

**CENTRAL UNIVERSITY OF HARYANA
MAHENDARGARH**

**SCHEME OF STUDIES & EXAMINATIONS
B. Tech. in CIVIL ENGINEERING**

**Choice Based Credit System
(w.e.f. Session 2020-21)**

**Central University of Haryana
Department of Civil Engineering**

A series of handwritten signatures in blue ink. The first signature is clearly legible as 'Vikas Garg'. The other signatures are more stylized and difficult to read.

CENTRAL UNIVERSITY OF HARYANA
SCHEME OF STUDIES & EXAMINATIONS
B.Tech. 2nd YEAR (SEMESTER – III: CIVIL ENGINEERING)
Choice Based Credit Scheme w.e.f. 2019-20

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P/D		Theory	Practical			
1	BT MAT 215A	MATHS III (TRANSFORM AND DISCRETE MATHEMATICS)	3	-	-	30	70	-	100	3	3
2	BT CE 201A	STRENGTH OF MATERIALS	3	1	-	30	70	-	100	4	3
3	BT CE 203A	SURVEYING	3	1	-	30	70	-	100	4	3
4	BT CE 205A	FLUID MECHANICS-I	3	1	-	30	70	-	100	4	3
5	BT CE 207A	BUILDING CONSTRUCTION AND MATERIALS	3	-	-	30	70	-	100	3	3
6		GEC-I	3	1	0	30	70		100	4	3
7	BT CE 209A	STRENGTH OF MATERIALS LAB	-	-	2	30		70	100	1	3
8	BT CE 211A	SURVEYING LAB	-	-	2	30		70	100	1	3
9	BT CE 213A	FLUID MECHANICS LAB	-	-	2	30		70	100	1	3
10	BT AUD 201	ENVIRONMENTAL SCIENCES	2	-	-	30	70	-	100	0	3
Total			20	4	6	300	490	210	1000	25	

Vikas Garg *Dr. Anil Kumar*

CENTRAL UNIVERSITY OF HARYANA
SCHEME OF STUDIES & EXAMINATIONS
B.Tech. 2nd YEAR (SEMESTER – IV: CIVIL ENGINEERING)
Choice Based Credit Scheme w.e.f. 2019-20

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	BT CE 202A	STRUCTURAL ANALYSIS - I	3	1	-	30	70	-	100	4	3
2	BT CE 204A	FLUID MECHANICS-II	3	1	-	30	70	-	100	4	3
3	BT CE206A	GEOMATIC ENGG	3	-	-	30	70	-	100	3	3
4	BT CE208A	TRANSPORTATION ENGINEERING - I	3	0	-	30	70	-	100	3	3
5	BT CE 218A	MECHANICAL ENGINEERING	3	0	-	30	70	-	100	3	3
6		GEC-II	3	1	-	30	70	-	100	4	3
7	BT CE 210A	STRUCTURAL ANALYSIS – I LAB	-	-	2	30		70	100	1	3
8	BT CE 212A	FLUID MECHANICS-II LAB	-	-	2	30		70	100	1	3
9	BT CE 214A	GEOMATIC ENGINEERING LAB	-	-	2	30		70	100	1	3
10	BT CE216A	TRANSPORTATION ENGINEERING – I LAB	-	-	2	30		70	100	1	3
11	BT GF 202A	GENERAL FITNESS IN CIVIL ENGINEERING	-	-	-	-	-	70	70	-	3
Total			18	3	8	300	420	350	1070	25	

Vikas Garg *Dr. Anurag Kumar*

BT CE AUD 201 (Environmental Studies)

L	T	P/D	Credits	Field Work	:	30 Marks
2	--	--	0	Examination (Theory/Practical)	:	70 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

UNIT I

The Multidisciplinary Nature of Environmental Studies, Introduction to Environment: Definition, Scope, and importance of environmental studies; need for public awareness.

Environmental Pollution: Definition, Cause and effects of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Role of an individual in prevention of pollution, Pollution case studies

UNIT- II

Natural Resources: Water resources: over-utilization, floods, drought, dams-benefits and problems; Mineral resources: Use and exploitation, environmental effects; Food resources : changes caused by modern agriculture, fertilizer-pesticide problems, water logging, Energy resources : Growing energy needs, renewable and non renewable energy sources; Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

UNIT –III

Ecosystems and Biodiversity: Concept of an ecosystem, Structure and function, Energy flow, Ecological succession, ecological pyramids. Concept of Biodiversity, definition and types, Hot-spots of biodiversity; Threats to biodiversity, Endangered and endemic species of India, Conservation of biodiversity.

UNIT –IV

Social Issues and Environment: Water conservation, rain water harvesting, Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, Public awareness. Population growth, variation among nations, Family Welfare Programme.



Human Population and the Environment - Population growth, Population explosion, Women and Child Welfare.

Field Work - Visit to a local area to document environmental assets—river/forest/grassland/hill/mountain. Visit to a local polluted site—Urban/Rural/Industrial/Agricultural. Study of common plants, insects, birds. Study of simple ecosystems—pond, river, hill slopes, etc
(Field work equal to 5 lecture hours)

REFERENCE BOOKS:

1. **A Textbook of Environmental Studies** by [Asthana D.K.](#) and [Asthana Meera](#) 2010
2. **Fundamental Concepts in Environmental Studies** by [Mishra D.D.](#) 2012
3. **Environmental Studies** by [S.C Sharma M.P Poonia](#) 2005
4. **Textbook of Environmental Studies for Undergraduate** by [Erach Bharucha](#) 2018
5. **Environmental Studies: Third Edition** by [R. Rajagopalan](#) April 2015

The image shows several handwritten signatures and names in blue ink. From left to right, there is a stylized signature, the name 'Vikas Garg' written in a cursive script, another stylized signature, the name 'Anurag' written in a cursive script, and a final stylized signature.

BT MAT 215A Mathematics-III

(TRANSFORM AND DISCRETE MATHEMATICS)

L	T	P/D	Credits	Field Work	:	30 Marks
3	--	--	0	Examination (Theory/Practical)	:	70 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

UNIT – I

Laplace Transform: Definition and existence of Laplace transform, Properties of Laplace Transform and formulae, Unit Step function, Dirac Delta function, Heaviside function, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace transforms method.

UNIT – II

Fourier Transform: Fourier Complex, Sine and Cosine transform, properties and formulae, inverse Fourier transforms, Convolution theorem. Fourier transform applications to solve ordinary and partial differential equations.

UNIT – III

Set Theory: Algebra of sets, Classes of sets, Power Sets, Multi sets, Cartesian Product, Representation of relations, Types of relation, Equivalence relations and partitions, Partial ordering relations.

Techniques of Counting: Permutations with and without repetition, Combination, Pigeonhole principle.

UNIT – IV



Algebraic Structures: Definition and examples of a monoid, Semigroup, Groups and rings, Homomorphism, Isomorphism and Automorphism, Subgroups and Normal subgroups, Cyclic groups, Integral domain and fields, Cosets, Lagrange's theorem.

Text Books:

1. E. Kreyszig, *Advanced Engineering Mathematics*, 10 edition. Hoboken, NJ: Wiley, 2011.
2. J.-P. Tremblay and R. Manohar, *Discrete Mathematical Structures with Applications to Computer Science*, 1 edition. New Delhi, India: McGraw Hill Education, 2017.
3. B. Kolman, R. Busby, and S. C. Ross, *Discrete Mathematical Structures*, 6 edition. Upper Saddle River, NJ: Pearson, 2015.
4. B. S. Grewal, *Higher Engineering Mathematics 44th Edition*. Khanna Publishers, 2017.

Reference Books:

1. S. Lipschutz, M. L. Lipson, and V. H. Patil, *Discrete Mathematics*, Revised Third edition. McGraw Hill Education, 2017.
2. C.L. Liu. and Mohapatra, *Elements of Discrete Mathematics: A Computer Oriented Approach*, 4th edition. New York: Mc Graw Hill India, 2017.
3. J. Bird, *Higher Engineering Mathematics, 7th ed*, 7 edition. Abingdon, Oxon ; New York, NY: Routledge, 2014.
4. R. K. Jain and S. R. K. Iyengar, *Advanced Engineering Mathematics 4/e*), Fourth edition edition. Oxford: Narosa Publishing House Pvt. Ltd. - New Delhi, 2014.

The image shows several handwritten signatures and names in blue ink. From left to right, there is a stylized signature, the name 'Vikas Garg' written in a cursive script, another stylized signature, the name 'Anurag', and a final signature that appears to be 'Ankur'.

BT CE 201A: STRENGTH OF MATERIALS

B. Tech. 2nd Year (Semester – III)

L	T	P	Credit	Class Work	: 30 Marks
3	1	--	4	Examination	: 70Marks
				Total	: 100 Marks
				Duration	of : 3 Hours
				Examination	

UNIT - I

Introduction: Concept of stress and strain, generalized Hooke's law, Stress-strain diagram of ductile and brittle material, thermal stresses, volumetric stresses and strains, Analysis of Principal stresses and Strains, Mohr's stress circle, Relationship among elastic constants.

Shear force and Bending moment diagrams: Types of load on beam and frames, classification of beams, statically determinate problems, shear force and bending moment diagrams: simply supported, overhang and cantilever beams subjected to any combination of point loads, uniformly distributed and varying load and moment, relationship between load, shear force and bending moment.

UNIT – II

Theory of pure bending: Flexural Stresses-Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$ - Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I,T and Channel sections.

Shear Stresses in Beams: Shear stress formula for beams, shear stress distribution in beams like rectangular, circular, triangular, I, T sections. Numericals.

UNIT – III

Torsion of Circular shafts: Basic assumptions, torsion formula, power transmitted by shafts, design of solid and Hollow shafts based on strength and stiffness.

Columns & Struts: Column under axial load, concept of instability and buckling, slenderness ratio, derivation of Euler's formulae for the elastic buckling load, Rankine Gordon Formula, Secant Formula, eccentric compression of a short strut of rectangular & circular sections, Numericals.

UNIT – IV

Slope & Deflection: Relationship between bending moment, slope & deflection, Mohr's theorem, moment area method, conjugate beam method, method of integration, Macaulay's method, calculations for slope and deflection of (i) cantilevers and (ii) simply supported beams with or without overhang under concentrated load, Uniformly distributed loads or combination of concentrated and uniformly distributed loads, Numericals.

Strain energy: strain energy under axial, bending, shear, torsion, gradual, sudden and impact loading.



Text Books

1. Strength of Materials by G H Ryder, ELBS publishers 2016
2. Elements of Strength of Materials by Timoshenko & Young, East- West Press, New Delhi, 2003.
3. Mechanics of Materials by Beer and Johnston, Tata McGraw Hill, 2015.
4. Elementary Structural Analysis, Norris & Wilbur, McGraw Hill Publisher 1991
5. Strength of Materials, R K Bansal, Luxmi Publications 2018
6. Strength of Materials, U C Jindal, Pearson Publications 2012

Reference Books

1. Strength of Materials by Sadhu Singh, Khanna Publishers 2014
2. Basic Structural Analysis, C.S. Reddy, Tata McGraw Hill Publication. 2010
3. Fundamentals of Solid Mechanics by M L Gambhir, Prentice Hall of India 2011
4. Strength of Materials Ramamurtham and Narayanan, S. Chand & Co. 2014
5. Fundamentals of Structural Analysis B D Nautiyal, New Age Publishers 2001

A series of handwritten signatures and a stamp. From left to right: a blue checkmark, a signature that reads 'Vikas Garg', a blue ink signature, another blue ink signature, and a final blue ink signature.

BT CE 205A: FLUID MECHANICS-I
B. Tech. 2nd Year (Semester – III)

L	T	P	Credit	Class Work	: 30 Marks
3	1	-	4	Examination	: 70 Marks
				Total	: 100 Marks
				Duration	of : 3 Hours
				Examination	

UNIT-I

Introduction:

Fluid properties, mass density, specific weight, specific volume and specific gravity, surface tension, capillarity, pressure inside a droplet and bubble due to surface tension, compressibility viscosity, Newtonian and Non-newtonian fluids, real and ideal fluids.

Kinematics of Fluid Flow:

Steady & unsteady, uniform and non-uniform, laminar & turbulent flows, one, two & three dimensional. flows, stream lines, streak lines and path lines, continuity equation in differential form, rotation and circulation, elementary explanation of stream function and velocity potential, rotational and irrotational flows, graphical and experimental methods of drawing flownets.

UNIT-II

Fluid Statics:

Pressure-density-height relationship, gauge and absolute pressure, simple differential and sensitive manometers, two liquid manometers, pressure on plane and curved surfaces, center of pressure, Buoyancy, stability of immersed and floating bodies, determination of metacentric height, fluid masses subjected to uniform acceleration, free and forced vortex.

UNIT-III

Dynamic of Fluid Flow:

Euler's equation of motion along a streamline and its integration, limitation of Bernouli's equation, Pitot tubes, venturimeter, orificemeter, flow through orifices & mouth pieces, sharp crested weirs and notches, aeration of nappe.



Dimensional Analysis and Hydraulic Similude:

Dimensional analysis, Buckingham theorem, important dimensionless numbers and their significance, geometric, kinematic and dynamic similarity, model studies, physical modeling, similar and distorted models.

UNIT-IV

Boundary layer analysis:

Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, turbulent boundary layer, laminar sub-layer, smooth and rough boundaries, local and average friction coefficient, separation and its control.

Drag and Lift:

Types of drag, drag on a sphere, flat plate, cylinder and airfoil, development of lift on immersed bodies like circular cylinder and airfoil, flow around a sphere-Stokes' law

Books:

1. Fluid Mechanics by Modi & Seth , Standard Book House, New Delhi 2018
2. Fluid Mechanics Through Problems by R.J.Garde 2011
3. Engineering Fluid Mechanics by R.J.Garde & A.G.Mirajgaoker 2010
4. Fluid Mechanics A.K.Jain Khanna Publishers, New Delhi

Reference books

1. Introduction to Fluid Mechanics by Robert W.Fox & Alan T.McDonald 2011
2. Fluid Mechanics Through Problems by R.J.Garde 2011
3. Streeter V.L., Fluid mechanics, Tata McGraw Hill, 1998.
4. Fluid Mechanics John F. Douglas, Gasiorek & Swaffield, Pearson Education 2006



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BT CE 207A: BUILDING CONSTRUCTION AND MATERIALS

B. Tech. 2nd Year (Semester – III)

L	T	P	Credit	Class Work	: 30 Marks
			s		
3	--	-	3	Examination	: 70 Marks
				Total	: 100 Marks
				Duration	of : 3 Hours
				Examination	

UNIT - I

Bricks: Composition of good brick earth, harmful ingredient, manufacture of bricks, characteristics of good bricks, testing of bricks, classification of bricks as per IS 1077-1985.

Rocks and Stones: Classification of rocks, test for stones, characteristics of a good building stone, deterioration of stones, common building stones of India, comparison of the brick work and stone work.

Timber: Classification of timbers, structure of timber, seasoning of timber, defects in timber, fire proofing of timber

UNIT - II

Cement: Types, Manufacture, basic properties of cement compounds, grades, packing, storage, quality control and curing, additives, special cements, all testing as per IS.

Steel: Manufacture of steel, market forms of steel e.g. mild steel and HYSD steel bars, rolled steel sections, stainless steel mortars

Aggregates: Classification of Aggregates, Characteristics of Aggregate, Deleterious Materials and Organic Impurities, Soundness, Alkali-Aggregate Reaction, Thermal Properties of Aggregate, Fine Aggregate, Coarse Aggregate, Broken Brick Coarse Aggregate, Testing of Aggregates

UNIT - III

Masonry, stone masonry, basic terms, materials for stone masonry, classification, dressing of stones, joints in stone masonry, Brick Masonry, laying tools, basic terms, bonding of bricks, tools, inspection of brickwork, strength of brick work, Cavity walls, features, wall ties, construction of cavity wall, Lintels.

Construction equipment's: Modern equipment's used in the construction of multi storey buildings and bridges

UNIT - IV

Damp proof course: requirement in buildings, D.P.C. at Plinth level, in basement and roof tops etc., Basement & Retaining walls. Drawings.

Foundation types and suitability, spread, arch, combined, cantilevered, Raft, Grillage, Piles & wells, Footings in block cotton soil, IS Specifications and drawings.

Stairs & Stair cases: Suitability of location, stairs in multi-storeyed buildings, Residential and public buildings, dimensions, Requirements, classification, types of stairs, Lift & escalators, drawings.

Text Books

1. Building Materials by P C Varghese, PHI. 2015
2. Engineering Materials, by S.C. Rangawala, Charotar Publishing House, Anand.2017



3. Building Construction by Sushil Kumar, Standard Publisher and Distributors. 2014
4. Building Construction by B. C. Punima, Laxmi Publisher House 2016

Reference Books

1. Engineering Materials, by Sushil Kumar, Metropolitan Press 2014
2. Engineering Materials by N.C. Choudhary, Technical Publishers.2012
3. Materials Science, J.C. Anderson & KDB Lever, ELBS. 2008.
4. Indian Practical Civil Engg. Handbook, P N Khanna, Engineers Publishers, 2012.
5. National Building Code, B. I. S. 2016

 Vikas Garg   

BT CE 209A: STRENGTH OF MATERIALS LAB

B. Tech. 2nd Year (Semester – III)

L	T	P	Credit	Class Work	: 30 Marks
--	--	2	1	Examination	: 70 Marks
				Total	: 100
					Marks
				Duration	of : 3 Hours
				Examination	

List of Experiments:

1. To determine Rockwell hardness number of the specimen of steel/soft metal.
2. To determine Brinnel hardness number of the specimen of steel/soft metal.
3. To study the behavior of ductile material under tension on Universal Testing Machine
4. To study the behavior of brittle material under tension on Universal Testing machine.
5. To study the behavior of brittle material under compression on Universal Testing machine.
6. To determine the Torsional rigidity of shaft on torsion testing machine.
7. To determine the impact strength of M.S./C.I. specimen on Izod impact testing machine.
8. To determine the impact strength of M.S./C.I. specimen on Charpy impact testing machine.
9. To determine flexural rigidity of a beam simply supported at the ends and carrying a concentrated load at the center.

The image shows several handwritten signatures and names in blue ink. From left to right, there is a signature that appears to be 'Vikas Gay', followed by another signature, and then a name that looks like 'Anurag'. There are also some other illegible signatures and initials.

BT CE – 211A: SURVEYING LAB
B. Tech. 2nd Year (Semester – III)

L T P Credits
-- -- 2 1

Class Work : 30 Marks
Examination : 70 Marks
Total : 100 Marks
Duration of : 3 Hours
Examination

List of Experiments

1. Chain Survey of an area
2. Compass Surveying
3. Plane table survey of an area.
4. Leveling Exercises.
5. Measurement of vertical and horizontal angles with Theodolite.
6. Tachometric Constants.
7. Tachometric Survey
8. Two point / three point problem.
9. Setting out a simple circular curve by different methods.
10. Measurements with Total Station.

The image shows several handwritten signatures and stamps at the bottom of the page. On the left, there is a signature that appears to be 'Vikas Gaj'. To its right, there are several other signatures, some of which are partially obscured by a rectangular stamp. The stamps are mostly illegible but appear to be official marks.

BT CE – 213A: FLUID MECHANICS LAB
B. Tech. 2nd Year (Semester – IV)

L	T	P	Credits	Class Work	:	30 Marks
--	--	2	1	Examination	:	70 Marks
				Total	:	100 Marks
				Duration	of :	3 Hours
				Examination		

List of Experiments

1. Verification of Bernoulli's Theorem.
2. Calibration of Venturimeter.
3. Calibration of an orifice meter.
4. Determination of Hydraulics Coefficients of a circular orifice.
5. Determination of friction factor for pipes.
6. Visualization of laminar and turbulent flow and estimating critical Reynold's number.
7. Determination of metacentric height of a ship model.
8. To measure the velocity distribution over a flat surface in a wind tunnel and to determine the Reynold's no. and boundary layer thickness along the plate.
9. To measure the pressure distribution around a cylinder in a wind tunnel and to calculate the coefficient of drag at different Reynold's number.

The image shows several handwritten signatures and names in blue ink. From left to right, there is a stylized signature, the name 'Vikas Gaj', another signature, the name 'Anurag', and a final signature that appears to be 'Ankur'.

IV Semester

Vikas Gaj  Any R Akumar gh

BTCE – 202 A: STRUCTURAL ANALYSIS I

B. Tech. 2nd Year (Semester – IV)

L	T	P	Credit	Class Work	: 30 Marks
3	1	--	4	Examination	: 70Marks
				Total	: 100 Marks
				Duration	of : 3 Hours
				Examination	

UNIT I

Analysis of Determinate Trusses Introduction, various types, stability, determination of forces in member of trusses by method of joints, method of sections, zero force members.

Deflection of Beams Review of Double Integration Method and Macaulay's Method, moment area theorem, conjugate beam method, unit method and strain energy method. Maxwell's reciprocal theorem.

UNIT II

Fixed and Continuous Beams: Degree of static and kinematic indeterminacies, Analysis of fixed beams, continuous beams and propped cantilevers by moment-area theorem and strain energy method, fixed end moments due to different types of loadings, effects of sinking and rotation of supports, bending moment and shear force diagrams for fixed beams and propped cantilevers, slope and deflection of fixed beams, analysis of continuous beams by the three moment theorem (Clapeyron's theorem) due to different types of loadings.

UNIT III

Rolling Loads: Introduction to rolling loads and influence lines, Determination of shear force, bending moment at a section and absolute shear force and bending moment due to single point load, uniformly distributed load, several point loads etc.

Influence Lines: Construction of Influence lines for reaction, shear forces and bending moment for simply supported, overhanging and compound beams, influence lines for girders with floor beams, Influence lines for forces in members of frames.

UNIT IV

Analysis of Two hinged and Three Hinged Arches:

Parabolic and circular Arches, Bending Moment Diagram for various loadings, Temperature effects, Rib shortening, Axial thrust and Radial Shear force diagrams.

Cables and suspension Bridges: Introduction, shape of a loaded cable, cable carrying point loads and UDL, cables with ends at different level, cable subjected to temperature stresses, suspension bridge with two hinged and three hinged stiffening girder.



Handwritten signatures and names in blue ink at the bottom of the page, including "Vikas Gay" and other illegible signatures.

Text Books

1. Elementary Structural Analysis, Norris & Wilbur, McGraw Hill Publisher, 1991
2. Basic Structural Analysis, C.S. Reddy, Tata McGraw Hill Publication.2110
3. C K WANG, “ Intermediate Structural Analysis” McGraw Hill Publisher 2014

Reference Books

1. Structural Analysis (A unified approach), D.S. Parkash Rao, University Press.1996
2. Theory of structures, Punmia and Jain, Luxmi Publications.2017
3. Structural Analysis Thandvamoorthy TS Oxford University Press 2011
4. Structural Analysis Devdas Menon Narosa Publishing House 2017

 Vikas Garg    

BT CE – 204 A: FLUID MECHANICS-II

B. Tech. 2nd Year (Semester – IV)

L	T	P	Credit	Class Work	: 30 Marks
			s		
3	1	--	4	Examination	: 70Marks
				Total	: 100 Marks
				Duration	of : 3 Hours
				Examination	

UNIT-I

Flow in Open Channels: Difference between pipe flow and channel flow, Types of channels, Classification of flows, Sub Critical and Supercritical Flows, Velocity distribution in channel, Design of Channels, Most efficient channel sections

Flow Measurement: Flow over notches and weirs, Pitot tube floats and current meters for velocity measurement, Flow over Spillways, Sluice gates, Free overfall flow.

UNIT- II

Concepts of Specific energy and specific Force: Specific energy and specific curve, Momentum Equation in open channels, Specific force & specific force curve Critical depth and its computation.

Hydraulic jump: Froude number and types of hydraulic jump, Applications Jumps in channels. Unsteady flow equation, Pre jump and post jump depths, length of Hydraulic Jump and energy dissipation, Surges.

Unit III

Gradually Varied Flow: Channel transitions, Non-uniform flow in open channels, Dynamic equation for GVF, Water surface profiles, GVF flow computations. Design of Channels, Most efficient channel sections.

UNIT-IV

Flow through pipes: Types of flows-Reynold's experiment, laminar flow through pipes-Hagen Poiseuille law, shear stress on turbulent flow, boundary layer in pipes-Establishment of flow, velocity distribution for turbulent flow in smooth and rough pipes, resistance to flow of fluid in smooth and rough pipes, Stanton and Moody's diagram. Darcy's weisbach equation, other energy losses in pipes, loss due to sudden expansion, hydraulic gradient and total energy lines, pipes in series and in parallel, equivalent pipe, branched pipe, pipe networks, Hardy Cross method, water hammer.

Books:

- 1 Fluid Mechanics by Modi & Seth , Standard Book House, New Delhi 2018



- 2 Fluid Mechanics Through Problems by R.J.Garde 2011
- 3 Engineering Fluid Mechanics by R.J.Garde & A.G.Mirajgaoker 2010
- 4 Fluid Mechanics A.K.Jain Khanna Publishers, New Delhi 2010
- 5 Open Channel Hydraulics Van te Chow McGraw Hill 2015
- 6 Open Channel Hydraulics Subramanya 2015

Reference books

- 1 Introduction to Fluid Mechanics by Robert W.Fox & Alan T.McDonald 2011
- 2 Fluid Mechanics Through Problems by R.J.Garde 2011
- 3 Streeter V.L., Fluid mechanics, Tata McGraw Hill, 1998.
- 4 Fluid Mechanics John F. Douglas, Gasiorek & Swaffield, Pearson Education 2006

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BT CE – 206A: GEOMATICS ENGINEERING

B. Tech. 3rd Year (Semester – IV)

L	T	P	Credits	Class Work	:	30 Marks
3	0	--	3	Examination	:	70Marks
				Total	:	100 Marks
				Duration	of :	3 Hours
				Examination		

UNIT – I

Introduction to Geomatic Engineering- Introduction to map and Geographic coordinate system- Map projections, projected coordinate system, application of coordinate systems; Global positioning system (GPS)- Elements, satellite constellation and signals and GPS measurements.

UNIT – II

Remote Sensing: Definition and scope of Remote sensing, Nature and spectrum of Electromagnetic radiation, Reflectance, Transmission and Absorption, Thermal Emission – Plank’s formula, Stefan – Boltzman Law, Wein’s Displacement Law; Emissivity – Kirchoff’s Law; Interaction of EMR with Atmosphere: Scattering, Refraction, Absorption, Transmission. Atmospheric Windows; Interaction of EMR with Earth Surface: Spectral Reflectance Curves, Interaction of earth surface with EM radiation in visible, Near Infrared, Thermal Infrared and Microwave regions. Idealised & Real sequence of remote sensing.

UNIT – III

Remote sensing- Platforms and sensors: Platforms, Orbital characteristics, sensor parameters- spatial resolution, spectral resolution, radiometric resolution, Storage and Retrieval of data.

Indian Remote Sensing satellite systems- Introduction, Stages of development, Sensors, Types of scanning system.

Data Processing: Initial data statistics. Pre-processing – Atmospheric, Radiometric and Geometric corrections, Image Histogram, Classification of images and interpretation.

Application- Application of remote sensing to various engineering fields.

UNIT – IV

Geographical Information system (GIS): Definition, and Components, Geographical data: types and characteristics; Spherical and plane coordinate systems in GIS; geo-referencing, Digital representation of geographic data: Data structure, spatial data model, raster and vector models; GIS data standards: concepts and components; Integration of Remote sensing and GIS; GIS project design and planning methodologies; GIS data base management systems; Application of GIS in civil engineering

Text Books



Handwritten signatures of faculty members, including one that reads "Vikas Garg".

1. Geomatic Engineering, Manoj K Arora, RC Badjatiya, Nem Chand & Bros. 2009
2. Remote Sensing and Image Interpretation, by Lillisand, T.M. & Kiefer R.W., John Wiley and Sons. 2015
3. Introduction to Remote Sensing, by Campbell, J.B. Taylor and Francis.2007
4. Principles of Geographic information systems, Burrough, P.A and MacDonnel, R.a , Oxford University press 2016
5. Concepts and Techniques of GIS, C.P.Lo,Albert K.W.Yeung, PHI 2009

Reference Books

1. Digital Remote Sensing, by Nag. P. & Kudrat, M. Concept Publication Company.1998
2. Remote Sensing and Photogrammetry – Principles and Applications, by Jhanwar, M.L. and Chouhan, T.S. Vigyan Prakashan, Jodhpur.2004

Handwritten signatures and text in blue ink. The first signature is 'Vikas Garg' with a box around it. The second signature is 'DR'. The third signature is 'Anj R'. The fourth signature is 'Akumar'.

BT CE- 208A: TRANSPORTATION ENGINEERING – I

B. Tech. 2nd Year (Semester – IV)

L	T	P	Credits	Class Work	: 30 Marks
3	1	--	4	Examination	: 70 Marks
				Total	: 100 Marks
				Duration of Examination	: 3 Hours

UNIT – I

Highways development Planning: Introduction, Different modes of transport, Development of Transport System, Phased development of Roads in India. Highway Surveys & Alignment, Design, Drawings, Estimates & Project Report.

Highway materials and testing: sub grade, sub base and base course materials, bituminous materials, testing of soil, aggregate and bitumen.

UNIT – II

Geometric Design of Highways: Introduction, Highways Classification, Right of way, Land width, width of formation, width of pavement, Sight Distances, camber, horizontal and vertical Road Curves, Transition Curves.

Design of Pavements: Types of pavements, Factors affecting design of pavements, wheel load factor, Climatic Factors, Structure of Flexible pavement, Function of various components of Flexible pavement, design of flexible pavements by G.I. & CBR methods, stresses in rigid pavements, design of rigid pavements by IRC method.

UNIT – III

Traffic Studies: Road user characteristics, Importance of traffic studies, spot speed, speed and delay and origin and destination studies. Vehicular flow models. Stream variables: Spacing and concentration, headway and flow, mean speed. Time distance diagram of flow. Traffic operations and control devices, intelligent transport systems.

Road Safety Audits: Road Safety Audits: Safety concerns in highway projects, Systems approach, various stages of Safety Audit, Preparation of Audit Reports.

UNIT – IV

Highway construction: road types--earth roads, gravel roads, water bound macadam, bituminous pavement including surface treatment, premix carpet, mastic asphalt, bituminous macadam, bituminous concrete and cement concrete roads. Construction of earth, gravel and water bound macadam roads, Construction Equipments.

Maintenance: Introduction, Maintenance of Earth, gravel, WBM, GSB, WMM Roads, Bituminous Roads, Maintenance of berms, Side Slopes, Pavement edge and draining work. Failures of flexible and rigid pavements: Maintenance, evaluation and its strengthening.

Text Books

1. Highway Engineering by Khanna and Justo, Nem Chand & Brothers, Roorkee 2015
2. Highway Engineering by L.R. Kadyali, Nem Chand & Brothers, Roorkee 2015

Reference Books



Handwritten signatures and names of authors or reviewers, including 'Vikas Garg' and others.

1. Highway Engineering by Oglesby and Hews 2010
2. Transportation Engineering by G.V. Rao, Tata McGraw Hill Publisher, New Delhi 2009

 Vikas Garg

BT CE – 218A: MECHANICAL ENGINEERING

B. Tech. 2nd Year (Semester – IV)

L	T	P	Credit	Class Work	: 30 Marks
3	--	--	3	Examination	: 70 Marks
				Total	: 100
					Marks
				Duration	of : 3 Hours
				Examination	

UNIT-I

THERMODYNAMICS - Elementary definitions in thermodynamics, fundamentals of first and 2nd law of thermodynamic- concept of internal energy, enthalpy and entropy, heat pump and refrigerator, elementary numerical problems.

PROPERTIES OF STEAM & BOILERS: properties of steam, use of steam tables and mollier diagram , measurement of dryness fraction of steam, Carnot and Rankin cycle, elementary numerical problems. Classification of boilers, Comparison of water and fire tube boilers mounting and accessories with their functions, Constructional and operational details of Cochran and Babcock and Wilcox boilers, elementary numerical problems.

STEAM TURBINES AND CONDENSERS: Classification of turbines and their working principles, Types of condensers and their uses.

UNIT-II

I.C. ENGINES AND GAS TURBINES: Introduction, Classification, Constructional details and working of two-stroke and four-stroke diesel and petrol engines, Efficiency of Otto & Diesel cycles , Working principle of gas turbine, elementary numerical problems



REFRIGERATION AND AIR CONDITIONING- rating of refrigeration machine, coefficient of performance, simple vapor compression cycle, fundamentals of air conditioning, use of Psychrometric charts.

UNIT-III

WATER TURBINES AND PUMPS : Introduction, Classification, Construction details and working principle of Pelton, Francis and Kaplan turbines, Classification of water pumps.

SIMPLE LIFTING MACHINES: Definition of machine, Velocity ratio, Mechanical advantage, Efficiency, Laws of machines, Reversibility of machine, Wheel and axle, Differential pulley block, Single, double and triple start worm and worm wheel, Single and double purchase winch crabs, Simple and compound screw jacks, elementary numerical problems.

UNIT-IV

INTRODUCTION TO POWER TRANSMISSION AND DEVICES: Belt drive, Rope drive, Chain drive, Types of gear and Gear train, Types and function of clutches, Types and function of brakes.

STRESSES AND STRAINS: Introduction, Concept & types of Stresses and strains, Poisson's ratio, stresses and strains in simple and compound bars under axial loading, Stress-strain diagrams, Hooke's law, Elastic constants & their relationships. Concept of shear force and bending moments in beams, elementary numerical problems.

TEXT BOOKS:

1. Hydraulic and Fluid Mechanics – Modi and Seth, Pub. – Standard Book House, New Delhi 2018
2. Engineering Thermodynamics – C.P. Arora, Pub. - TMH, New Delhi 2017
3. Thermal Engineering – A.S. Sarad, Pub. - Satya Prakashan, New Delhi. 2016
4. Engineering Mechanics – K.L. Kumar, Pub. - TMH, New Delhi. 2017
5. Theory of Machines – S.S. Rattan, Pub. – TMH, New Delhi. 2017

The image shows a series of handwritten signatures in blue ink. On the left, there is a signature that appears to be 'Vikas Garg' next to a rectangular stamp. To the right of the stamp are several other signatures, including one that looks like 'Raj' and another that looks like 'Ankur'.

Reference Books:

1. Basic Mechanical Engineering by Pravin Kumar, Pearson
2. Fundamental of Mechanical Engineering by G.S. Sawhney, PHI Publication New Delhi
3. Elements of Mechanical Engineering by Sadhu Singh S. Chand Publication

 Vikas Garg  Anurag Kumar

BT CE – 210A: STRUCTURAL ANALYSIS-I LAB

				B. Tech. 2nd Year (Semester – IV)	
L	T	P	Credit	Class Work	: 30 Marks
--	--	2	1	Examination	: 70 Marks
				Total	: 100
					Marks
				Duration	of : 3 Hours
				Examination	

List of Experiments:

1. To verify Betti's Law
2. To determine the flexural rigidity (EI) of a given beam.
3. To verify Moment-Area Theorems for slope and deflection of a beam.
4. To study the behavior of different types of struts.
5. To determine the elastic displacement of curved members.
6. To determine the horizontal displacement of the roller end in a curved beam.
7. To make computer programs for theoretical verification of the above experiments.

The image shows several handwritten signatures and names in blue ink. From left to right, there is a signature that appears to be 'Vikas Gaj', followed by another signature, and then a name that looks like 'Anurag'. There are also some other illegible signatures and initials.

BT CE -212A: FLUID MECHANICS-II LAB

B. Tech. 2nd Year (Semester – IV)

L	T	P	Credit	Class Work	: 30 Marks
--	--	2	1	Examination	: 70 Marks
				Total	: 100 Marks
				Duration	of : 3 Hours
				Examination	

List of Experiments:

1. To determine Manning's co-efficient of roughness for the rough bed of a given flume.
2. To measure the velocity distribution in a rectangular channel by Prandtl Pitot tube and to determine the energy correction factors
3. To study the flow through a horizontal contraction in a rectangular open channel.
4. To calibrate a current meter
5. To study the formation of hydraulic jump in a horizontal rectangular open channel (Measurement of Froude no. and energy loss)
6. To study the flow over a hump in a channel bed.
7. To study the pressure distribution along the spillway surface for different heads.
8. To calibrate a broad-crested weir and to study the pressure distribution along its surface.
9. To study the flow under a sluice gate and formation of hydraulic jump at different Froude no.

The image shows several handwritten signatures and names in blue ink. From left to right, there is a stylized signature, the name 'Vikas Gaj', another signature, the name 'Anurag', and a final signature that appears to be 'Ankur'.

BT CE – 214A: GEOMATICS ENGINEERING LAB

B. Tech. 2nd Year (Semester – IV)

L	T	P	Credit	Class Work	: 30 Marks
--	--	2	1	Examination	: 70 Marks
				Total	: 100
					Marks
				Duration	of : 3 Hours
				Examination	

List of Experiments

1. Study and image interpretation of remote sensing data.
2. Introduction to CAD/GIS/Image Processing software
3. Study of digital image characteristics such as:
 - DN value,
 - Histogram,
 - Color image generation,
 - Simple Image enhancement,
 - On-screen digitization from images,
 - Area computation,
 - Geo-registration of images etc.



BT CE- 216A : TRANSPORTATION ENGINEERING-I LAB

B. Tech. 3rd Year (Semester – IV)

L	T	P	Credits	Class Work	:	30 Marks
--	--	2	1	Examination	:	70 Marks
				Total	:	100 Marks
				Duration	of :	3 Hours
				Examination		

List of Experiments:

1. To test toughness of road Aggregates by Impact Test
2. To test hardness of aggregates by Los Angeles Abrasion Test
3. To perform Crushing Strength Test on Aggregates
4. To identify grade of bitumen using Penetration Test.
5. To test the ductility of bitumen using Ductility test.
6. To test water absorption and specific gravity of road aggregates using density basket.
7. To find out Softening Point of Bitumen.
8. To find out Flash & fire point of bitumen.
9. To determine spot speed of traffic by radar speedometer and endoscope.
10. To conduct CBR test on samples of subgrade.
11. To perform classified traffic Volume count on a road section.

The image shows several handwritten signatures and a stamp. On the left, there is a signature that appears to be 'Vikas Gaj'. To its right is another signature, followed by a signature that looks like 'Anurag'. Further right is a signature that appears to be 'Ankur'. There is also a rectangular stamp or box partially visible, containing some illegible text.