B. N. Mandal University, Laloonagar, Madhepura

Details of theory & Sessional Papers code of 3rd Year B. Tech. Course

Branch: CIVIL ENGINEERING

Sl No.	Subject	Subject Code	Branch Code	L	T	P	Th. Ext.	Th. Int.	Sessional
01	Advance surveying	S-II	CE-301	2	1	3	70	30	S-II-100
02	Soil Mechanics	SM	CE-302	2	1	3	70	30	SM-50
03	Structural Analysis-I	SA-I	CE-303	2	1	3	70	30	SA-50
04	Water Resources Engg	WRE-I	CE-304	3	1	0	70	30	WRE-I 50
05	Mechanics Of Solids	MOS-II	CE-305	3	1	0	70	30	---------
06	Design of concrete Structure	CS-I	CE-306	2	1	3	70	30	
07	Design Of steel structure	SS	CE-307	3	1	0	70	30	---------
08	Environmental engg.	EE	CE-308	2	1	3	70	30	EE-50
09	Industrial Training	IT	CE-309	0	0	3	---	---	Industrial Training-50
10	Elective(Only Lab)	EL-I	CE-310	0	0	3			EL-50

Elective-I

1.

A) CED using AutoCad
B) Solid Waste Management

Expert-I
(External)
Name:
Designation:
Address:

Expert-II
(Internal)
Name: Kumar Anand V. Pushe
Designation: HOD, CE
Address: Dept. of CE, MIT, Purnia.

Dean
Faculty of Science & Engineering
BNMU, Madhepura

ADVANCED SURVEYING CE – 301 (New course) Credit : 5

L-T-P : 3-0-3

Theory: 1st Terminal

1.   **Curve :** (a) simple curve - Scope, degree of curve, characteristics, offset from tangent, offset from chord produced. Rankine's method, obstacles. (b) Compound and reverse curve – introduction of cases. (c) Transition curve —compound curve, super elevation, length of transition curve, characteristics equations, shift, tangent length and curve length of combined curve. Computation for setting out of combined curve (d) Vertical curve – scope, assumption of vertical curve, equations, computations for setting out curve, summit and valley curve.   **Lecture : 10**

2.   **Electronic Distance meter :** Scope, electromagnetic curve, basic definitions, phase of wave, types of waves, distance by transit time and phase difference, carrier wave, method of modulation. Electro-optical EDM measurement, infra-red EDM instrument, microwave EDM instruments, effect of atmospheric conditions and corrections, slope and height corrections, use of total station.   **Lecture : 9**

3.   **Triangulation :** Scope, classification, inter-visibility, satellite station, eccentricity of signals, base line and extension of base line. Theory of error terms, laws of weight, determination of M.P.V., M.P.E, adjustment of geodetic triangle with central station, adjustment of level line, adjustment of spherical triangle.   **Lecture : 10**

Second Term-

4. Astronomical Survey : Terms, spherical triangle, spherical trigonometry. Time, sidereal time, apparent time, mean solar time, equation of time, universal time, standard time, conversion of time, determination of time, determination of azimuth, Latitude, Longitude. Lecture: 06

5. Geodetic Leveling : Scope, curvature and refraction correction, axis-signal correction, single angle observation, reciprocal leveling. Lecture: 04

6. Hydrographic Surveying : Scope, methods of sounding, locating of sounding, three-point problem and shoreline survey. Lecture: 04

Text Books:

1. Geodesy by G.L Hosmer, John Wiley & sons, New York.

2. Surveying vol. II and III by B.C. Punmia, A.K. Jain, Laxmi Publications (p) Ltd. New Delhi.

3. Surveying, vol. II and III by K.R. Arora, Standard Book House, Delhi.

4. The Elements of Astronomy for surveyors by J.B. Mackie, Charles Griffin and Company Ltd., High Wycombe, England.

5. Electromagnetic Distance Measurement by C.D. Burnside, Crosby Lockwood and son Ltd., London.

Practical:

Triangulation, Setting out complex curve, Contour plotting etc.

L-T-P: 2-1-3

Theory:

First Term-

1. Introduction:- Origin and Classification of soils, soil weight volume relationships, Index propertics of soil, soil structures and Clay Minerals.   Lecture:04

2. Effective stress principle:- Surface tension and capiliarity, Permeability of soils, Darcy's law, test for determination of permeability, engineering use of permeability. Factors affecting permeability.   Lecture:04

3. Seepage analysis, flow nets, flow through dams.   Lecture:02

4. Effective stress distribution in soils under hydrodynamic conditions. Quick sand, Piping, Prevention of piping failures.   Lecture:04

5. Compressibility and Consolidation:- Consolidation Process- Spring analogy, Definition, measurement of consolidations- Determination of void ratio at various load increments, Terzaghi's theory of one dimensional consolidation, Determination of Coefficient of consolidation, Analysis of consolidation data.   Lecture:06

Second Term-

6. Vertical stress below applied load in soils (Boussinesq, Westergaard, and graphical solutions), one and two dimensional cases.   Lecture:03

7. Compaction characteristics, water content – dry unit weight relationships, OMC, max, Dry unit weight field compaction control.   Lecture:03

8. Soil stabilization   **Lecture:01**

9. Shear Strength of Soil : Engineering use of shear strength, Direct and triaxial shear tests, Mohr-Coulomb strength criterion, drained, consolidated undrained and undrained tests, strength of loose and dense sands, NC and OC soils, dilation, pore pressure and Skempton's pore pressure coefficients.   Lecture:06

10. Earth pressure theories & Retaining Walls : Limit equilibrium method, effect of wall movement on earth pressure, pressure at rest, Rankine state of plastic equilibrium, Coulomb's theory, Rebhann and Culmann's graphical methods. Sheet piles – Types and uses of sheet piles, Analysis of Cantilever and anchored sheet piles in cohesionless and cohesive soil, Rowe's theory of moment reduction.   Lecture:08

11.Stability of slopes : Limit equilibrium methods, methods of slices, simplified Bishop's method and friction circle method, factors of safety, stability under conditions of submergence, drawdown and steady seepage, location of critical arc, stability number, chart.   Lecture:06
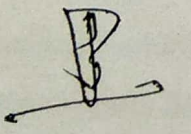
Text Books :

1. A Text Book of Soil Mechanics and Foundation Engineering by V.N.S. Murthy, Saikripa Technical consultants.
Bangalore.

2. Geotechnical Engineering by S. K. Gulati et. al., TMH Publication Co. Ltd., New Delhi

3. Basic and applied Soil Mechanics by Gopal Ranjan and A. S. R. Rao, Wiley Eastern Ltd.,

4. Soil Mechanics and Foundation Engineering by K. R. Arora, Standard Pub. and Dist., Delhi
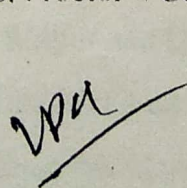
Reference Books :

1. Soil Mechanics in Engineering Practice by Terzaghi and Pech, John Wiley and Sons Inc New York.

2. Soil Mechanics by Lamb and Whitman, Wiley Eastern Pvt. Ltd., New Delhi.

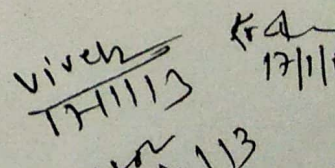3. Fundamentals of Soil Mechanics by Taylor, John Wiley and Sons Inc New Delhi.

Practical :

Specific Gravity of Soil, Field Density of soils, Particle size distribution of soils by sieving, Particle size distribution of soils by hydrometer method, Determination of Atterberg's limits, Permeability of soils using falling head method, Permeability of soils using constant head method, Consolidation Characteristics of soils, Proctor's Compaction Test

STRUCTURAL ANALYSIS - I (SA-I) CE-303

L-T-P : 2-1-3

Theory :

First Term-

1. **Basic introductory concepts :** structural systems, elements, joints, stability, equilibrium, compatibility, indeterminacy, types of loading.   Lecture:04

2. **Force-displacement relation,** free-body diagrams; analysis of forces in statically determinate structures : trusses (including compound and complex trusses), beams and frames (including internal hinges), cables and three hinged arch.   Lecture:08

3. **Stability of Walled Structures**   Lecture:04

4. **Influence lines** for beams and trusses under moving loads; Criteria for maxima.   Lecture:04

Second Term-

5. **Work and energy principles :** principle of virtual work, potential energy and Clastingliano's theorems, complementary energy theorems, reciprocal theorems and Mueller Breslau's principle with applications.   Lecture:06

6. **Analysis of displacements**   Lecture:06

   In statically determinate structures : Unit (dummy) load and energy methods, moment-area and conjugate beam methods, Williot-Mohr diagram.

7. **Introduction to Matrix Methods**   Lecture:04

   For determinate structures : Flexibility & Stiffness Methods.

Text Books :

1. Elementary Structural Analysis by Norris, Wilbur and Utku, McGraw Hill.

2. Basic Structural Analysis by C.S. Reddy, Tata McGraw Hill.

3. Intermediate Structural Analysis by C.K.Wang, McGraw Hill

4. Theory of Structures – Volumes 1 and 2 by S. P. Gupta and G. S. Pandit, Tata McGraw Hill.

5. Structural Analysis by L.S.Negi & R.S.Jangid, Tata McGraw Hill.

L-T-P : 3-1-3

First Term-

1. Introduction : Hydrologic cycle and processes, Precipitation, Infiltration and Evapotranspiration, Forms of precipitation, measurement, analysis, depth-area-duration and intensity-duration frequency relations.   Lecture:08

2. Evaporation :   Lecture:03

Process, measurement and estimation, Infiltration process, measurement and estimation, Evapotranspiration measurement and estimation, Stream flow measurements.

3. Runoff and Hydrographs, Factors affecting flow hydrograph, Rainfall Runoff correlations, Flow duration curve, Mass curve, Unit hydrograph, its analysis and S-curve hydrograph, synthetic and instantaneous unit hydrographs.   Lecture:08

4. Statistical analysis, flood frequency studies, Rational method, time Area curves, Design flood, Design Storm, Risk, reliability and safety factor.   Lecture:06

5. Channel and flood routing, time series analysis of droughts and floods.   Lecture:04

6. Groundwater hydrology:-   Lecture:04

Flow equations confined and unconfined flow, Well hydraulics Steady and unsteady flow, Well losses, Specific capacity.

Second Term-

7. Concepts of boundary layer flow:-   Lecture:03

Introduction, boundary layer growth over a flat plate, Boundary layer thickness, laminar boundary layer, turbulent boundary layer, transition from laminar to turbulent flow.

8. Basic concepts of Open Channel flow :   Lecture:04

Effect of gravity and viscosity on the flow behaviour, prismatic and non-prismatic channels.

9. Uniform flow : Theoretical uniform flow equations; hydraulically efficient sections, velocity distribution in open channels, equation for velocity distribution, velocity distribution coefficients.   Lecture:04

Non-uniform flow : specific energy, Critical flow in a rectangular channel, Discharge curve, Dimensionless specific energy and discharge curve, applications of specific energy, momentum principle applied to open channel flow, specific force, small waves and surges applied to an open channel.   Lecture:06

10. Gradually varied flow : Equation of gradually varied flow, classification of channel slopes; classification and examples of surface profiles, computation methods for length of surface profile.   Lecture:04

11. RVF. Hydraulic jump: Formation, length and loss of energy in a hydraulic jump, Location, elements, characteristics and types of a hydraulic jump.   Lecture:04

Text Books :

1. Flow in Open Channels by K.G. Ranga, Raju, Tata McGraw Hill Publication Co. Ltd., New Delhi.

2. Flow in Open Channel by K.Subramanya, Tata McGraw Hill Publication Co. Ltd., New Delhi.

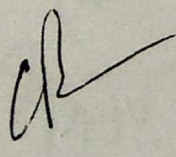3. Fluid Mechanics by A. K. Jain, Khanna Publishers, Second Edition, Delhi-6, 1980
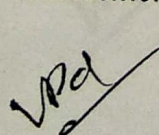
Reference Books :

1. Open Channel Hydraulics by V.T.Chow, McGraw Hill International, New York, 1959.

2. Foundation of Fluid Mechanics by S.W. Yuan, Tata McGraw Hill Publication Co. Ltd., New Delhi.

3. Open Channel Hydraulics by R.H. French, McGraw Hill Book co., New York, 1986.

4. Boundary Layer Theory by H.Schlichting, 7th Edition, McGraw Hill Book co., New York, 1979.

5. Engineering Hydrology by K. Subramanya, Tata McGraw Hill Pub., New Delhi.
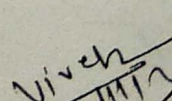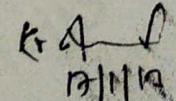
Practical :

Rainfall measurement, evaporation loss measurement, gauge discharge measurement, Infiltration, Hydraulic jump

MECHANICS OF SOLID - II (MOS-II) CE-305

L-T-P : 3-1-0

Theory :

First Term-

1. **Introduction** to elasticity theory; Simple 2D/3D problems and their solutions.   Lecture:04

2. **Pure bending** of beams with unsymmetrical section; Shear Centre; Torsion of noncircular members.   Lecture:04

3. **Curved Beams** : Beams on elastic foundation.   Lecture:03

4. **Plastic Theory**, plastic hinges and shape factor, uniqueness, upper bound and lower bound theorems; Failure theories.   Lecture:06

Second Term-

5. **Energy methods :**   Lecture:04

Introduction to viscoelasticity and viscoplasticity; Numerical methods

6. **Stability of Equilibrium :**   Lecture:06

Columns, Euler's formula, Eccentric loading, end conditions and effective length, Practical Design formulae.

7. **Coupled axial force** and bending moment problems; coupled torsion and bending moment problems.   Lecture:04
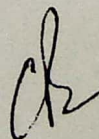
Text Books :

1. Advanced Mechanics of Materials by A.P. Boresi and O.M. Sidebottom, Fifth Edition, Wiley, Singapore.
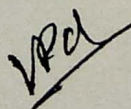
2. Mechanics of Solid, Singh by A.K., PHI, New Delhi.

3. Strength of Materials Vol. 2 by S.P. Timoshenko, CBS Publishers, Delhi.

DESIGN OF CONCRETE STRUCTURE - I (CS-I)   CE-306

L-T-P: 2-1-0

Theory:

First Term-

1. Introduction to the design of concrete structure: Lecture:06

   Working stress and Limit, State Analysis

2. Design of beams for flexure   Lecture:12

   (Working Stress & Limit State Method)

3. Bond, Shear and Torsion :   Lecture:12

Second Term-

4. One and two- way slabs. Flat slabs & Ribbed slabs.   Lecture:08

5. Axially and eccentrically loaded columns : Isolated and combined footings.   Lecture:12
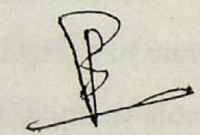
(IS : 456 to be followed with limit state Design method or any other method as recommend in IS code)
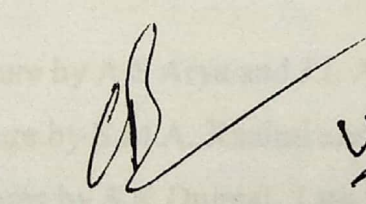
Text Books:

1. IS-456-2000 Code of practice of plain and Reinforced concrete.

2. Design of Reinforced concerts structure by P.Dayaratnam, Oxford IBM publication, New Delhi

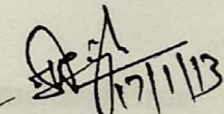3. Reinforced concrete Design by S.N.Sinha, Tata McGraw Hill New Delhi

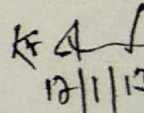# DESIGN OF STEEL STRUCTURES (SS) CE-307

L-T-P:3-1-0

First Term

1. **Introduction to Design :** Design Loads and Load combinations, Working Stress Design, Plastic Design, LRFD Method, Introduction to steel and steel structures.   Lecture:10

2. Design of structural Fasteners : rivets, bolts and welds.   Lecture:06

3. **Design of tension members.**   Lecture:06

4. **Design of compression member, laced and battened columns.**   Lecture:04

Second Term-

5. **Design of flexure members :**   Lecture:08

   Beams- rolled sections, built up section, plate Girders- riveted/ bolted and welded,Design of eccentric connections: riveted/ bolted and welded.

6. **Design of beam :** Columns and columns based welded and riveted column bases- moment resistant connection - semi rigid connection- design of supports.   Lecture:06

7. **Design of steel industrial sheds.** Wind Design.   Lecture:04

8. **Introduction:-**   Lecture:04

   Inelastic action and plastic hinges application of PD and LRFD.Lecture:

Text Books:

1. Design of steel Structure by A.S Arya and J.I. Ajmani, Nemchand Bros.

2. Design of steel Structure by S.M.A. Kazimi and R.S. Jindal, Prentice Hall (India) New Delhi

3. Design of steel Structures by S.K.Duggal, Tata McGraw Hill, New Delhi

Practical/Sessional :

Based upon theory Classes

ENVIRONMENTAL ENGINEERING-I (EE) EE-308

L-T-P: 3-0-3

Theory:

First Term-

1. **Water quantity demand,** Design period; population forecast, variation of quantity of water, sources of water: ground and surface, Intakes. Lecture:03

2. **Water quality** physical chemical and biological parameters: Examination of physical, chemical and biological characteristics of water. Lecture:03

3. **Water purification:** philosophy of treatment. Unit operations and processes, Design of physical chemical and biological processes: Plain sedimentation, Coagulation and flocculation.
Lecture:03

4. **Filtration:** Slow and rapid sand filters: disinfection. Softening, adsorption and reverse osmosis and other treatment method. Lecture:03

5. **Water Storage:** Pumping Transportation of water; Water distribution systems and analysis' Appurtenances of water transport and distribution systems, Hardly-Cross method of analysis.
Lecture:05

6. **Introduction** to air noise pollution & **Generation and collection of waste-water,** sanitary, storm and combined sewerage systems, Quantities of sanitary wastes and storm water, Design of sewerage system. Lecture:06

Second Term

7. **Physical, Chemical and Biological characteristics** of waste-water, Primary, Secondary and Tertiary treatment of waste-water. Wastewater; Wastewater Disposal Standards. Lecture:03

8. **Basic of microbiology Biological :** Wastewater treatment systems : BOD, Kinetics and Design of Aerobic Processes- Activated sludge process and its modifications. Trickling filter, RBC, Oxidation ponds and Aerated Lagoons. Lecture:04

9. **Anaerobic process :** conventional anaerobic digester, High rate and Hybrid anaerobic reactors, Sludge digestion and handling, Septic tanks, Disposal of effluent and sludge. Lect:05

10. **Simple design problems** on sewerage, waste-water treatment unit and sludge digestion.
Lecture:05

11. Introduction to Municipal solid Waste Management's

Text Books :

1. Waste water Engineering Treatment and Reuse by Metcalf & Eddy, TMH Publication.
2. Environmental Engineering by Peavy H. S, Rowe D.R. and Techobanoglous G. Tata McGraw Hills, New Delhi.
3. Introduction to Environmental Engineering & Science 2nd Ed. by Gilbert M. Masters. Prentice Hall. New Jersey.

Reference Books :

1. Elements of water supply and waste-water Disposal by G.M.Fair. J.C.Geyer, D.A.Okan, John Wiley and Sons Inc.
2. Water supply and sewage by Terence, J. McGhee, McGraw Hill Book Co.
3. Water and Waste Water Technology by M.C.Hammer, John Wiley and sons, New York.
4. Elements of Water Supply and Wastewater Disposal by G.M Fair. J.C.Geyer. D.A. Okan, John Wiley and Sons Inc
5. Water Supply and Sewerage by Terence, J McGhee, McGraw Hill Book Co.
6. Water and Waste Water Technology by M.J. Hammer, John Wiley and Sons. New York
7. CPHEEO Manual on water supply and treatment, Ministry of Urban Development.
8. Environmental Management by GN Pandey ,Publishing House Pvt

INDUSTRIAL TRAINING   CE-309

ELECTIVE (ONLY LAB)   CE-310

(A) CIVIL ENGINEERING DRAWING USING AUTOCAD

L-T-P: 0-0-3

Theory: Introduction to Auto Cad :   Lecture:24

Loading and configuring AutoCAD. Creating viewing and editing the drawing in Auto Cad, Different compound entries, From Table menu, From bottom menu, Data entries, Absolute coordinates, Relative and Polar coordinates, World coordinates, Pointing with key boards, object snap etc. Advanced user Interfaces. Menu bar and pull Down menus Icon menu dialogue Boxes, Utility, Commands, All the available commands in Auto Cad, Edit and Enquiry Commands, Display Controls, Dimensioning and crosshatching, Exercise 3 Nos. Plotting, Sessional Examinations.

(B) SOLID WASTE MANAGEMENT

L-T-P: 0-0-3

Theory: Lecture:24

Solid wastes-Sources, nature and characteristics of municipal solid waste, Quantities and qualities, Rates of generation and factors affecting them, Potential of diseases, nuisances and other problems due to solid waste management, Solid wastes management-Generation, on-site storage, collection, separation, processing and disposal On-site storage methods-containers, their type, size and location, Collection systems-Vehicles, routing, route balancing and transfer stations , Processing methods, recovery and reuse of materials and energy, Disposal methods such as sanitary landfill biological digestion etc. Industrial and hazardous solid waste management, Urban solid waste management and its modeling.