Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat) SCHEME OF STUDIES & EXAMINATIONS B.Tech. 3rd YEAR (SEMESTER – V: CIVIL ENGINEERING) Credit Based Scheme w.e.f. 2014-15

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	CE301B	STRUCTURAL ANALYSIS - II	3	2		25	75	-	100	5	3
2	CE303B	HYDROLOGY	3	1		25	75	-	100	4	3
3	CE305B	REINFORCED CONCRETE DESIGN – I	3	2		25	75	-	100	5	3
4	CE307B	ENVIRONMENTAL ENGINEERING - I	3	1		25	75	-	100	4	3
5	CE309B	TRANSPORTATION ENGINEERING - I	3	1		25	75	-	100	4	3
6	CE311B	GEO-MECHANICS	3	1		25	75	-	100	4	3
7	CE313B	REINFORCED CONCRETE DESIGN – I LAB	-	-	2	20	-	30	50	1	3
8	CE315B	ENVIRONMENTAL ENGINEERING – I LAB	-	-	2	20	-	30	50	1	3
9	CE317B	TRANSPORTATION ENGINEERING – I LAB	-	-	2	20	-	30	50	1	3
10	CE319B	GEO-MECHANICS LAB	-	-	2	20	-	30	50	1	3
11	CE321B	SURVEY CAMP	-	-	2*	20	-	30	50	2	3
Total			**18**	**8**	**10**	**250**	**450**	**150**	**850**	**32**	

Note:

23 Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of sports is given in General Proficiency Syllabus.

24 The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator are prohibited in the examination.

25 Electronics gadgets including Cellular phones are not allowed in the examination

26 * Assessment of survey camp held after fourth semester.

CE-301B: STRUCTURAL ANALYSIS – II

B. Tech. 3nd Year (Semester – V)

L	T	P	Credits			
				Class Work	:	25 Marks
3	2	--	5	Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

UNIT - I

Analysis of Indeterminate Structures: Degree of static and kinematic indeterminacies, analysis of indeterminate beams, pin jointed frames, rigid frames and trusses by method of consistent deformation, effect of lack of fitness, temperature, method of least work, induced reactions on statically indeterminate beams, pin jointed frames, rigid frames and trusses due to yielding of supports.

Fixed and Continuous Beams: 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 theorom (Clapeyron's theorem) due to different types of loadings.

UNIT - II

Slope and Deflection Method: Introduction, slope-deflection equations, analysis of statically indeterminate beams and rigid frames (sway and non-sway type) due to applied loads and uneven support settlements.

Moment Distribution Method: Introduction, absolute and relative stiffness of members, stiffness and carry-over factors, distribution factors, analysis of statically indeterminate beams and rigid frames (sway and non-sway type) due to applied loads and uneven support settlements, symmetrical beams and frames with symmetrical, skew-symmetrical and general loading.

UNIT - III

Kani’s Method: Introduction, basic concept, analysis of statically indeterminate beams and rigid frames (sway and non-sway type) due to applied loadings and yielding of supports, symmetrical beams and frames, general case- storey columns unequal in height and bases fixed or hinged.

Approximate Analysis of Frame: Vertical and lateral load analysis of multistory frames, portal, cantilever and substitute-frame methods and their comparison.

UNIT - IV

Space Frames: Introduction, simple space truss, types of supports, equilibrium and stability conditions, analysis of determinate and indeterminate space frames using tension coefficient method.

PLASTIC ANALYSIS: Basics of plastic analysis, static and kinematic theorems for plastic analysis of beams and frames.

REFERENCE BOOKS

1. **Indeterminate Structural Analysis C K Wang Tata McGraw Hill**

TEXT BOOKS :

1. **Basic structural analysis - C.S. Reddy**
2. **Structural Analysis- Thandvamoorthy TS Oxford University Press**
3. **Structural Analysis - Devdas Menon Narosa Publishing House**

Note:

1. **In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.**
2. **The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.**

CE-303B: HYDROLOGY

B. Tech. 3rd Year (Semester – V)

L	T	P	Credits			
3	1	--	4	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

UNIT I

Precipitation: Hydrologic cycle and Water Budget, Scope and Applications, Drainage basin and its characteristics. Precipitation - Types and Forms, Measurement by rain gauge and other methods, Design of rain gauges station, Mean precipitation, Presentation of rainfall data, Estimation of missing rainfall data. Test for consistency of record, Analysis of rainfall data, Intensity-depth-area relationship, Duration-Frequency curves, Depth-Area-Duration curves, Frequency analysis of rainfall data.

Abstractions From Precipitation: Evaporation and Transpiration, Factors affecting evaporation, Measurement by different methods. Infiltration, Factors affecting infiltration, Infiltration measurement, Infiltration capacity curve, Infiltration indices.

UNIT II

Run Off: Factors affecting run off, Estimation of run off by various methods, Rainfall-runoff co-relations. Flow Duration Curve, Mass Flow Curve.

Hydrographs: Components, Base flow separation, Derivation of Unit Hydrograph and its applications & limitations, Synthetic and Instantaneous Unit Hydrograph, S-Curve Hydrograph, Dimensionless Unit Hydrograph, CWC method for Indian Catchments.

UNIT III

Reservoir Planning: Types of reservoir, Flood Routing through reservoir, Storage zones, Selection of reservoir site, Mass curve analysis for reservoir capacity, Reservoir yield and its determination for a given reservoir capacity, Reservoir sedimentation and its control, Control of erosion in catchment areas, Watershed management and Rain water harvesting

UNIT IV

Floods: Floods, Methods of flood control, Flood Routing through channels. Estimation of flood by Envelope Curves, Emperical Formulae and Rational Method, Application of Unit Hydrograph. Flood frequency analysis, Probability plotting, Gumbel's distribution. Selection of a design return period.

Text Books

1. **Engineering Hydrology by K. Subramanya, Tata McGraw-Hill Publication**
2. **Hydrology by H.M. Raghunath, New Age International Publishers**
3. **A text book of Hydrology by D.P. Jaya Rami Reddy, University Science Press**

Reference Books

1. **Applied Hydrology, V T Chow, D R Maidment and W L Mays, McGraw-Hill Publication**
2. **Hydrology, M Wanielista, R Kersten, R Eaglin, John Wiley**

Note: In the semester examination, the examiner will set eight questions in all, at least one question from each unit and students will be required to attempt only 5 questions.

CE 305B: REINFORCED CONCRETE DESIGN – I

B. Tech. 3nd Year (Semester – V)

L	T	P	Credits			
				Class Work	:	25 Marks
3	2	--	5	Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

USE OF RELEVANT INDIAN STANDRAD IS ALLOWED IN THE EXAMINATIONS

UNIT I

Introduction: Reinforced concrete, definition, properties of materials, grades of concrete and reinforcing steel, stress-strain curves, permissible stresses, concrete structural systems-slabs, beams, columns and foundations, design philosophies working stress design, ultimate strength and limit state design method, Codal Provision for RC Elements: (I) General (II) for ductility.

Working Stress Design Method : Introduction, Assumptions, derivation of design constants, problems on computation of moment of resistance, determination of stresses, and design of rectangular beams reinforced in tension and compression, flanged beams and slabs.

UNIT II

Working Stress Design Method : Design for shear and bond and torsion, Permissible shear strength, maximum shear strength, shear reinforcement and design procedure for shear reinforcement, bond and development length, anchoring and curtailment of bars.

Working Stress Design Method - Design for Compression, Design of short and long columns, sections subjected to direct load and uniaxial bending.

UNIT III

Limit State Design Method : Introduction, Limit States, Characteristic values, characteristic strength, characteristic loads, design values for materials and loads, factored loads. Limit State of Collapse (Flexure) Types of failures, assumptions for analysis and design of singly reinforced, doubly reinforced sections, and flanged sections.

UNIT IV

Limit State Design Method : Limit State of Collapse (Shear, bond and torsion) Introduction - Design for shear, structural components subjected to torsion, design of rectangular beam section for torsion, development length, continuation of reinforcement (beyond cut off points). Limit State of Collapse (Compression) Columns and their classification, reinforcement in columns, assumptions, short and long (both tied and helical) columns subjected to axial load, short columns subject to axial, uniaxial and biaxial bending.

Text Books

1. **Reinforced Concrete Design, M.L. Gambhir, Macmillan India Limited, New Delhi**
2. **Limit State Design of Reinforced Concrete, A.K. Jain, Nem Chand Brothers, Roorkee.**
3. **Limit State Design, Ram Chandra, Standard Book House, New Delhi**

Reference Books

1. **Reinforced Concrete Design, Pillai & Menon , Tata McGraw Hill Publishers, New Delhi**
2. **Reinforced Concrete Structures by Paulay and Thomas Park**
3. **Reinforced Concrete Design by Nilson and Winter**
4. **Reinforced Concrete Fundamentals Keith by Ferguson**
5.

Note:

1. **In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.**
2. **The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.**

CE-307B: ENVIRONMENTAL ENGINEERING – I

B. Tech. 3nd Year (Semester – V)

L	T	P	Credits			
				Class Work	:	25 Marks
3	1	--		Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

UNIT - I

1. **Water Sources: Definition and Scope of Environmental Engineering, Surface and ground water sources; Selection and development of sources;**
2. **Water Supply Systems: Municipal water demands and demand variations, Population forecasting and water demand estimations; Intakes and transmission systems, pipes for transporting water and their design**

UNIT -II

3. **Water Quality: Physical, chemical and biological water quality parameters; Water quality index; Water quality standards; Classification of water bodies.**
4. **Water treatment - I: Water treatment schemes; Basic principles of water treatment; Design of plain sedimentation, coagulation and flocculation, filtration – slow, rapid and pressure; Disinfection units. Data and background information for the design of water supply system;**

UNIT - III

5. **Water treatment - II: Fundamentals of water softening, fluoridation and deflouridation, and water desalinization and demineralization.**

6. **Design of Water Supply Systems: Water supply network design and design of balancing and service reservoirs; operation and maintenance of water supply systems.**

UNIT - IV

7. **Pumps and pumping stations: Types of pumps and their characteristics and efficiencies; Pump operating curves and selection of pumps; Pumping stations.**
8. **Small scale and household level water purification system and water fixtures**

Text Books

1. **Manual on Water Supply and Treatment by Ministry of Urban Development, New Delhi.**
2. **Water Supply and Sewerage, McGhee, McGraw Hill.**
3. **Environmental Engineering, Vol. I, S.K. Garg, Khanna Publishers, New-Delhi.**

References Books

1. **Environmental Engineering Peavy, Rowe and Tchobanglous, McGraw Hill.**
2. **Water and Waste Water Engineering (Vol. 1&2), Fair, Geyer & Okun, John Wiley, New York.**
3. **Water Supply Engineering P.N. Modi, Standard Book House New-Delhi.**
4. **Standard Methods for the Examination of Water and Waste Water, American Public Health Association.**

Note:

1. **In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.**
2. **The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.**

CE- 309B: TRANSPORTATION ENGINEERING – I

B. Tech. 3rd Year (Semester – V)

L	T	P	Credits			
				Class Work	:	25 Marks
3	1	--	4	Examination	:	75Marks
				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**
2. **Highway Engineering by L.R. Kadyali, Nem Chand & Brothers, Roorkee**

Reference Books

1. **Highway Engineering by Oglesby and Hews**
2. **Transportation Engineering by G.V. Rao, Tata McGraw Hill Publisher, New Delhi**
3. **Principles of Pavement Design by E.J. Yodder**
4. **Traffic Engineering by Matson,Smith & Hurd**

Note:

1. **In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.**
2. **The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.**

CE- 311: GEO-MECHANICS

B. Tech. 3rd Year (Semester – V)

L	T	P	Credits			
				Class Work	:	25 Marks
3	1	--	4	Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3Hours

UNIT I

Basic Soil Properties: Introduction to soil mechanics. Soil formation, various soil types, Soil map of India, Phase relationships; Index properties, sieve & hydrometer analysis, Atterberg's limits, sensitivity, thixotropy, and plasticity charts. Indian standard and Unified classification systems of soils, Introduction to Clay minerals, their characteristics. Soil structure, granular soil fabric.

Rock Mechanics: importance, composition of rocks, classification for engg. purposes, theories of brittle failure, elastic and dynamic properties of rocks.

UNIT II

Permeability of soil: Darcy's law, validity of Darcy's Law, seepage velocity, factors affecting permeability, Laboratory and field determination of permeability. Flow net and its properties, Laplace equation, methods of drawing flownet, seepage through earth dams, exit gradient and seepage pressures, phenomenon of piping and heaving, filters. Anisotropy & average permeability of layered soils.

Effective Stress Principle: Capillarity, types of head, seepage forces, quick sand condition, and critical hydraulic gradient.

UNIT III

Compaction: compaction tests, OMC, factors affecting compaction, control of compaction, field compaction equipment and their suitability.

Compressibility and Consolidation: isotropic one and three dimensional compressions, Terzaghi's theory, time rate of consolidation, consolidation test, Compressibility & Coefficient of Consolidation, NC, OC soils, determination of pre-consolidation pressure, settlement analysis, secondary consolidation.

UNIT IV

Stresses in Soils: Boussinesq and Westergarrd's formulae, pressure bulbs, Newmark's chart. Approximate methods

Shear Strength: Mohr's circle, Failure theories, direct, tri-axial, unconfined and vane shear tests. Drainage conditions, Concept of pore pressure coefficients, shear characteristics of normally consolidated, over consolidated clays and dense and loose sands, Dilatancy, residual strength, stress path, constant volume shear.

Text Books

1. **Basic and Applied Soil mechanics by Gopal Ranjan & A.S.R. Rao, New Age Publisher, New Delhi**
2. **A text book on Soil Mechanics and Foundation Engineering by V.N.S. Murthy, U.B.S. Publisher, New Delhi**
3. **Geotechnical Engg. by Parshotham Raj, Tata McGraw Hill, New Delhi.**

Reference Books

1. **Soil Mechanics by R. F. Craig, Chapman and Hall, U.K.**
2. **Principles of Soil Mechanics by B.M. Das, PWS and Kent Publisher USA.**
3. **Geotechnical Engg. by Venkatramaiah, New Age Publisher, New Delhi.**
4. **Modern Geotechnical Engineering Alam Singh**

Note:

1. **In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.**

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

CE-313: REINFORCED CONCRETE DESIGN - I LAB

B. Tech. 3rd Year (Semester – V)

L	T	P	Credits			
-	-	2	1	Class Work	:	20 Marks
				Examination	:	30Marks
				Total	:	50 Marks
				Duration of Examination	:	3Hours

Structural Drawings through AUTOCAD of the followings

2. **Singly reinforced concrete beams**
3. **Doubly reinforced concrete beams**
4. **Flanged beams**
5. **Cracking pattern of reinforced concrete beams**
6. **Simply supported and cantilever slabs**
7. **Continuous slabs**
8. **Two way slabs**
9. **Columns**

Students are required to draw full length sheets on AUTOCAD and submit minimum 8 sheets during examinations.

CE-315B: ENVIRONMENTAL ENGINEERING - I LAB

B. Tech. 3rd Year (Semester – V)

L	T	P	Credits			
-	-	2	1	Class Work	:	20 Marks
				Examination	:	30Marks
				Total	:	50 Marks
				Duration of Examination	:	3Hours

List of Experiments:

1) Flow measurements in closed conduits – venturimeter, orifices.
2) Determination of Color & Turbidity.
3) Determination of Solids: Total, Dissolved and Suspended; dissolved solids through conductivity.
4) Determination of Alkalinity and its species.
5) Determination of pH, and Acidity and its species.
6) Determination of Hardness (different types)
7) Determination of Chlorides.
8) Determination of Fluorides.
9) Jar test for optimum coagulant dose estimation.
10) Determination of residual chlorine and chlorine dose.
11) MPN Test.

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

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CE- 317B : TRANSPORTATION ENGINEERING-I LAB

B. Tech. 3rd Year (Semester – V)

L	T	P	Credits			
				Class Work	:	20 Marks
--	--	2	1	Examination	:	30 Marks
				Total	:	50 Marks
				Duration of Examination	:	3 Hours

List of Experiments:

1. **Aggregate Impact Test**
2. **Los Angles Abrasion Test on Aggregates**
3. **Crushing Strength Test on Aggregates**
4. **Penetration Test on Bitumen.**
5. **Ductility test on Bitumen.**
6. **Water absorption and specific gravity tests.**
7. **Softening Point Test on Bitumen**
8. **Flash & fire point test.**
9. **Determination of speed by radar and endoscopes.**
10. **Study of driving skills.**
11. **CBR test.**
12. **Traffic Volume Study**
13. **Accident Study**

Note: Atleast ten experiments are to be performed in the Semester however some more experiments may also be performed as designed & set by the concerned Institution as per the scope of the syllabus.

CE- 319: GEO MECHANICS LAB

B. Tech. 3rd Year (Semester – V)

L	T	P	Credits			
				Class Work	:	20 Marks
--	--	2	1	Examination	:	30 Marks
				Total	:	50 Marks
				Duration of Examination	:	3 Hours

List of Experiments:

1. Visual Soil Classification
2. Determination of water content.
3. Determination of field density by Core cutter method
4. Determination of field density by Sand replacement method
5. Grain size Analysis by Mechanical Method.
6. Grain size Analysis by Hydrometer Method.
7. Determination of Specific Gravity by Psychomotor.
8. Determination of Atterberg's limits
9. Determination of Permeability by constant head permeameter.
10. Determination of permeability by variable head permeameter.
11. Proctor's Compaction Test
12. Unconfined Compression Test.
13. Direct Shear Test.

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

CE- 321B: Survey Camp

B. Tech. 3rd Year (Semester – V)

L	T	P	Credits			
--	--	2	1	Class Work	:	20 Marks
				Examination	:	30 Marks
				Total	:	50 Marks
				Duration of Examination	:	3 Hours

Survey Camp: Civil Engineering Surveying Practical Experience is a Two-Three week course between the spring and summer semesters. Each day is about eight hours long and full of hands-on experience with surveying and map preparation. Teams of 4-6 students will work with faculty, practicing surveyors and use their equipment out in the field. The camp will provide a necessary foundation for any engineer. It will teach them how surveying is applied to engineering projects and what they need to know in order to review survey data. The students will prepare map of an area following various steps like establishment of control points, Triangulation, computations,

error adjustment, plotting details on map and contouring .

The students for this course shall be evaluated in 5th semester by a Committee consisting of three teachers to be constituted by the Chairperson of the department.

Teachers associated with evaluation work will be assigned 2 periods per week load.

GEN 301B MORAL VALUES AND ETHICS

B. Tech. Semester – V (Common for all Branches)

L	T	P	Credits		
1	--	--	0	Field Work	: 25Marks
				Total	: 25 Marks

University Rules/Regulation specifically related to students and academic ordinances. University Vision, Mission, Goals, objectives.

A few topics from the below mentioned books

BOOKS

1. **R.R.Gaur, R. Sangal and G.P. Bagaria, " Bagaria, " A foundation course in Human Values and Professional Ethics", Pub: Excel Books, New Delhi-110028.**

2 **M. Govindrajan, S Natrajan & V.S. Senthil Kumar, " Engineering Ethics (including Human Values)" Eastern Economy Edition, Prentics Hall of India Ltd.**

Note:

1. **A minor test will be conducted during the semester and its award out of ten will be forwarded respective Chairperson of the Department.**
2. **Weightage of Ethics is given in General Proficiency Syllabus.**