			Credits	Evaluation							
							Sessional Test-I		Sessional Test-II		Total Sessional Marks (Max. 40)	Semester End Examination		Max. Total Marks
		THEORY	L	P	T		Duration in Hours	Max. Marks	Duration in Hours	Max. Marks		Duration in Hours	Max. Marks	
1	13CE3201	R.C.C. Structural Design - II	3	-	1	4	2	40	2	40	0.8(Better of two sessional tests) + 0.2(Other)	3	60	100
2	13CE3202	Hydrology	4	-	-	4	2	40	2	40		3	60	100
3	13CE3203	Structural Analysis -II	3	-	1	4	2	40	2	40		3	60	100
4	13CE3204	Concrete Technology	4	-	-	4	2	40	2	40		3	60	100
5	13CE3205	Environmental Engineering - I	4	-	-	4	2	40	2	40		3	60	100
6	13CE32EX	Elective –I	4	-	-	4	2	40	2	40		3	60	100
		PRACTICALS												
1	13SH32P1	Advanced Communication Skills Laboratory	-	3	-	2	-	-	-	-	Day-to-day Evaluation and a test	3	60	100
2	13CE32P1	Highway Materials Laboratory	-	3	-	2	-	-	-	-		3	60	100
		TOTAL	**22**	**06**	**02**	**28**								**800**

Elective I:

13CE32E1 Industrial Steel Structural Design
13CE32E2 Advanced Foundation Engineering
13CE32E3 Transportation Planning
13CE32E4 Industrial Waste and Waste Water Management
13CE32E5 Ground Water Hydrology

13CE3201 – R.C.C. STRUCTURAL DESIGN – II

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**R.C.C.Structural Design, Foundation Engineering**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to design rectangular and trapezoidal combined footings.
	CO2	Be able to design cantilever and counterfort retaining walls.
	CO3	Be able to design water tanks, spherical and conical domes.
	CO4	Be able to design circular slabs using yield line theory.
	CO5	Be able to calculate stresses for prestressed rectangular sections

Course Content

UNIT – I

DESIGN OF FOUNDATIONS: Design of combined footings (Rectangular and Trapezoidal).

UNIT – II

DESIGN OF RETAINING WALLS: Design of retaining walls – Cantilever and Counterfort types for different loadings.

UNIT – III

DESIGN OF WATER TANKS: Review of working stress design method – Circular and Rectangular tanks resting on ground – Circular tanks with IS code method and Rectangular tanks with Approximate method – Spherical and Conical domes – Design of Intze tanks.

UNIT – IV

YIELD LINE THEORY: Introduction – behavior of slab up to failure – assumptions – guidelines for predicting yield line pattern – yield criterion – methods of analysis and basic principles – virtual work – Equilibrium method – corner levers – circular slabs.

UNIT – V

PRESTRESSED CONCRETE: Principles of prestressing – Materials used – Methods and Systems of prestressing – Losses of prestress – Analysis of rectangular sections for stresses.

Text Books and reference Books:	**TEXT BOOKS:** 1. Comprehensive RCC Designs by Dr. B. C. Punmia, A. K. Jain & Arun Kumar Jain. 2. Limit State Design (IS 456: 2000) by N. Krishna Raju & R. N. Pranesh. 3. Prestressed Concrete by N. Krishna Raju. **REFERENCE BOOKS:** 1. Limit State Theory and Design of Reinforced Concrete by S. R. Karve & V. L. Shah. 2. Reinforced Concrete – Limit State Design by A.K.Jain. **3.** RC Design by SN Sinha.

13CE3202 - HYDROLOGY

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to measure, analyze and estimate rainfall data.
	CO2	Be able to measure and calculate evaporation, transpiration, evapotranspiration and infiltration indices.
	CO3	Be able to determine runoff volume.
	CO4	Be able to analyze unit hydrograph method.
	CO5	Be able to perform flood routing by Pul's and Muskingum methods. Be able to calculate the yield of aquifers

Course Content

UNIT – I

INTRODUCTION: Hydrologic cycle – Hydrologic data – Sources of Data.

PRECIPITATION : Precipitation – forms and types of precipitation – Measurement of precipitation – Mean precipitation over an area – Rain gauge network – Estimation of missing data – Double mass curve – Intensity – duration – frequency (IDF) curves.

UNIT – II

ABSTRACTIONS: Evaporation, Transpiration, Evapotranspiration – Factors affecting – Measurement – Methods for reduction – Infiltration – Measurement – Infiltration indices.

UNIT – III

RUNOFF: Runoff process – Factors affecting runoff – Drainage basin characteristics – Determination of run off – Run off formulae, tables – Stream gauging Yield – Flow duration curve – Flow mass curve.

UNIT – IV

FLOODS: Importance of flood studies – Methods of estimating flood peak – Empirical formulae – Rational method – Components of a Hydrograph – Base flow separation – Unit hydrograph – Derivation of unit hydrograph of different durations – Gumbel's method of flood frequency analysis.

	UNIT – V **FLOOD ROUTING:** Basic equation – Types – Routing by Pul's and Muskingum methods. **GROUNDWATER:** Groundwater occurrence – Darcy's law – Types of aquifers – Dupuit's equation – wells – yield – recuperation test.
Text Books and reference Books:	**TEXT BOOKS:** 1. Engineering Hydrology by Subramanya, K. 2. A Text Book of Hydrology by P. Jayarami Reddy. **REFERENCE BOOKS:** 1. Hydrology by H.M. Raghunath. 2. Hydrology by Madan Mohan Das. **3.** Hand Book of Applied hydrology by Ven Te Chow.

13CE3203 - STRUCTURAL ANALYSIS –II

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	Structural Analysis –I (III –I)	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to draw influence line diagram for determinate structures under various loadings.
	CO2	Be able to understand the static and kinematic indeterminacies of structures and apply Castigliano's theorem-II
	CO3	Be able to draw SFD and BMD of indeterminate structures using slope deflection and moment distribution methods.
	CO4	Be able to draw SFD and BMD using Kani's method..
	CO5	Understand the concept of plastic analysis and be analyse indeterminate structures
Course Content	**UNIT – I** **INFLUENCE LINES :** Influence lines for reactions SF and BM for determinate structures – Maximum BM and SF for single, two and multipoint loads – UDL longer and shorter than span and EUDL. **UNIT – II** **INDETERMINATE STRUCTURES:** Determination of static and kinematic indeterminacies – Solution of trusses having up to two degree of internal and external indeterminacies – Castigliano's theorem – II. **UNIT – III** **STATICALLY INDETERMINATE BEAMS AND FRAMES:** (i) **Slope – Deflection method** with degree of indeterminacy not exceeding three – Effect of sinking (ii) **Moment Distribution method** including frames with sway limited to single bay single storey – effect of sinking of supports. **UNIT – IV** **KANI'S METHOD:** Continuous beams – settlement of supports – single bay portal frames with side sway. **MULTISTOREYED FRAMES:** Analysis of multi-storeyed frames using, portal and cantilever methods. **UNIT – V** **PLASTIC ANALYSIS:** Idealized stress – strain diagram – Shape factors – Moment-Curvature relationships – Plastic hinges – Collapse Mechanism – Analysis of fixed and continuous beams and portal frames.	

Text Books and reference Books:	**TEXT BOOKS:** 1. Structural Analysis Vol. I & II by S. S. Bhavikatti. 2. Comprehensive structural Analysis Vol. I & II by R. Vaidanathan & P. Perumal. 3. Analysis of Structures Vol. I & II by V.N. Vazirani & M.N. Ratwani. **REFERENCE BOOKS:** 1. Theory of Structures Vol.I by S. P.Gupta, G.S. Pandit & R. Gupta. 2. Mechanics of Structures Vol.II by S.B. Junnarkar. 3. Structural Analysis by L.S. Negi & R.S.Jangid. 4. Steel Structures Vol. II by Ramchandra.

13CE3204 –CONCRETE TECHNOLOGY

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	Building Technology (2-1)	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Understand the behavior and characteristics of various types of cements and additives.
	CO2	Understand the characteristics and behavior of various types of aggregates. Determine the properties of fresh and hardened concrete. Understand the different types of mixing, storage, transportation and placement of concrete.
	CO3	Understand the various methods of curing concrete. Understand the various tests to be conducted on hardened concrete.
	CO4	Understand the long term behavior of elasticity, shrinkage and creep. Understand the durability of concrete.
	CO5	Be able to design concrete mix for various grades using different methods
Course Content		**UNIT – I** **PORTLAND CEMENT :** Composition – Physical properties – Rapid hardening Portland cement –Portland Blast Furnace cement – Low heat Portland cement – Sulphate resisting Portland cement – White Portland Cement – Coloured Portland cement – High alumina cement – Super sulphate cement – Masonry cement – Expansive cements – Oil well cements. **ADDITIVES:** Classifications – Accelerators – Retarders – Water Proofers – Pigments – Air entraining agents – Pozzolana. **UNIT – II** **CONCRETE AGGREGATES :** Classifications – Heavy aggregates – Normal weight aggregates – Strength and other mechanical properties – Moisture content and its effects – Deleterious substances – Alkali–Aggregate reaction – Thermal properties – Grading curves and Grading requirements – Gap–graded aggregate – Maximum aggregate size – Use of 'Plums' – Handling of aggregates. **FRESH CONCRETE:** Workability – Factors affecting workability – Measurements of workability – Comparison of tests – Effect of time and temperature – Segregation – Bleeding – Mixing of concrete – Concrete mixers – vibration of concrete – Types of vibrators – Ready mixed concrete – Pumped concrete. Prepacked concrete and vacuum processed concrete

	UNIT – III **CURING OF CONCRETE:** Methods of curing − Maturity – Influence of temperature – Steam curing at atmospheric pressure – High pressure steam curing. **HARDENED CONCRETE:** Compression tests – Effect of capping – Flexure test – Splitting test – Rebound Hammer test – Ultrasonic pulse test – Abrasion of Concrete. **UNIT – IV** **ELASTICITY, SHRINKAGE AND CREEP:** Modulus of elasticity – Dynamic modulus – Poisson's ratio – Shrinkage and its effects – Creep of concrete – Factors affecting creep. **DURABILITY:** Permeability – Chemical attack of Concrete – Efflorescence – Air entrained concrete – measurements – effects – Thermal properties – Resistance of concrete to fire. **UNIT – V** **CONCRETE MIX DESIGN AND QUALITY CONTROL:** Basic consideration – Factors in the choice of properties – Method of calculation by absolute volume method – Simple example of mix design – Design of high strength mixes– ACI & IS methods of mix design.
Text Books and reference Books:	**TEXT BOOKS:** 1. Concrete Technology by M.S. Shetty. 2. Concrete Technology by G Gambhir 3. Concrete Practice by R.H. Elvery. **REFERENCE BOOKS:** 1. Properties of Concrete by A.M. Neville 2. Concrete Technology Vol. I & II by D.F. Orchard. 3. Concrete Technology & Practice by W.H.Taylor. 4. I.S. 10262–2009 Guidelines for Concrete Mix Design.

13CE3205 - ENVIRONMENTAL ENGINEERING – I

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Fluid mechanics – I**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Identify the sources of water and intake works for collection. Be able to forecast and calculate water demand.
	CO2	Be able to determine the water quality and understand the conventional methods of water treatment.
	CO3	Understand the concepts of filtration and disinfection.
	CO4	Apply the advanced water treatment methods.
	CO5	Understand the various methods of conveyance and distribution of water. Be able to design pipe-networks by hardy-cross method. Understand various joints, valves and house service connections.

Course Content

UNIT – I

SOURCES, DEMAND AND COLLECTION OF WATER: Sources of water-Source selection Water demand-Types-Factors affecting water demand-Fluctuations in water demand-Design period-Population forecasting methods and their suitability-Intake works for collection of water.

UNIT – II

WATER QUALITY: Need for protected water supply-Water quality- Characterization-Water quality standards-Water-borne diseases

CONVENTIONAL TREATMENT OF WATER: General outline of conventional water treatment units and their functions-Theory of aeration-Aeration methods-Principles and design of sedimentation-coagulation, flocculation and clarification

UNIT – III

FILTRATION AND DISINFECTION: Theory of filtration-Types of filters- Working and design of slow and rapid sand filters-Operational troubles in filters-Disinfection-Types of disinfectants-Theory of chlorination-Break point chlorination.

UNIT – IV

ADVANCED TREATMENT METHODS: Membrane process- Removal of salinity-Adsorption technique-Removal of arsenic-Ion exchange process-Removal of hardness-

	Chemical oxidation and precipitation-Removal of Iron &, manganese, fluorides. **UNIT – V** **CONVEYANCE SYSTEM:** Intake structures-Systems of conveyance of water-Pipe materials Hydraulics of flow in pipes **WATER DISTRIBUTION:** Requirements of water distribution-Components-Service reservoirs Layout of distribution networks-Design of pipe networks-Hardy cross and equivalent pipe method-Pipe joints-Valves-House service connections.
Text Books and reference Books:	**TEXT BOOKS:** 1. Water Supply Engineering by S.K. Garg. 2. Water Supply Engineering by B.C.Punmia. **REFERENCE BOOKS:** 1. Water Treatment Principles and Design by James M. Montgomery. 2. Water and waste water Technology by E.W. Steel. **3.** Environmental Engineering by H.S. Peavy et al.,

13CE32E1 – INDUSTRIAL STEEL STRUCTURAL DESIGN

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	Steel Structural design	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to design plate girders
	CO2	Be able to design water tanks
	CO3	Be able to design roof frames
	CO4	Be able to design chimneys
	CO5	Be able to analyse and design light gauge steel structures

Course Content

UNIT – I

DESIGN OF PLATE GIRDERS: Riveted and welded plate girders – Design of cross section- Curtailment of flange plates – Vertical and horizontal stiffeners – Splicing of web – Splicing of flange.

UNIT – II

DESIGN OF WATER TANKS: Design of cylindrical steel tanks, pressed steel tanks and rectangular steel tanks including staging.

UNIT – III

DESIGN OF ROOF TRUSSES : Loading on roof trusses – Design of purlins – Design of members of roof truss – Angular and tubular members – Design of connection of members.

UNIT – IV

CHIMNEYS: Introduction - lining for masonry chimneys – various forces acting on masonry chimneys - stability of masonry chimneys – architectural treatment of masonry chimneys - specifications for design of masonry chimneys - Design of chimneys.

UNIT – V

LIGHT GAUGE STEEL STRUCTURES: Light gauge steel types of sections – Specifications – Basic allowable design stresses – Compression members – Local

	buckling of elements, Stiffened and unstiffened compression elements – Computation of permissible stresses – Design of columns – Flexural Members – Bending – Deflection - Local bucking of compression elements – Laterally supported and unsupported beams- computation of permissible stresses – Design of beams.
Text Books and reference Books:	**TEXT BOOKS:** 1. Design of Steel Structures – Ramchandra Vol. I&II 2. Steel Structures Vol. III – Vazirani and Ratwani 3. Design of Steel Structures – Arya and Ajmani

13CE32E2 - ADVANCED FOUNDATION ENGINEERING

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Foundation Engineering**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to foundation design considerations
	CO2	Be able to design of footing
	CO3	Be able to design of mat foundation by conventional method
	CO4	Be able to analyze pile load in group of piles
	CO5	Be able to predict the settlements in shallow and deep foundations

Course Content

UNIT – I

FOUNDATION DESIGN CONSIDERATION: Depth and spacing of footings – Displaced soil effects – Water table fluctuation – Foundations in sands and clays – Environmental considerations.

UNIT – II

FOOTINGS: Classification and purpose – Contact pressure under footings – proportioning of footings – Principles of footing design.

UNIT – III

MAT FOUNDATIONS: Allowable bearing pressure for mat foundations – conventional design of mat foundations – Modulus of sub-grade reaction.

UNIT – IV

DEEP FOUNDATIONS: Single piles versus pile groups – pile spacing – pile caps – Analysis of pile load in a group of piles.

UNIT – V

SETTLEMENT ANALYSIS: Prediction of settlement in cohesive and cohesion less soil deposits (Shallow & Deep foundations).

Text Books and reference Books:	**REFERENCE AND TEXT BOOKS:** 1. Soil mechanics and foundation engineering by V.N.S. Murthy. 2. Modern geotechnical engineering by Alam Singh. 3. Foundation analysis and design by Bowles, J.E. 4. Foundation engineering by Brahma, S.P. 5. Foundation engineering by Teng, W.C. 6. Analysis and Design of foundation and Retaining structures by Shamsher Prakash, Gopal Ranjan and Swami Saran. 7. Foundation Engineering by Peck, Honson, Thornburn. 8. Basic and Applied Soil Mechanics by Gopal Ranjan & A.S.R. Rao. 9. Geotechnical Engineering by C. Venkatramaiah. **10.** Numerical Problems, Examples and Objective Questions in Geotechnical Engineering A.V. Narasimha Rao and C. Venkatramaiah.

13CE32E3 - TRANSPORTATION PLANNING

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Transportation Engineering**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	To understand the necessity of a planning process, its implementation and components.
	CO2	To summarize data collection techniques and in depth analysis of ways data is collected, assimilated and processed.
	CO3	To discuss the earlier two stages of the four stage planning model so as to familiarize students to model and forecasting techniques.
	CO4	To discuss the earlier two stages of the four stage planning model that will help students understand the planning process from a point of a planner.
	CO5	To analyze and execute plans and ideas required for a planning process along with a brief introduction to planning for a city of small or medium size.

Course Content

UNIT – I

TRANSPORT PLANNING PROCESS –Scope of the Subject, Interdependence of the Land Use and Traffic, Systems Approach to Transport Planning. Stages in Transport Planning, Survey and Analysis of Existing Conditions, Forecast Analysis of Future Conditions and Plan Synthesis, Evaluation, Programme Adoption and Implementation, Continuing Study, Citizen Participation, Difficulties in the Transport Planning Process.

UNIT – II

TRANSPORTATION SURVEY: Introduction, Definition of the Study Area, Zoning , Type of Surveys, Home Interview Surveys, Commercial Vehicles Surveys, Taxi Surveys, Road Side Interview Surveys, Post Card Questionnaire, Registration Number Plate Surveys, Tags on Vehicles, Public Transport Surveys, Inventory of Transport Facilities, Inventory of Land Use and Economic Activities, Expansion of Data From Samples.

UNIT – III

TRIP GENERATION – Introduction and Definitions, Trip Purpose, Factors Governing Trip Generation and Attraction Rates, Multiple Linear Regression Analysis, Category Analysis.

TRIP DISTRIBUTION – What is Trip Distribution, Methods of Trip Distribution,

	Uniform (Constant) Factor Method, Average Factor Method. **UNIT – IV** **TRAFFIC ASSIGNMENT** – Purpose of Traffic Assignment, General Principles, Assignment Techniques - All-or-Nothing Assignment, Multiple Route Assignment, Capacity Restraint Assignment, Diversion Curves. **MODAL SPLIT** – General Considerations, Factors Affecting Modal Split, Modal Split in the Transport Planning Process. **UNIT – V** **EVALUATION** – Need for Evaluation, Several Plans to be Formulated, Testing, Considerations in Evaluation, Economic Evaluation. **TRANSPORT PLANNING FOR SMALL AND MEDIUM SIZED CITIES** – Introduction, Difficulties in Transport Planning for Small and Medium Cities, Quick response Techniques.
Text Books and reference Books:	**TEXT BOOKS** 1. Traffic Engineering and Transport Planning by L.R. Kadiyali. **REFERENCE BOOKS:** 1. A course in Highway Engineering by S.P. Bindra, Dhanpat Rai & Sons, Delhi 1988. 2. Transpiration Engineering, Vol I by Vazirani and Chandola, 2000

13CE32E4 - INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Environmental Engineering**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	To understand the water quality requirements for different industries.
	CO2	To reduce the concentration or strength of waste and to reduce the volume of waste also.
	CO3	Understanding the methods for disposing waste into streams, oceans and lakes.
	CO4	The re-use of the industrial waste as well as municipal wastewater.
	CO5	Identifying the sources and characteristics of liquid waste from different industries and treatment methods for those wastes.
	CO6	Understanding the limitations, advantages and suitability of effluent treatment plants and disposal methods.
Course Content	**UNIT – I** Quality requirements of boiler and cooling waters – Quality requirements of process water for Textiles – Food processing, and Brewery Industries – Boiler and Cooling water treatment methods. **UNIT – II** Basic Theories of Industrial Waste water Management – Volume reduction – Strength reduction – Neutralization – Equalization and proportioning. Joint treatment of industrial wastes and domestic sewage – consequent problems. **UNIT – III** Industrial waste water discharges into streams. Lakes and oceans and problems. Recirculation of Industrial Wastes – Use of Municipal Waste Water in Industries. **UNIT – IV** Manufacturing Process and design origin of liquid waste from Textiles, Paper and Pulp industries, Thermal Power Plants, Fertilizers, Steel Plants, Oil Refineries, and Distillers, Special Characteristics, Effects and treatment methods.	

	UNIT – V Common Effluent Treatment Plants – Advantages and Suitability, Limitations, Effluent Disposal Methods.
Text Books and reference Books:	TEXT BOOK: 1. Waste Water Treatment by M.N. Rao and Dutta, Oxford & IBH, New Delhi. REFERENCES: 1. Liquid waste of Industry by Newmerow. 2. Water and Waste Water technology by Mark J. Hammer and Mark J. Hammer (Jr).

13CE32E5-GROUND WATER HYDROLOGY

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Hydrology**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Identify the ground water flow & prediction and well hydraulics.
	CO2	Explain the method to identify groundwater sources.
	CO3	Demonstrate the saline water intrusion.
	CO4	Identify the sources of groundwater contamination.
	CO5	Apply the process for sustainable groundwater management
Course Content		UNIT – I **WATER WELLS:** Shallow Well – Deep well – Well Construction – Well Completion – Well development – Testing of wells for yield – Protection of wells – Well rehabilitation. UNIT – II **SUBSURFACE INVESTIGATIONS AND ARTIFICIAL RECHARGE:** Test drilling – Geophysical, resistivity and spontaneous potential logging – Concept of artificial recharge. UNIT – III **SALINE WATER INTRUSION:** Occurrence – Ghyben – Herzberg relation between fresh and saline waters – Shape of interface – Control of saline water intrusion. UNIT – IV **POLLUTION OF GROUND WATER:** Municipal, Industrial and Agricultural sources of pollution – Attenuation, distribution and evaluation of ground water pollution – Monitoring ground water quality.

	UNIT – V **GROUND WATER MANAGEMENT:** Concept of basin management – Equation of hydrologic equilibrium – Ground water basin investigation – Data Collection – Alternative basin yields – Evaluation of perennial yield – Basin management by conjunctive use.
Text Books and reference Books:	**TEXT BOOKS:** 1. Ground water hydrology by D.K.Todd. 2. Ground water by H.M.Raghunath. **REFERENCES BOOKS:** 1. Liquid waste of Industry by Newmerow. 2. Water and Waste Water technology by Mark J. Hammer and Mark J. Hammer (Jr).

13CE32P1 – HIGWAY MATERIALS LABORATORY

Course category:	Program core	**Credits:**	2
Course Type:	Theory	**Lecture - Tutorial - Practical:**	0 - 0 - 3
Prerequisite:	**TRANSPORTATION ENGG – I**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to determine various properties of highway materials.
	CO2	Be able to conduct various test for highway materials.
	CO3	Be able to assess the quality of highway materials.
	CO4	Be able to choose the required material based on field conditions.
	CO5	Be able to evaluate the quality of the highway materials.

Course Content

CYCLE – I: TESTS ON AGGREGATES

1. Specific Gravity and Water Absorption Test.
2. Aggregate Impact Test
3. Elongation Index Test
4. Flakiness Index Test
5. Angularity Number Test
6. Los Angles Abrasion Test
7. Aggregate Crushing Test

CYCLE – II: TESTS ON BITUMEN

1. Flash & Fire Point Test
2. Softening Point Test
3. Specific Gravity Test
4. Penetration Test
5. Ductility Test
6. Stripping Value Test

13HS32P1 – ADVANCED COMMUNICATION SKILLS LABORATORY

Course category:	Program core	**Credits:**	2
Course Type:	Theory	**Lecture - Tutorial - Practical:**	0 - 0 – 3
Prerequisite:	**English, English Language Lab**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Attend interview with ease and confidence
	CO2	Understand the importance of the various skills involved in developing enriching interpersonal relationships.
	CO3	Able to reach the corporate expectations
	CO4	Gain proficiency in usage of vocabulary for both professional and personal life
	CO5	Empower in writing skills in order to prepare a persuasive resume and letters

Course Content

LIST OF EXPERIMENTS

1. **Vocabulary Building** – Synonyms and Antonyms, Word roots, One-word Substitutes, Prefixes and Suffixes, Study of word origin, Analogy, Idioms and Phrases.

2. **Group Discussion** – Dynamics of Group Discussion, Intervention, Summarizing, Modulation of voice, Body Language, Relevance, Fluency and Coherence.

3. **Intrapersonal & Interpersonal Relationship Skills** - Intrapersonal & Interpersonal Relationship Skills - To be an Effective Team Player

4. **Resume' Writing** – Structure and Presentation, Planning, Defining the career Objective, Projecting ones strengths and Skill-Sets, Summary,

	Formats and Styles, Letter-Writing. 5. **Interview Skills** – Concept and Process, Pre-Interview Planning, Opening Strategies, Answering Strategies, Interview through Tele and Video-Conferencing. 6. **Corporate Etiquettes**- Dressing Etiquettes- Dining Etiquettes- Nonverbal Communication- Proximity of Place
Text Books and reference Books:	**Books Recommended:** 1. Effective Technical Communication, M. Ashraf Rizivi, Tata Mc. Graw-Hill Publishing Company Ltd. 2. A Course in English commucation. Madhavi Apte, Prentice-Hall of India,2007. 3. Communication Skills. Leena Sen, Prentice-Hall of India,2005. 4. Academic Writing-A Practical guide for students by Stephen Bailey,Rontledge Falmer, London & New York,2004. 5. English Language Communication: A Reader cum Lab Manual., Dr A Ramakrishna Rao, Dr G Natanam &Prof SA Sankaranarayanan, Anuradha Publications, Chennai. 6. Body Language- Your Success Mantra. Dr. Shalini Verma, S. Chand, 2006. 7. Soft Skills, Dr K. Alex, S. Chand Publications, New Delhi.

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY :: VIDYANAGAR

(AUTONOMOUS)

CIVIL ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the batch admitted in the academic year 2013-2014)

IV YEAR OF FOUR YEAR B.TECH. DEGREE COURSE – I SEMESTER

S.No.	Course Code	Course Title	Contact Hours/ Week			Credits	Evaluation							
							Sessional Test-I		Sessional Test-II		Total Sessional Marks (Max. 40)	Semester End Examination		Max. Total Marks
		THEORY	L	P	T		Duration in Hours	Max. Marks	Duration in Hours	Max. Marks		Duration in Hours	Max. Marks	
1	13CE4101	Environmental Engineering – II	4	-	-	4	2	40	2	40	0.8(Better of two sessional tests) + 0.2(Other)	3	60	100
2	13CE4102	Irrigation & Hydraulic Stru..	4	-	-	4	2	40	2	40		3	60	100
3	13CE4103	Quantity Surveying & Valuation	3	-	1	4	2	40	2	40		3	60	100
4	13CE4104	Construction Planning & Management	3	-	1	4	2	40	2	40		3	60	100
5	13SH4101	Economics & Accountancy	4	-	-	4	2	40	2	40		3	60	100
6	13CE41EX	Elective – II	4	-	-	4	2	40	2	40		3	60	100
		PRACTICALS												
1	10CE41P1	Concrete Technology Laboratory	-	3	-	2	-	-	-	-	Day-to-day Evaluation and a test	3	60	100
2	10CE41P2	Environmental Engineering Laboratory	-	3	-	2	-	-	-	-		3	60	100
		TOTAL	**22**	**06**	**02**	**28**	**12**	**320**	**12**	**320**		**24**	**480**	**800**

Elective – II:

13CE41E1	Prestressed concrete structures	13CE41E2	Advanced structural design
13CE41E3	Solid waste management	13CE41E4	Traffic engineering
13CE41E5	Applied soil mechanics	13CE41E6	Bridge engineering

VISION AND MISSION OF INSTITUTE

Vision:

- To emerge as a comprehensive Institute that provides quality technical education and research thereby building up precious human resource for the industry and society.

Mission:

- To provide a learner-centered environment that challenges individuals to actively participate in the education process.
- To empower the faculty to excel in teaching while engaging in research, creativity and public service.
- To develop effective skills enabling learners to pick up critical thinking thus crafting them to be professionally fit and ethically strong.
- To reach out industries, schools and public agencies to partner and share human and academic resources.

VISION AND MISSION OF CIVIL ENGINEERING DEPARTMENT

Vision:

- To promote excellence in civil engineering education, enrich research and provide quality professional service to the society in all areas of civil engineering.

Mission:

- To provide a learner-centered environment for students to gain comprehensive knowledge in civil engineering.
- To provide a learning experience that fosters an aptitude for research.
- To provide graduates with contemporary skills and tools required to excel in civil engineering profession or alternate fields. To produce graduates to serve within the constraints of complex needs of the society with high integrity.

PROGRAMME EDUCATIONAL OBJECTIVES OF THE DEPARTMENT

PEO 1: Graduates will be proficient in the fundamental knowledge of basic science, engineering science including mathematical and computational skills appropriate for civil engineering.

PEO 2: Graduates will be successful practicing engineers in civil engineering and allied fields or alternate careers using their technical knowledge, teamwork, communication skills and leadership qualities.

PEO 3: Graduates will be innovative problem solvers within the realistic constraints of economic, environmental, social, political, health, safety and sustainability impacts, and serve the society as responsible professionals with integrity

PEO 4: Graduates will engage in lifelong learning within the profession or through higher studies.

PROGRAMME OUTCOMES OF THE DEPARTMENT

The programme outcomes are the skills and knowledge which the graduates have at the time of graduation:

a. An ability to apply knowledge of mathematics, science, and engineering.
b. An ability to design and conduct experiments, as well as to analyze and interpret data
c. An ability to design an engineering system, component, or process
d. An ability to identify, formulate, and solve engineering problems
e. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
f. A knowledge of contemporary issues.
g. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
h. An understanding of professional and ethical responsibility
i. An ability to function on multi-disciplinary teams
j. An ability to communicate effectively
k. To embark on a career as an entrepreneur or civil engineering project manager/ consultants thereby playing a very important role in society.
l. A recognition of the need to be successful in competitive examinations, and an ability to engage in lifelong learning

13CE4101 -ENVIRONMENTAL ENGINEERING – II

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Environmental Engineering – I**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to estimate sewage and design the sewage system.
	CO2	(a) Be able to determine the characteristics of domestic wastewater. (b) Be able to design preliminary sewage treatment plant.
	CO3	Be able to design secondary sewage treatment plant.
	CO4	Understand the concepts of sludge management and tertiary sewage treatment.
	CO5	Understand the methods of effluent disposal.
Course Content		**UNIT – I** **WASTEWATER COLLECTION AND ESTIMATION:** Sanitation-Systems of sanitation Sewerage-Systems of sewerage-Sources of wastewater-Sewage and storm water estimation Hydraulic design of sewers-Different materials used for sewers-Shapes of sewer-Sewer appurtenances-House drainage & Plumbing systems **UNIT – II** **CHARACTERISTICS OF DOMESTIC WASTEWATER:** Characteristics of sewage-physical, chemical, biological-BOD equation-Factors affecting the BOD rate of reaction Population equivalent-Relative stability **PRELIMINARY AND PRIMARY SEWAGE TREATMENT:** Layout and general outline of wastewater treatment plant-Function of each unit-Principles and design of screens-Grit chambers-Primary settling tanks

	UNIT – III **SECONDARY SEWAGE TREATMENT:** Principles and nutritional requirement of biological treatment system-Factors affecting biological treatment-Working principles and constructional details of Trickling filter-Activated sludge process-Oxidation/Stabilization pond-Oxidation ditch **UNIT – IV** **SLUDGE MANAGEMENT:** Sludge-Characteristics and types-Sludge treatment-Thickening Stabilization-Conditioning-Dewatering-Drying/Incineration-Sludge utilization and disposal **TERTIARY SEWAGE TREATMENT:** Removal of nitrogen-Phosphorus-Refractory organic-Heavy metals-Suspended solids and pathogenic bacteria. **UNIT – V** **EFFLUENT DISPOSAL:** Methods-Dilution-Self purification of surface water bodies-Oxygen sag curve-Marine disposal-Land disposal-Sewage farming Onland disposal and treatment systems-Working principle and design of septic tank-Septic tank effluent disposal system-Disposal standards
Text Books and reference Books:	**TEXT BOOKS:** 1. Sewage Disposal and Air Pollution Engineering by S.K. Garg. 2. Wastewater Engineering by B.C.Punmia. **REFERENCE BOOKS:** 1. Water Supply and Sanitary Engineering by G. S. Birdie & J. S. Birdie. 2. Environmental Engineering by H.S. Peavy et al. **3.** Wastewater Engineering, Treatment, Disposal and Reuse by Metcalf and Eddy.

13CE4102 - IRRIGATION & HYDRAULIC STRUCTURES

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Advanced Hydrology**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Understand the basic terminologies of irrigation engineering.
	CO2	Be able to design lined channel.
	CO3	Be able to design weir on permeable foundation.
	CO4	Understand the planning and design methods of dams and reservoirs.
	CO5	Understand the hydraulic design principles of spillways.

Course Content

UNIT – I

IRRIGATION ENGINEERING : Benefits and ill effects of irrigation – Methods of irrigation – Quality of irrigation water – Duty and Delta – Irrigation efficiencies – Irrigation water requirements – Assessment of Irrigation water - Crop Seasons – Principle crops – Rotation of crops.

UNIT – II

CANALS : Classification of canals – Canal alignment – Kennedy's and Lacey's theories – Design – Balancing depth – Effects, causes and prevention of water logging – Types of lining – Design of lined canals – Canal outlets – Falls – CD works.

UNIT – III

DIVERSION HEAD WORKS: Location of diversion head works – Components – Causes of failure of weirs and remedial measures – Bligh's and Khosla's theories of design of weirs and permeable foundation.

UNIT – IV

STORAGE HEAD WORKS: Types of dams – Site selection and Reservoir Planning – Forces acting on and causes of failure of a gravity dam – Elementary and practical profiles – Stability analysis – Single and multiple step methods of design – Grouting – Multipurpose projects.

	UNIT – V **SPILLWAYS :** Requirements, components and types of spillways – Design principles of ogee spillway – Methods of energy dissipation below spillways – effect of TWC and JHC – Scour protection below spillways Stilling basins and appurtenances – Hydraulic design of energy dissipaters.
Text Books and reference Books:	**TEXT BOOKS:** 1. Irrigation Engineering and Hydraulic Structure – P.N. Modi. 2. Irrigation Engineering and Hydraulic Structures – S.K. Grag. **REFERENCE BOOKS:** 1. A text book of Irrigation Engineering and Hydraulic Structures – R.K.Sha. 2. Irrigation and water power Engineering – Dr. B.C. Punmia

13CE4103 -QUANTITY SURVEYING AND VALUATION

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	Building technology	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to prepare approximate and detailed estimates of simple buildings.
	CO2	Understand the specifications of various components of simple building.
	CO3	Be able to carry out rate analysis for various construction works for a simple building.
	CO4	Be able to prepare tenders and arbitration of tenders.
	CO5	Be able to prepare valuation document.

Course Content

UNIT – I

INTRODUCTION: General items of work in buildings – Standard units – Principles of working out quantities for detailed and abstract estimates, approximate and detailed estimates of simple buildings.

UNIT – II

SPECIFICATIONS: Types - Standard specifications for different items of building construction – Earth work for foundations, Sand, Cement, Kankar, mortars, foundation concrete, Reinforced concrete, Brick work, Stone masonry, Lime, Mosaic Flooring, RCC roof and GI sheet roof, plastering, , pointing , Painting and wood works.

UNIT – III

RATE ANALYSIS:

Earth work for foundations and basement of buildings.

Mortars : Lime mortar (1:1.5), Cement Mortar (1:4)

Foundation Concrete : Lime concrete (1:2:4), Cement Concrete (1:5:10)

Reinforced Concrete : Lintels, Slabs, Beams, Columns (1:2:4)

Brick work : Constructed with first class bricks with L.M. (1:1.5) and C.M.(1:6)

C.R.S. – Ist sort constructed with C.M. (1:2) and R.R.Masonry in mud, lime mortar (1:1.5),

	C.M.(1:2) Flooring: a) With Cuddapah or Shahbad slabs. b) Ellis pattern flooring with 10cm concrete and 20mm cement concrete surface - Mosaic flooring. Roofing: a) R.C.C. roof 10cm thick, 2 courses of flat tiles to top. b) A.C. corrugated sheet roofing on steel purlins. Plastering : a) With L.M. (1:1.5) 2 coats (20mm thick) b) C.M. (1:4) 12mm thick. Pointing: a) With C.M.(1:3) flush pointing to R.R. Masonry. b) C.M. (1:3) for brick masonry. Painting: a) White washing and colour washing of walls: 2 coats. b) Painting iron and wood work: 3 coats. Wood work: a) Panelled doors and windows. b) W.B.M. road with bituminous carpet 20mm thick. **UNIT – IV** **CONTRACTS:** Types of contracts, contract document, conditions of contracts, contract procedure, termination of contracts, specifications, important conditions of contract, arbitration and tenders. **UNIT – V** **VALUATION:** Introduction, technique of valuation, elements of valuation and factors affecting valuation, methods of valuation of land property and building property, rate of interest for sale, purchase, mortgage, capital gain, tax, estate duty and death duty. Types of valuation – Valuation for renewal of lease, extension of lease, standard rent, easement rights, preparation of feasibility reports, valuation of reports, awards.
Text Books and reference Books:	**TEXT BOOKS:** 1. Text book of estimating and costing – B.N. Dutta. 2. Estimating Consting by G.S.Birdie. **REFERENCEBOOKS**: 1) Valuation by Rangwala. 2) A.P.D.S.S. Standard data book Vol. II. 3) A.P. Department standard specifications. 4) Professional practice – by Roshan Namvati.

13SH4101 ECONOMICS & ACCOUNTANCY

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Able to demonstrate an ability to define analyze and identify the appropriate solution to a business problem using sound economic and accounting principles.
	CO2	Able to know the role of various cost concepts in managerial decisions and also the managerial uses of production function.
	CO3	Able to understand to take price and output decisions under various market structures.
	CO4	Able to know in brief formalities to be fulfilled to start a business organisation.
	CO5	Able to analyse the firm's financial position with the techniques of economic aspects as well as financial analysis.
Course Content		**UNIT – I** **Demand Analysis:** Definition and basic concepts of Economics – consumer's equilibrium: Marginal Utility Analysis - the concept of Demand - Law of demand – Elasticity of Demand: Types, determinants and its importance. **UNIT – II** **Theory of Production and Cost and Banking :** Production function – Cobb – Douglas production function and its properties – Law of variable proportions – Law of Returns to Scale – Cost concepts – Revenue curves – Break-Even Analysis-Money-functions of Money-Functions of Commercial Banks-Features of Indian Economy. **UNIT – III** **Theory of Pricing:** Classification of markets – Pricing under perfect Competition – Pricing under Monopoly – Price discrimination – Monopolistic Competition. **UNIT – IV** **Types of Business Organizations:** Sole tradership, partnership and Joint Stock Companies – Formation of companies - Shares and debentures.

	UNIT – V **Financial & Management Accounting:** Concepts and principles, Journal and Ledger, Trial Balance, Final Accounts: Trading account, Profit and Loss account and Balance Sheet. Basic concepts in Capital Budgeting process and Methods – Working Capital: operating cycle, factors and sources
Text Books and reference Books:	**TEXT BOOKS:** 1. Management Accounting : S N Maheswari 2. Economic Analysis : K. Sankaran 3. Elementary Book keeping & Principles of Commerce : K.sanyasaiah **REFERENCES**: 1. Double entry book keeping : Battlibai 2. Cost Accounting : Jain and Narang 3. Managerial Economics : Maheswari and Varshaney

13CE4104 -CONSTRUCTION PLANNING AND MANAGEMENT

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	Concrete Technology (3-2)	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	.Be able to understand the basics of construction management.
	CO2	Be able to schedule various components of project and apply CPM/ PERT techniques.
	CO3	Be able to demonstrate the working of various equipments in construction industries.
	CO4	Be able to perform quality control and prepare audit statement.
	CO5	Be able to demonstrate the importance of safety and risk in construction. Be able to understand the organizational structures and roles.
Course Content		**UNIT - I** **INTRODUCTION:** Significance of construction management, Objectives and functions of construction management. Types of construction, Resources for construction industry. Stages of construction, Construction team. Engineering drawings **UNIT - II** **CONSTRUCTION PLANNING:** Stage of planning, Scheduling, Preparation of material, Equipment, labour and finance schedules, Bar charts, Mile stone charts. Network Techniques In Construction Management: Critical Path Method (CPM), Programe Evaluation and Review Technique (PERT) – Network techniques breakdown structures. Classification of activities, Rules, for developing net works. Network development. Network analysis. Critical activities and critical path - Cost optimization **UNIT – III** **CONSTRUCTION AND EQUIPMENT MANAGEMENT** Equipment requirement in construction industry, heavy earth moving equipment Bulldozer Scrapers, loaders Excavator, shovels and Cranes; Compaction equipment; Grading equipment. Aggregate production equipment; Asphalt mixing plant; Asphalt laying equipment; Hauling equipment, Concrete mixing equipment; Material handling devices; Pneumatic equipment; Bridge construction equipment; Drilling and blasting equipment; Pumping and dewatering equipment. **UNIT – IV** **INSPECTION AND QUALITY CONTROL:** Need for inspection and quality control Principals of inspection. Enforcement of specifications Stages of inspection and quality control Ethical Audit: Introduction - Aspects of project realization - Ethical audit procedures - The decision makers - Variety of interests - Formulation of briefs - The audit statement - The audit reviews

	UNIT – V **SAFETY AND RISK:** Introduction – Safety and risk - Concept and importance of safety - Types of risk - Safety and engineers - Safety measures in construction works - Design for safety - Risk benefit analysis – Accidents. **ORGANISING CONSTRUCTION:** Principals of organization. Communication Leadership and human relations. Types of organization. Organization for a construction firm. Temporary services. Job layout**.**
Text Books and reference Books:	**TEXT BOOKS:** 1. Construction Planning and Management by P.S. Gahlot and B.M Dhir. 2. Construction Equipment and its Management by S.C. 3. Construction Management and Accounts by J.L. Sharma **REFERENCE BOOKS:** 1. Engineering Ethics by M. Govinda Rajan. 2. Construction Engineering and Management by S. Seetharaman. 3. Construction Management and Accounts by Haripal Singh.

13CE41E1-PRESTRESSED CONCRETE STRUCTURES

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Design of Reinforced Cement Concrete Structures**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	To calculate resultant stresses in rectangular sections.
	CO2	To design prestresses concrete sections.
	CO3	To design pre-tensioned and post tensioned members.
	CO4	To analyse and design composite prestressed concrete members.
	CO5	To design prestressed concrete slabs.

Course Content

UNIT – I

INTRODUCTION: Basic concepts of prestressing, historical development, advantages of prestressed concrete, high strength concrete, high tensile steel.
PRESTRESSING SYSTEM: Introduction, tensioning devices ,pretensioning and post tensioning systems, thermo-electric and chemical prestressing.
ANALYSIS OF PRESTRESSED CONCRETE SECTIONS: Basic assumption, analysis of prestress, resultant stress at a section, pressure line, concept of load balancing, stress in tendons and cracking moment.

UNIT – II

LOSSES OF PRESTRESS: Nature of losses of prestress, loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip. Total losses allowed for in design.
DESIGN OF PRESTRESSED CONCRETE SECTIONS: Design of sections for Flexure, Axial tension, compression bending and for shear. Design of members for bond and the sections for bearing.

UNIT – III

DESIGN OF PRE- TENSIONED AND POST-TENSIONED MEMBERS: Dimensioning of flexural members, Estimation of self weight of beams, Design of pretensioned and post-tensioned beams. Design of partially prestressed members.

	UNIT – IV **COMPOSITE CONSTRUCTION OF PRESTRESSED AND IN SITU CONCRETE:** Composite structural members, types of composite construction, analysis of stress, differential shrinkage, deflection of composite members, flexural strength of composite sections and design of composite sections. **UNIT – V** **PRESTRESSED CONCRETE SLABS**: Types of prestressed concrete floor slabs, design of prestressed concrete one way slabs, two way slabs & simple flat slabs
Text Books and reference Books:	**TEXT BOOKS:** 1. Prestressed concrete by N.Krishna Raju. 2. Prestressed concrete structures by P. Dayaratham. **REFERENCE BOOKS:** 1. Fundamentals of Prestressed Concrete by N.C.Sinha and S.K.Roy. 2. Modern Prestressed Concrete by James R.Libby.

13CE41E2- ADVANCED STRUCTURAL DESIGN

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Design of Reinforced Cement Concrete Structures, Steel Structures Design**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to design the long columns, deep beams and concrete walls.
	CO2	Be able to design multistory frames, grid slabs and flat slabs.
	CO3	Be able to design simply supported and continuous beams, columns using plastic design philosophy.
	CO4	Be able to design pre-stressed beams for limit state of collapse and limit state of serviceability.
	CO5	Be able to design slabs, pressure pipes and Railway sleepers using pre-stressed concrete concepts.
Course Content	**UNIT – I** **REINFORCED CONCRETE:** Design of Slender Columns – Deep Beams – Concrete walls under vertical loads. **UNIT – II** **REINFORCED CONCRETE:** Design of Multistorey Building Frames – Grid Floors – Flat Slabs. **UNIT – III** **STRUCTURAL STEEL:** Plastic Design of simply supported and continuous beams and columns – single bay rectangular frames. **UNIT – IV** **PRESTRESSED CONCRETE:** Design of beams for strength in limit state in flexure and shear – Limit state strength at transfer conditions – Limit state of deflection and cracking. **UNIT – V** **PRESTRESSED CONCRETE:** Design of reinforcement in anchor zones – Design of rectangular slabs – Design of pressure pipes – Design of Railway sleepers.	

Text Books and reference Books:	**TEXT BOOKS:** 1. Limit State Design of Reinforced Concrete by P.C. Varghese. 2. Advanced Reinforced Concrete Design by N. Krishna Raju. 3. Prestressed Concrete by N. Krishna Raju. 4. Prestressed Concrete by G.S.Pandit & S.P.Gupta. 5. Design of Steel Structures by Ramachandra.

13CE41E3 -SOLID WASTE MANAGEMENT

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Environmental Engineering**	**Sessional Evaluation :** **Univ.Exam** **Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to understand the importance, sources, classification and characterization of solid waste.
	CO2	Be able to understand collection, handling, storage and processing of solid waste.
	CO3	Be able to understand the process of recovery of products and energy.
	CO4	Be able to understand the various methods for disposing solid waste and application of GIS in land fill.
	CO5	Be able to find the properties of hazardous waste.
Course Content	**UNIT – I** **INTRODUCTION:** Goals and objectives of solid waste management, impacts of solid waste generation in a technological society. Quantities of solid wastes, challenges and opportunities. **GENERATION OF SOLD WASTES:** Sold waste generation sources, classification of solid waste, data on Indian city wastes, factors influencing generation of solid wastes, characterization and analysis of solid wastes. **UNIT – II** **ONSITE HANDLING, STORAGE AND PROCESSING:** Public health and aesthetics, onsite handling, methods used at residential and commercial sources, onsite storage dust bins, community containers container locations onsite processing methods. **COLLECTION:** Frequency of collection equipment and labour requirements, collection routes, transport means and location of transfer stations.	

	UNIT – III **PROCESSING TECHNIQUES AND EQUIPMENT:** Purpose of processing paling shredding, and incineration. **RECOVERY OF RESOURCE CONVERSION PRODUCTS AND ENERGY:** Material processing and recovery systems, recovery of chemical conversion products, recovery of biological conversion products recovery of energy from conversion products. **UNIT – IV** **DISPOSAL OF SOLID WASTES:** Sanitary landfills – General considerations, site selection – operational management systems in land fill – gas and leachate control – construction ocean disposal of solid wastes combustion – incineration and types of incinerators – Application of GIS in Land Fill. **UNIT – V** **HAZARDOUS WASTES:** Special wastes hazardous wastes, hospital wastes, sewage sludges, industrial solid wastes methods of disposal.
Text Books and reference Books:	**REFERENCE BOOKS:** 1. Bhide, A.D. and sundaresam B.B. (1983) solid waste management in developing countries INSDOC, New Delhi. 2. Solid waste engineering principles and management issues – Technobanglous, G. Theise, H.and Ehasisn, R. (1996). McGraw Hill, Tokyo.

13CE41E4 - TRAFFIC ENGINEERING

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Transportation Engineering**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Understand the necessity of traffic management and its organizational structure in a civil body.
	CO2	To compare and analyze detailed parking techniques applicable in the view of street management techniques.
	CO3	To inspect various technical aspects of vehicle control and different types of methods used in to ensure a smooth transit.
	CO4	To understand and debate various rules and regulations laid upon by the civic administration to provide an environment that provides for a hassle free commute.
	CO5	To analyze the effects vehicle use has on the environment and to familiarize with justice issues.
Course Content		**UNIT – I** Traffic Engineering Administration – Functions of traffic engineering, Organisational structure in state departments and for a city. Need for Traffic Forecasting. **UNIT – II** Parking – Parking surveys, Ill effects of parking, methods of parking – On street and off street, regulations for on street parking, parking metres, peripheral parking schemes, loading and unloading facilities. **UNIT – III** Traffic signals – Advantages and disadvantages, Signal indications, signal face, Type of traffic signals systems, warrents for traffic control signal installation. Miscellaneous traffic control aids and street furniture – Road delineators, hazard markers, object markers, speed breakers, rumble strips, guard rails. **UNIT – IV** Traffic regulations – Basic principles of regulation, regulation of speed, vehicles,

	driver, mixed traffic, parking regulations, enforcement of regulations. Traffic management – Traffic management measures, restrictions of turning movements, one way streets, tidal flow operation, closing side streets, exclusive bus lanes. **UNIT – V** Traffic and environment – Effects of traffic on environment, noise pollution, air pollution, vibration, visual intrusion and degrading the aesthetics. Fuel crisis and transportataion – factors affecting fuel consumption of motor vehicles – Effect of road condition on fuel consumption of vehicles
Text Books and reference Books:	**TEXT BOOKS:** 1. Traffic Engineering and Transport Planning by L.R.Kadiyali. 2. Highway Engineering by Justo and Khanna. **REFERENCE BOOKS** 1. Transportation Engineering by S.P.Bindra. 2. Transportation Engineering by Ahuja.

13CE41E5 - APPLIED SOIL MECHANICS

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 – 0
Prerequisite:	**Foundation Engineering, Soil Mechanics**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to apply the knowledge of ground improvement techniques for shallow layers
	CO2	Be able to apply the knowledge of ground improvement techniques for deep layers
	CO3	Be able to estimate the pressure distribution for bulk heads
	CO4	Be able to design anchored bulk heads by various methods
	CO5	Be able to design various components of bracing.

Course Content

UNIT – I

SOIL IMPROVEMENT TECHNIQUES FOR SHALLOW LAYERS:
Soil improvement – Mechanical treatment – Lime stabilization – Cement Stabilization – Bituminous stabilization – Chemical Stabilization – Freezing and heating – Geotextiles.

UNIT – II

SOIL IMPROVEMENT FOR DEEP LAYERS :
Dynamic compaction and consolidation – Preloading – Sand drains – Electro – osmosis – Lime columns – Stone columns – Grouting.

UNIT – III

BULKHEADS:
Uses of sheet piling walls – Common types of sheet piling walls – Common sheet pile sections – Cantilever sheet piling walls in cohesionless soils – cantilever sheet piling walls in cohesive soils (Approximate analysis only).

UNIT – IV

ANCHORED BULKHEADS:
Anchored bulkhead design by free earth support method – Anchored bulkhead design by fixed earth support method – Methods of reducing lateral pressure – Tyes of anchorage.

	UNIT – V **BRACED EXCAVATIONS:** Braced cut – Apparent pressure diagrams for cuts in both sands and clays – Types of bracing systems – Design of various components of bracing – Bottom heave of cuts in soft clays – Piping failure of cuts in sands.
Text Books and reference Books:	**TEXT BOOKS:** 1. Alam Singh "Modern Geotechnical Engineering" 2. Gopal Ranjen & A.S.R.Rao, "Basic and Applied Soil Mechanics. 3. K.R.Arora – "Soil Mechanicas and Foundation Engg". 4. C.Venkatramaiah – Geotechnical Engineering. 5. A.V.Narasimha Rao and C.Venkatramaiah – Numerical Problems, Examples and Objective Questions in Geotechnical Engg.

13CE41E6 - BRIDGE ENGINEERING

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 – 0
Prerequisite:	**D.R.C.C.S., S.S.D**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be familiar with site investigation principles and various loading conditions and be able to design box culverts and bridge bearings.
	CO2	Be able to design bridge deck slab using effective width method of analysis for different loading conditions.
	CO3	Be able to design T-beam bridge by pigeauds method.
	CO4	Be able to design plate girder and composite bridges.
	CO5	Be able to analyze stability of piers and abutments.

Course Content

UNIT - I

INTRODUCTION:

Importance of site investigation in Bridge design. Highway Bridge loading standards. Impact factor. Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.

BOX CULVERT: General aspects. Design loads, Design of Box culvert subjected to RC class AA tracked vehicle only.

BRIDGE BEARINGS :

General features – Types of Bearings – Design principles of steel Rocker & Roller Bearings – Design of a steel Rocker Bearing – Design of Elastometric pad Bearing.

UNIT - II

DECK SLAB BRIDGE :

Introduction – Effective width method of Analysis Design of deck slab bridge (Simply supported) subjected to class AA Tracked Vehicle only.

UNIT - III

BEAM & SLAB BRIDGE (T-BEAM BRIDGE)

General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only.

UNIT – IV

PLATE GIRDER BRIDGE :

Introduction – elements of a plate girder and their design. Design of a Deck type welded plate girder – Bridge of single line B.G.

	COMPOSITE BRIDGES : Introduction – Advantages – Design of Composite Bridges consisting of RCC slabs over steel girders' including shear connectors **UNIT V** **PIERS & ABUTMENTS:** General features – Bed Block – Materials piers & Abutments Types of piers – Forces acting on piers – Stability analysis of piers – General features of Abutments – forces acting on abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of Bridge foundations (excluding Design).
Text Books and reference Books:	**TEXT BOOKS :** 1. Bridge Engineering by Ponnu Swamy, TATA Mcgraw Hill Company, New Delhi. 2. Design of Bridges by N.Krishnam Raju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi. 3. Relevant – IRC & Railway bridge Codes. **REFERENCE :-** 1. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain. 2. Design of Bridges Structure by D.J.Victor. 3. Design of Steel structures by Ramachandra. 4. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain. 5. Design of Bridges Structure by T.R.Jagadish & M.A.Jayaram Prentice Hall of India Pvt., Delhi.

13CE41P2 -ENVIRONMENTAL ENGINEERING LABORATORY

Course category:	Program core	**Credits:**	2
Course Type:	Theory	**Lecture - Tutorial - Practical:**	0 - 0 - 3
Prerequisite:	**Environmental Engineering – I**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Physical characteristics of water
	CO2	Chemical characteristics of water
	CO3	Amount of solids in water
	CO4	Biological characteristics of water
	CO5	Chlorine demand of water
Course Content	**LIST OF EXPERIMENTS** 1. Determination of Colour 2. Determination of Turbidity 3. Determination of Total and dissolved solids 4. Determination of Settleable solids 5. Determination of pH 6. Determination of Acidity 7. Determination of Alkalinity 8. Determination of Hardness 9. Determination of Chlorides 10. Determination of Sulphates 11. Determination of BOD 12. Determination of Chlorine demand 13. Determination of Optimum Coagulant Dose	
Text Books and reference Books:	**TEXT BOOKS:** 1. Environmental Laboratory Manual by Dr. Kotaiah and Dr. N. Kumara Swamy	

	2. Standards Methods for Analysis of water and Wastewater-APHA **REFERENCE BOOKS:** 1. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999 **2.** Manual on Sewerage and Sewage Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1993.

13CE41P1 -CONCRETE TECHNOLOGY LABORATORY

Course category:	Program core	**Credits:**	2
Course Type:	Theory	**Lecture - Tutorial - Practical:**	0 - 0 - 3
Prerequisite:	**Concrete Technology, Building Technology**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Characteristic properties of cement
	CO2	Evaluate the quality of aggregates for civil engineering works
	CO3	Workability of fresh concrete and compressive strength of hardened concrete
	CO4	Compressive strength of bricks.
	CO5	Water absorption and Efflorescence test of brick

Course Content

LIST OF EXPERIMENTS

CEMENT

1. Fineness by dry sieving
2. Normal consistency, initial & final setting times
3. Specific gravity
4. Compressive Strength

AGGREGATES

5. Specific gravity and water absorption of coarse and fine aggregates
6. Sieve analysis of coarse and fine aggregates
7. Bulking of sand by volume method
8. Bulking of sand by weight method
9. Bulk density

CONCRETE

10. Workability of fresh concrete by slump test
11. Workability of fresh concrete by compaction factor test
12. Workability of fresh concrete by vee-bee test
13. Workability of fresh mortar by flow table test

	14. Compressive strength **BRICKS** 15. Compressive strength 16. Water absorption 17. Efflorescence

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY :: VIDYANAGAR

(AUTONOMOUS)

CIVIL ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the batch admitted in the academic year 2013-2014)

IV YEAR OF FOUR YEAR B.TECH. DEGREE COURSE – II SEMESTER

S.No.	Course Code	Course Title	Contact Hours/ Week			Credits	Evaluation							
							Sessional Test-I		Sessional Test-II		Total Sessional Marks (Max. 40)	Semester End Examination		Max. Total Marks
		THEORY	L	P	T		Duration in Hours	Max. Marks	Duration in Hours	Max. Marks	0.8(Better of two sessional tests) + 0.2(Other)	Duration in Hours	Max. Marks	
1	13CE4201	Design & Drawing Of Irrigation Structures	1	3	-	4	2	40	2	40		3	60	100
2	13CE4202	Environmental Studies	4	-	-	4	2	40	2	40		3	60	100
3	13CE42EX	Elective - III	4	-	-	4	2	40	2	40		3	60	100
		PRACTICALS												
1	13CE42P1	CAAD Laboratory	-	3	-	2	-	-	-	-	Day to day evaluation and a test (100 Marks)		-	100
2	13CE42PR	Project Work	-	3	-	6	-	-	-	-	Continuous Assessment and seminar (80 Marks)		120	200
		TOTAL	**09**	**09**		**20**	**6**	**-**	**6**	**-**	**300**	**9**	**300**	**600**

Elective – III:

13CE42E1 Remote Sensing & GIS

13CE42E2 Finite Element Analysis

13CE42E3 Advanced Highway Engineering

13CE42E4 Ground Improvement Techniques

13CE42E5 Environmental Pollution and Control

13CE4201 - DESIGN AND DRAWING OF IRRIGATION STRUCTURES

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Irrigation Engineering**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to design surplus weir
	CO2	Be able to design tank sluice with tower head
	CO3	Be able to design canal drop and canal regulator
	CO4	Be able to design syphon well drop
	CO5	Be able to design syphon aqueduct.
Course Content	**Design and Drawing of** 1. Surplus weir 2. Tank sluice with a tower head 3. Canal drop-notch type 4. Syphon well drop 5. Canal regulator 6. Syphon Aqueduct (Type – II) (Under tunnel)	
Text Books and reference Books:	**TEXT BOOKS:** 1. "Water Resources Engineering Principles and Practice" by C.S. Murthy. **REFERENCE BOOKS:** 1. "Irrigation Engineering Structures" by Elhis. 2. "Irrigation Engineering and Hydraulic Structures" by Sharma R.K.	

13CE4202 - ENVIRONMENTAL STUDIES

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to understand the features of ecosystem and bio-diversity.
	CO2	Understand the management of major natural resources.
	CO3	Be able to understand the causes, effects and remedial measures of environmental pollution.
	CO4	Be able understand effectives of elements on environment and disaster management.
	CO5	Be able to familiar with environmental acts and must be able to apply the knowledge of environmental studies to certain case studies.

Course Content

UNIT – I

INTRODUCTION: Definition-Scope and Importance of Environmental studies- Environmental components.

ECOSYSTEM: Introduction- types, characteristics- features- structure and functions of Ecosystems

Bio-diversity and its conservation - Value of bio-diversity consumptive and productive use, social, ethical, aesthetic and option values. Threats to biodiversity- Conservation of bio diversity.

UNIT – II

ENVIRONMENT AND NATURAL RESOURCES MANAGEMENT:

a. Land Resources and its importance, Land degradation, Soil erosion and desertification, Effects of modern agriculture, fertilizer and pesticide problems.
b. Forest Resources: Use and over- exploitation - Mining and dams- their effects on forest and tribal people.
c. Water Resources: Use and over- utilization of surface and ground water, Floods and droughts, Water logging and salinity, Conflicts over water sharing, Rain water harvesting, clouds seeding and watershed management.
d. Energy resources Energy needs: Renewable and non-renewable energy needs use of alternate energy sources, Impact of energy use of environment

	UNIT – III **ENVIRONMENTAL POLLUTION**: Causes- Effects and control measures of Air pollution- Water Pollution-Soil pollution-Marine Pollution-Noise pollution. Nature of Thermal pollution and nuclear hazards-Global warming, Acid rain-Ozone depletion. Solid waste management: Composting – Vermiculture - Urban and industrial Wastes - recycling and reuse. **UNIT – IV** **ENVIRONMENTAL PROBLEMS IN INDIA**: Drinking water - Sanitation and public health- Effects of urbanization - transportation, Industrialization on the quality of environment, Green revolution. **ECONOMY AND ENVIRONMENT:** The economy and environment interaction - Sustainability, Environment Impact Assessment - Social Issues. **DISASTER MANAGEMENT:** Floods- Earth quakes – Cyclones – Tsunamis. **UNIT – V** **ENVIRONMENTAL ACTS:** Water (Prevention and control of pollution) Act- Air (Prevention and control of pollution) Act - Environment protection Act, Wildlife protection Act, Forest conservation Act, Coastal Zone Regulations **Case Studies:** Silent Valley Project, Madhura Refinery and Taj Mahal, Tehri Dam, Kolleru Lake Aquaculture, Fluorosis in Andhra Pradesh **Field Work**: Visit to Local Area having river/ Forest/grass land/hill/mountain to document and environmental assets. Study of local environment- common plants, insects, birds. Study of simple ecosystems- pond, visits to Industries, water treatment plants, effluent treatment plants.
Text Books and reference Books:	**TEXT BOOKS:** 1. Environmental science by Anubha Kaushik and C.P. Kaushik. 2. Environmental science and Engineering by P. Anandan and R.Kumaravelan . REFERENCES BOOKS: 1. Introduction of Envioromental Science by Y. Anjaneyulu. 2. Environmental studies by Dr.B.S. Chauhan. **3.** Environmental Science by M Chandra Sekhar.

13CE42E1 - REMOTE SENSING & GIS

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	None	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	To know the workings of a remote sensing system along with the terms and concepts of the physical applications of such a system.
	CO2	To focus on different technical aspects of a remote sensing network with specific detail on India.
	CO3	To compare different types of data obtained from a remote sensing network with tools specifically designed for the purpose.
	CO4	To understand about various methods of corrections applied to data to ensure maximum credibility and accountability to the data collected.
	CO5	To identify concepts of GIS and its applications in various fields of planning and policy.

Course Content

UNIT – I

FUNDAMENTALS : Definition – History – Physics of Remote Sensing – Electromagnetic Radiation – Interaction of Electromagnetic Radiation with Atmosphere, Earth Surface Features – Vegetation, Soils, Water – Spectral Signature – Atmospheric Windows.

UNIT – II

REMOTE SENSING SYSTEM: Introduction - Platforms – Types – Satellites – Indian Remote Sensing Satellites.

SENSORS : Introduction – Types – Characteristics of Sensors – IFOV – Indian Remote Sensing Sensors – LISS-WIFS-PAN.

UNIT – III

VISUAL DATA ANALYSIS: Introduction – Types of Data Products – Image interpretation Techniques – Detection, Recognition, Analysis, Classification, Deduction, Idealization – Elements of Image Interpretation – Keys.

	UNIT – IV **IMAGE PROCESSING :** Introduction – Overview – Preprocessing _ Radiometric Correction – Geometric correction – Rectification. Enhancement Techniques – Contrast Stretch – Edge enhancement – Filtering Techniques – Classification Techniques – Supervised and unsupervised classification. **UNIT – V** **GEOGRAPHICAL INFORMATION SYSTEM:** Basic Principles – Definition – Components – Data Structures – Raster and Vector formats – Functioning of GIS - Data Input – Data Manipulation – Data Retrieval – Data Analysis – Data Display – Data Base Management Systems.
Text Books and reference Books:	**TEXT BOOKS:** 1. Remote sensing and GIS by Prof. Anji Reddy. 2. Principles of Remote Sensing & GIS by Dr. PH Anand & V. Raj Kumar **REFERENCE BOOKS:** 1. F.F.Sabins Jr. Remote Sensing Principles and Interpretation. 2. P.J.Curran, Principles of Remote Sensing. 3. Little and Kiefe, Remote Sensing Principles and Image Interpretation. 4. C.P.I., Principles of Geographic Information Systems. 5. J.R. Jense, Principles of Remote Sensing. 6. Prithvish Nag, M. Kudrat, Digital Remote Sensing.

13CE42E2 - FINITE ELEMENT ANALYSIS

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Structural Analysis**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Able to apply the fundamental concepts of FEM.
	CO2	Able to understand and apply the concepts of one dimensional finite elements.
	CO3	Able to apply basic FEM concepts of truss elements.
	CO4	Able to apply basic concepts of FEM for beam elements.
	CO5	Able to apply isometric concepts in modeling of finite elements.

Course Content

UNIT –I

INTRODUCTION TO FINITE ELEMENT METHOD: Introduction, Finite Difference Method, Advantages and disadvantages, basis steps, Limitations, Finite Element Modeling and Discretization, Interpolation and shape functions, Types of elements, nodes and degrees of freedom

UNIT – II

ONE DIMENSIONAL FINITE ELEMENTS: Introduction, bar element, beam element, bar and beam elements of arbitrary orientation, assembly of elements, stiffness matrices, boundary conditions, loads, applications.

UNIT – III

TRUSSES: Plane trusses, local and global coordinate systems, direction cosines, element stiffness matrix, assembly of global stiffness matrix, stress calculation.

UNIT – IV

FINITE ELEMENT FORMULATION: Introduction beam stiffness, assembly of beam stiffness matrix, loading, boundary conditions, plane stress, plane strain analysis

UNIT – V

ISOPARAMETRIC ELEMENTS AND FINITE ELEMENT MODELLING: Mesh requirements, material properties, loads and reactions, boundary conditions, checking the model, analysis and design software (for practice purpose only)

Text Books and reference Books:	**TEXT BOOKS:** 1. Finite Element Analysis – Govinda Rao. 2. Finite Element Analysis – S. S. BhavaKatti. 3. Introduction to Finite Elements Engineering. - Chandrupatla & Belegundu. 4. Introduction to Finite Elements.- Abel & Desai. 5. Finite Element Analysis in Engineering Design- S. Rajasekaran . 6. Finite Element Analysi, Theory and Programming. - C.S. Krishna Murthy. **REFERENCE BOOKS:** 1. The Finite Element Method.- Zienkiewicz. 2. Concepts and Applications of Finite Element Analysis.- Robert Cook Davis Mallcus. 3. Theory and Problems of Finite Element Analysis. - George Buchanan.

13CE42E3 - ADVANCED HIGHWAY ENGINEERING

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 – 0
Prerequisite:	Transportation Engineering	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	To familiarize with design considerations of highway projects and factors that are involved in everyday work on a project.
	CO2	To analyze and study different methods of road maintenance along with failures normally associated with projects involving pavements and sub soils.
	CO3	To understand special and complex projects, their maintenance and workings along with factors which influence their efficiency.
	CO4	To explain concepts of planning and land use development with respect to highways in particular and the community in general.
	CO5	To understand the concepts of safety and economics, important in the economic growth of the community for its social and behavioral consequences.
Course Content	**UNIT – I** Highway Lighting – Design factors, design of highway lighting systems. Machinery and equipment – for earth work, rock excavation, transportation of materials, watering compaction, bituminous and concrete works. **UNIT – II** Soil treated roads, Soil stabilized roads – various methods. Maintenance of Highway causes of pavement failures – classification of maintenance works, failures in-flexible pavements, failure in cement concrete pavements, maintenance of bituminous roads and cement concrete roads. **UNIT – III** Ghat roads – Alignment, geometry of hill roads, drainage in ghat roads, maintenance problems. Roads in special areas – Roads in swampy and water logged areas and in block cotton soils.	

	UNIT – IV Road side development – environmental factors in planning and development of highways, road side development and arboriculture- planning plantation of trees, care of trees. **UNIT – V** Highway safety – Road accident situations in India, causes of road accidents. Road and its effects on Road accidents, Safety during construction. Highway Economics – Introduction – Highway user benefits, highway costs
Text Books and reference Books:	**TEXT BOOK** 1. Highway Engineering – S.K.Khanna & C.E.G.Justo. 2. Principles and Practices of Highway Engineering by – L.R.Kadiyali. **REFERENCE BOOKS:** 1. Principles, Practice and Design of Highway Engg., by S.K. Sharma, S.Chand & Co.Ltd., New Delhi, 1985. **2.** A course in Highway Engineering by S.P. Bindra, Dhanpat Rai & Sons, Delhi 1988.

13CE42E4 -GROUND IMPROVEMENT TECHNIQUES

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Soil Mechanics, Foundation Engineering**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Be able to understand dewatering methods and grouting techniques.
	CO2	Be able to apply in-situ densification methods for soils.
	CO3	Be able to understand and apply the various chemicals for stabilization of soils.
	CO4	Be able to understand components of reinforced earth and application of geosynthetics.
	CO5	Be able to understand the concept of ground improvement for expansive soils.

Course Content

UNIT – I

Dewatering: methods of de-watering- sumps and interceptor ditches- single, multi stage well points - vacuum well points. Horizontal wells-foundation drains-blanket drains- criteria for selection of fill material around drains –Electro-osmosis .

Grouting: Objectives of grouting- grouts and their properties- grouting methods-ascending, descending and stage groutinghydraulic, fracturing in soils and rocks-post grout test.

UNIT – II

In – situ densification methods in granular Soils:– Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth.

In – situ densification methods in Cohesive soils:– preloading or dewatering, Vertical drains – Sand Drains, Sand wick geodrains – Stone and lime columns – thermal methods.

UNIT - III

Stabilisation: Methods of stabilization-mechanical-cement- lime-bituminous-chemical stabilization with calcium chloride, sodium silicate and gypsum

UNIT – IV

Reinforced Earth: Principles – Components of reinforced earth – factors governing design of reinforced earth walls – design principles of reinforced earth

	walls. **Geosynthetics** : Geotextiles- Types, Functions and applications – geogrids and geomembranes – functions and applications. **UNIT – V** **Expansive soils**: Problems of expansive soils – tests for identification – methods of determination of swell pressure. Improvement of expansive soils – Foundation techniques in expansive soils – under reamed piles.
Text Books and reference Books:	**TEXT BOOKS:** 1. Hausmann M.R. (1990), Engineering Principles of Ground Modification, McGraw-Hill International Edition. 2. Purushotham Raj. Ground Improvement Techniques, Laxmi Publications, New Delhi **REFERENCES:** 1. Moseley M.P. (1993) Ground Improvement, Blackie Academic and Professional, Boca Taton, Florida, USA. 2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) Ground Control and Improvement, John Wiley and Sons, New York, USA. 3. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jercy, USA

13CE42E5 - ENVIRONMENTAL POLLUTION AND CONTROL

Course category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 1 - 0
Prerequisite:	**Environmental Studies, Environmental Engineering**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	Understanding the nature, significance and effects of pollution.
	CO2	Understand the effects of air pollution and various controlling parameters.
	CO3	Understanding the effects of water pollution and various controlling parameters
	CO4	Understand the various methods for solid and hazardous waste disposal.
	CO5	Understand the environmental legislation acts for industrial pollution control.

Course Content

UNIT – I

THE NATURE OF POLLUTION:
Air pollution and its effects on living and non-living. Water pollution and its effects, solid wastes and land pollution.

UNIT – II

AIR POLLUTION CONTROL:
Influence of metereological parameters, physical principles, dry systems, fabric collectors, wet scrubbers, electrostatic precipitations, fume incineration tall sacks. Physical separation systems gravity setting chambers, inertial separators, cyclones, fabric collectors, wet scrubbers, electrostatic precipitators, fume incineration.

UNIT – III

WATER POLLUTION CONTROL:
Routine methods for removal of suspended and dissolved impurities, advance methods like chemical oxidation, membrane separation process, and biological process for removal of phosphorous and nitrogen. Land treatment, eutrophication control.

UNIT – IV

SOLD WASTE MANAGEMENT:
Quantities and characterizations of municipal solid wastes, recovery of materials and energy sanitary land filling. Disposal of hazardous wastes.

	UNIT – V **ENVIRONMENTAL LEGISLATION AND INDUSTRIAL POLLUTION CONTROL:** Legislation conserving water pollution air pollution and hazards wastes. Caste studies of pollution control in cement industries, paper, & pulp industries, brewing.
Text Books and reference Books:	**TEXT BOOKS:** 1. Environmental Pollution and Control J. Jeffrey Peirce, P Aarne Vesilind, Ruth Weiner 2. Environmental Pollution Control Engineering by CS Rao 3. Environmental Pollution and Control by P. R. Trivedi **REFERENCE BOOKS:** 1. Environmental engineering by peavey and Rowe 2. Environmental pollution and control – P.A Vesilind, J.J. Peirce.

13CE42P1 - COMPUTER AIDED ANALYSIS AND DESIGN

Course category:	Program core	**Credits:**	2
Course Type:	Theory	**Lecture - Tutorial - Practical:**	0 - 0 - 3
Prerequisite:	**Structural Analysis, D.R.C.C.S., Building Planning and Drawing**	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	A student will able to know how to apply engineering drawing using computers.
	CO2	A student can understand about the scope of Auto CAD software.
	CO3	Use STAAD Pro for analysis of simple beams and truss problem.
	CO4	Use STRAP Pro for analysis of a pin jointed frame, multi storeyed, multi bay portal frame.
	CO5	Execute solution of system of linear simultaneous equations of large system.
Course Content	1. Elementary Graphics in Civil Engineering. 2. Elements of Auto CAD and its applications in Civil Engineering. 3. Solution of beam problem by STAAD Pro. 4. Solution of truss problem by STAAD Pro. 5. Analysis of simple Pin jointed frame using **STRAP**. 6. Analysis of multi storeyed, multi bay portal frame by **STRAP**. 7. Solution of system of linear simultaneous equations of large system.	

13CE42PR PROJECT WORK

Course category:	Program core	**Credits:**	6
Course Type:	Theory	**Lecture - Tutorial - Practical:**	0 - 0 - 3
Prerequisite:		**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	CO1	To develop basic concept and principle of real life problems in Civil engineering.
	CO2	Understand the behaviour of simple and complex problems related with Civil Engineering.
	CO3	Recognize and be able to apply fundamental principles to check the accuracy , safety and reliability.
	CO4	Generate an ability to apply knowledge of Civil Engineering in the design of real life Civil engineering problems.
	CO5	Built the necessary theoretical background for planning and estimation of different designed civil engineering structures.
Course Content	The progress in the project work is to be presented by the middle of IV Year- II Semester before the internal evaluation committee. By this time, the students will be in a position to publish a paper in international/ national journals/conferences. The external examiner will evaluate the project work in final project presentation. **Project report:** To be prepared in proper format decided by the concerned department. The report shall record all aspects of the work, highlighting all the problems faced and the approach/method employed to solve such problems. Members of a project group shall prepare and submit separate reports. The student's sessional marks for project will be out of 200, in which 80 marks will be based on day to day performance assessed by the guide. Balance 120 marks will be awarded based on the presentation of the project by the students before an external examiner.	