COURSE STRUCTURE AND SYLLABUS
(EFFECTIVE FROM Session: 2015-16)

B.Tech. (Civil Engineering)

Third Year (5th & 6th Semester)

JULY 10, 2015
U.P. TECHNICAL UNIVERSITY, LUCKNOW
STUDY & EVALUATION SCHEME
B. Tech. Civil Engineering
(Effective from the session – 2015-16)

Third Year, 5th Semester

<table>
<thead>
<tr>
<th>S.No</th>
<th>Course Code</th>
<th>Subject</th>
<th>Period</th>
<th>Evaluation Scheme</th>
<th>Subject Total</th>
<th>Credit</th>
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**THEORY SUBJECTS**

1. NHU 501 Engineering Economics
   - Period: 2 0 0
   - Evaluation Scheme: 15 10 25 50
   - Subject Total: 75
   - Credit: 2

2. NCE 501 Geotechnical Engineering
   - Period: 3 1 0
   - Evaluation Scheme: 30 20 50 100
   - Subject Total: 150
   - Credit: 4

3. NCE 502 Transportation Engineering-1
   - Period: 3 1 0
   - Evaluation Scheme: 30 20 50 100
   - Subject Total: 150
   - Credit: 4

4. NCE 503 Environmental Engineering-1
   - Period: 2 1 0
   - Evaluation Scheme: 15 10 25 50
   - Subject Total: 75
   - Credit: 3

5. NCE 504 Structural Analysis-2
   - Period: 3 1 0
   - Evaluation Scheme: 30 20 50 100
   - Subject Total: 150
   - Credit: 4

6. NCE 505 Design of Concrete Structure-1
   - Period: 3 1 0
   - Evaluation Scheme: 30 20 50 100
   - Subject Total: 150
   - Credit: 4

**PRACTICAL/DRAWING/DESIGN**

7. NCE 551 Geotechnical Engineering Lab
   - Period: - - 3
   - Evaluation Scheme: 10 10 20 30
   - Subject Total: 50
   - Credit: 1

8. NCE 552 Transportation Engineering Lab
   - Period: - - 3
   - Evaluation Scheme: 10 10 20 30
   - Subject Total: 50
   - Credit: 1

9. NCE 553 CAD Lab-1
   - Period: - - 3
   - Evaluation Scheme: 10 10 20 30
   - Subject Total: 50
   - Credit: 1

10. NCE 554 Estimation Costing & Valuation
    - Period: 3
    - Evaluation Scheme: 10 10 20 30
    - Subject Total: 50
    - Credit: 1

11. GP 501 General Proficiency
    - Period: - - - -
    - Evaluation Scheme: 50 -
    - Subject Total: 50
    - Credit: 1

**TOTAL**

- Period: 16 5 12
- Evaluation Scheme: 1000
- Subject Total: 25
# U.P. Technical University, Lucknow
## Study & Evaluation Scheme
### B. Tech. Civil Engineering
#### (Effective from the session – 2015-16)

#### Third Year, 6th Semester

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<tr>
<th>S. No</th>
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<tr>
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**PRACTICAL/DRAWING/DESIGN**

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<tr>
<td>7</td>
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<td>Structural Detailing Lab</td>
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<td>8</td>
<td>NCE 652</td>
<td>Environmental Engineering Lab</td>
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<td>9</td>
<td>NCE 653</td>
<td>CAD Lab-2</td>
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<td>10</td>
<td>NCE 654</td>
<td>Survey Camp*</td>
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<td>11</td>
<td>NGP 601</td>
<td>General Proficiency</td>
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**TOTAL**

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<tr>
<th>S. No</th>
<th>Code and Course</th>
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<tr>
<td>5 (A)</td>
<td>NCE 011</td>
<td>Advanced Foundation Design</td>
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<tr>
<td>5 (B)</td>
<td>NCE 012</td>
<td>Matrix Analysis of Structures</td>
</tr>
<tr>
<td>5 (C)</td>
<td>NCE 013</td>
<td>Environmental Management for Industries</td>
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<td>5 (D)</td>
<td>NCE 014</td>
<td>Principals of Town Planning and Architecture</td>
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**Departmental Elective - 1 (Full Unit Course with Credit: 4)**

**Departmental Elective – 2 (Half Unit Course with Credit: 3)**

Note:**The teaching load of survey camp will be counted as equivalent to 0-0-3.
UNIT – 1

Origin and classification: Preview of Geotechnical field problems in Civil Engineering, Soil formation, transport and deposit, Soil composition, Basic definitions, Weight volume relationships, Clay minerals, Soil structure, Index properties, Particle size analysis, Soil classification.

UNIT – 2

Soil Hydraulics: Modes of occurrence of water in soil. Stress conditions in soil- total, effective and neutral stresses and relationships. Permeability - Bernoulli’s equation, Darcy’s Law, hydraulic conductivity, laboratory determination of hydraulic conductivity, equivalent hydraulic conductivity in stratified soil.
Seepage- Laplace equation of continuity, flow nets, seepage calculation from a flow net, flow nets in anisotropic soils, seepage through earth dam, critical hydraulic gradient and quick sand condition.
Soil compaction, water content – dry unit weight relationships. Factors controlling compaction. Field compaction equipment; field compaction control; Proctor needle method.

UNIT – 3

Stresses in soils: Normal and shear Stresses on a plane, Stresses due to applied loads, Boussinesq’s solution for a point load, line load, strip load, uniformly loaded circular and rectangular areas, Isobar and pressure bulb concept, stress distribution on horizontal and vertical planes, Newmark’s chart and its application, contact pressure.
Consolidation: Consolidation and compaction, primary and secondary consolidation, Terzaghi’s one dimensional theory of consolidation, Consolidation test, Normal and Over Consolidated soils, Over Consolidation Ratio, determination of coefficient of consolidation, consolidation under construction loading.

UNIT – 4

Shear Strength: Mohr-Coulomb failure criterion, shear strength parameters and determination; direct and tri-axial shear test; unconfined compression test; vane shear test; sensitivity and thixotropy; pore pressure, Skempton’s pore pressure coefficients. Earth pressure: Classical theories, Coulomb and Rankine approaches for frictional and c-φ soils, Smooth and rough walls, Inclined backfill, graphical methods of earth pressure determination. Types of retaining structures.

UNIT – 5

Characterization of ground, site investigations, groundwater level, methods of drilling, sampling, in situ tests, SPT, CPT, DCPT.
Sub-Structures: Introduction to foundations- types and differences; choice; loads; design philosophies. Bearing capacity of shallow foundations; modes of failures; corrections for size, shape, depth and eccentricity; provisions of IS code of practice. Introduction to deep foundations.

Note: The students should be given a comprehensive problem at the end which requires inputs/ knowledge/ application from all the units of the syllabus. It may be evaluated as a part of TAQ.

Text & References Books

1. V.N.S. Murthy – Soil Mechanics and Foundation Engineering (Fifth Edition)
4. Alam Singh – Modern Geotechnical Engineering
5. Brij Mohan Das – Geotechnical Engineering, CENGAGE Learning
6. I.H. Khan – Text Book of Geotechnical Engineering
7. C. Venkataramaiiah – Geotechnical Engineering

5.3 NCE – 502: TRANSPORTATION ENGINEERING-I

UNIT-1
Introduction: Role of Transportation, Modes of Transportation History of road development, Road types and pattern, Nagpur road plan, Bombay road plan & 3rd 20 Year Road Plan, NHAI Act (1988), Road Development Plan Vision: 2021 documents, Expressway Master Plan, Features of PMGSY.

UNIT-2
Highway Alignment & Location Survey: Horizontal Profile, Vertical Profile, Factors Controlling the alignment, Survey for route location, Preparation of Detailed Project Report (DPR)
Geometric Design: Cross sectional elements, camber, shoulder, sight distance, horizontal curves, super elevation, extra widening, transition curves and gradient, vertical curves, summit and valley curves.
UNIT-3
Traffic Engineering: Traffic Characteristics, traffic volume and speed study, traffic capacity, density, traffic control devices, signs, signals, Island, Intersection at grade and grade separated intersections, design of rotary intersection

UNIT-4

UNIT-5
Highway Construction: Construction of Subgrade, Water Bound Macadam (WBM), Wet mix macadam (WMM), Granular Sub Base (GSB),Tack Coat, Prime Coat, Seal Coat, Surface Dressing, Bituminous Madadam (BM), Semi dense bituminous concrete (SDBC) and Bituminous concrete, Dry lean concrete (DLC), Cement Concrete (CC) road construction, Roller Compacted Concrete Roads.

Note: The students should be given a comprehensive problem at the end which requires inputs/ knowledge/ application from all the units of the syllabus. It may be evaluated as a part of TAQ.

Text Book:

References:
7. Chakraborty Partha & Das Animesh., “Principles of Transportation Engineering”, Prentice Hall (India), New Delhi
8. IRC : 37-2012, “Tentative Guidelines for the design of Flexible Pavements” Indian Roads Congress, New Delhi
12. MORTH, “Specifications for Road and Bridge Works”, Ministry of Shipping, Road Transport & Highways, Published by Indian Roads Congress, New Delhi.

5.4 NCE – 503 ENVIRONMENTAL ENGINEERING – I

Unit-1

Water supply: Water demands and domestic use, variation in demands; population forecasting by various methods using logistic curve method; basic needs and factors affecting consumption; design period. Sources of water and their characteristics, quality of surface and ground waters; factors governing the selection of a source of water supply; intakes structures and their design, determination of the capacity of impounding reservoir.

Unit-2

Transmission of water: Various types of conduits, capacity and sizes including economical sizes of rising main, structural requirements; laying and testing of water supply pipelines; pipe materials, joints, appurtenances and valves; leakages and control.

Storage and distribution of water: Methods of distribution, pressure and gravity distribution systems, Concept of service and balancing reservoirs.

Unit-3

Capacity of distribution reservoirs; general design guidelines for distribution system, Hardy - Cross method, equivalent pipe method of pipe network analysis. Plumbing systems in buildings and houses: water connections, different cocks and pipe fittings.


Storm water: Collection and estimation of storm water by different formulae.

Unit-4

Flow in sewers: Flow in full and partially full sewers and design of sewers; types of sewers, materials and construction of sewers, joints and sewer appurtenances, layout and construction of sewer lines, small bore sewer systems, Planning of sewerage systems.

Air Pollution: Definition, Sources, Classification of air Pollutants, National ambient
air quality standards, Lapse rate, Inversion, Plume behavior, Acid rain, Vehicular emission and its standards.

Note: The students should be given a comprehensive problem at the end which requires inputs/ knowledge/ application from all the units of the syllabus. It may be evaluated as a part of TAQ.

Text Books:


References:

3. Steel and McGhee: Water Supply and Sewerage
4. Fair and Geyer: Water Supply and Wastewater Disposal
5. Hammer and Hammer Jr.: Water and Wastewater Technology
6. Raju: Water Supply and Wastewater Engineering
7. Rao: Textbook of Environmental Engineering
8. Davis and Cornwell: Introduction to Environmental Engineering
12. Ramalho: Introduction to Wastewater Treatment Processes
5.5 NCE - 504: STRUCTURAL ANALYSIS-2

L-3, T-1, P-0
CT- 30, TA- 20, ESE- 100

Unit – 1
Analysis of fixed beams, Continuous beams and simple frames with and without translation of joint, method of Consistent Deformation, Slope-Deflection method, Moment Distribution method, Strain Energy method.

Unit – 2
Muller-Breslau’s Principle and its applications for drawing influence lines for indeterminate beams, Analysis of two hinged arches, Influence line diagrams for maximum bending moment, Shear force and thrust.

Unit – 3
Suspension Bridges, Analysis of cables with concentrated and continuous loadings, Basics of two and three hinged stiffening girders, Influence line diagrams for maximum bending moment and shear force for stiffening girders.

Unit – 4
Basics of Force and Displacement Matrix methods for beams, frames and trusses.

Unit – 5
Basics of Plastic Analysis, Applications of Static and Kinematic theorem for Plastic Analysis of Beams and Frames.

Note: The students should be given a comprehensive problem at the end which requires inputs/ knowledge/ application from all the units of the syllabus. It may be evaluated as a part of TAQ.

Text Books & References:

Unit – 1

Unit – 2

Unit – 3
Behaviour of RC beam in Shear, Shear Strength of beams with and without shear reinforcement, Minimum and Maximum shear reinforcement, design of beam in shear, Introduction to development length, Anchorage bond, flexural bond. (Detailed Examples by Limit State Design Method), Failure of beam under shear, Concept of Equivalent Shear and Moments.

Unit – 4
Design of one way and two way solid slabs by Limit State Design Method, Serviceability Limit States, Control of deflection, cracking and vibrations.

Unit – 5
Design of Columns by Limit State Design Method- Effective height of columns, Assumptions, Minimum eccentricity, Short column under axial compression, requirements for reinforcement, Column with helical reinforcement, Short column under axial load and uni-axial bending, Design of columns under bi-axial loading by Design Charts.

Note:
1. All designs shall be conforming to IS: 456 – 2000.
2. The students should be given a comprehensive problem at the end which requires inputs/ knowledge/ application from all the units of the syllabus. It may be evaluated as a part of TAQ.
Text Books & References:


5.7 NCE – 551: GEOTECHNICAL ENGINEERING LAB

L-0, T-0, P-3
CT-10, TA-10, ESE-30

1. Determination of water content of a given moist soil sample by (i) oven drying method, (ii) pycnometer method.
2. Determination of specific gravity of a given soil sample by (i) density bottle, (ii) pycnometer method.
3. Determination of in situ dry density of soil mass by (i) core-cutter method, (ii) sand replacement method.
4. Determination of relative density of a given soil sample.
5. Determination of complete grain size distribution of a given soil sample by sieve analysis and sedimentation (hydrometer) analysis.
6. Determination of consistency limits (liquid, plastic and shrinkage limits) of the soil sample used in experiment no. 5 (grain-size analysis).
7. Classify the soil as per the IS 1498-1970 based on the results obtained from experiments at serial nos. 5 & 6 (grain size distribution and consistency limits).
8. Determination of compaction characteristics (OMC & MDD) of a given soil sample.
9. Determination of permeability of a remolded soil sample by constant head &/or falling head method.
10. Determination of consolidation characteristics of a remolded soil sample by an oedometer test.
11. Determination of shear strength characteristics of a given soil sample by U/U test from Tri-axial Compression Machine.
12. Retrieving soil samples and conducting SPT tests by advancing boreholes through hand-held auger.

Note: Any 8 experiments are to be performed from the list of experiments.

References:


5.8NCE – 551: TRANSPORTATION ENGINEERING LAB
L-0, T-0, P-3
CT-10, TA-10, ESE-30

LIST OF EXPERIMENTS

1. To Determine the Crushing Value of Coarse Aggregates.
2. To Determine the Impact Value of Coarse Aggregates.
3. To determine the Flakiness Index and Elongation Index of Coarse Aggregates.
4. To determine the Los Angeles Abrasion Value of Coarse Aggregates.
5. To determine the Stripping Value of Coarse Aggregates.
6. To determine the penetration Value of Bitumen.
7. To determine the Softening Point of Bituminous material.
8. To determine the Ductility Value of Bituminous material.
9. To determine the Flash and Fire Point of Bituminous material.
10. To determine the Stripping Value of Bituminous material.
11. Classified both directional Traffic Volume Study.
12. Traffic Speed Study. (Using Radar Speedometer or Enoscope).
13. Determination of CBR Value of soil sample in the Lab or in Field.

Note: A minimum of 8 experiments are to be performed from the list of Experiments.

References:


1. Working on Latest Version of ANALYSIS SOFTWARE LIKE ANSYS, ADINA, NISA, MATLAB
2. Working on Latest Version of DESIGN SOFTWARE LIKE STAAD PRO / STRUDS / SAP / ETAB / STRAP

References:
Unit – 1

Nature of Stresses in flat slabs with and without drops, coefficient for design of flat slabs, reinforcement in flat slabs. (IS Code Method).

Unit – 2

Analysis and design of beam curved in plan. Structural behaviour of footings, design of footing for a wall and a single column, combined rectangular and trapezoidal footings, Design of strap footing.

Unit – 3

Structural behaviour of retaining wall, stability of retaining wall against overturning and sliding, Design of T-shaped retaining wall, Concept of Counter fort retaining wall. Loads, forces and I.R.C. bridge loadings, Design of R.C. slab culvert.

Unit – 4

Design criteria, material specifications and permissible stresses for tanks, design concept, of circular and rectangular tanks situated on the ground / underground, design of overhead tanks.

Unit – 5

Advantages of prestressing, methods of prestressing, losses in prestress, analysis of simple prestressed rectangular and T-section.

Note: The students should be given a comprehensive problem at the end which requires inputs/ knowledge/ application from all the units of the syllabus. It may be evaluated as a part of TAQ.

Text Books & References

8. Dayaratnam, P,”Reinforced Concrete Design”, Oxford & IBH.
Unit-1


Unit-2

Screen, Sedimentation: Determination of settling velocity, efficiency of ideal sedimentation tank, short circuiting; different classes of settling; design of settling tanks; removal efficiency for discrete and flocculent settling. Coagulation: Mechanisms of coagulation, coagulants and their reactions, coagulant aids; design of flocculators and clariflocculators. Adsorption.

Unit-3

Filtration: Theory of filtration; hydraulics of filtration; Carmen - Kozeny and other equations, slow sand, rapid sand and pressure filters, backwashing; design of slow and rapid sand filters. Disinfection: Requirements of an ideal disinfectant; kinetics of disinfection, various disinfectants, chlorination and practices of chlorination. Water softening and ion exchange: calculation of dose of chemicals.

Unit-4

Wastewater Treatment: Preliminary, primary, secondary and tertiary treatment processes. Primary Treatment: Screens, grit chamber and their design. Secondary Treatment: Theory of organic matter removal; activated sludge process, design of different units and modifications, extended aeration systems; trickling filters; aerated lagoons, waste stabilization ponds, oxidation ditches, R.B.C. etc. Anaerobic digestion of sludge.

Unit-5

Design of low and high rate anaerobic digesters and septic tank. Basic concepts of anaerobic contact process, anaerobic filter, anaerobic fixed film reactor, fluidized bed and expanded bed reactors and upflow anaerobic sludge blanket (UASB) reactor. Other emerging technologies for wastewater treatment: Duckweed pond,
vermiculture, root zone technologies, sequential batch reactor (SBR) etc.
Solid waste Management: Definition of solid waste and its classification,
Hazardous waste, Prevailing regulations of solid waste management in India.
Noise Pollution: Definition, Sources, Prevailing noise standards in India.

Note: The students should be given a comprehensive problem at the end which requires inputs/knowledge/application from all the units of the syllabus. It may be evaluated as a part of TAQ.

References:

Text books:
2. Metcalf and Eddy Inc.: Wastewater Engineering

Reference books:
3. Arceivala: Wastewater Treatment for Pollution Control
4. Hammer and Hammer Jr.: Water and Wastewater Technology
5. Raju: Water Supply and Wastewater Engineering
7. Pandey and Carney: Environmental Engineering
11. Ramalho: Introduction to Wastewater Treatment Processes
12. Parker: Wastewater Systems Engineering

Unit-1
Unit-2

Network Techniques: Bar Chart, Mile stone chart, work break down structure, and preparation of networks. Net work techniques like PERT and CPM. In construction Management, Project Monitoring and resource allocations through network techniques.

Unit-3


Unit-4

Contract Management: Legal Aspects of Contracts, laws related to contracts, land acquisition, labour safety and welfare, Different types of contracts, their relative advantages and disadvantages, Elements of Tender Preparation, Process of tendering, pre qualifications of contracts, Evaluation of tenders, contract negotiation and award of work, monitoring of contract, settlement of disputes, arbitration and commissioning of project.

Unit-5

Equipment Management: Productivity, operational cost, owning and hiring cost. Constriction equipment: Earth moving, Hauling equipments, Hoisting equipments, Conveying Equipments, Concrete Production equipments, Tunneling equipments.

Note: The students should be given a comprehensive problem at the end which requires inputs/ knowledge/ application from all the units of the syllabus. It may be evaluated as a part of TAQ-

References:

4. Construction Management by Ojha
DEPARTMENTAL ELECTIVE – 1 SUBJECT (NCE-011 to NCE-014)

6.5 (A) NCE-011: ADVANCED FOUNDATION DESIGN

L – 3, T – 1, P-0
CT – 30, TA – 20, ESE – 100

Unit – 1
Modern methods of soil investigations ,Geophysical methods; soil resistivity
methods seismic refraction method ,stress below ground due to loads
Unit – 2
Bearing capacity and settlement analysis of shallow foundations: Meyerhof
and Hansen’s bearing capacity equations, BIS bearing capacity equation,
immediate and consolidation settlements in cohesive soil, De-Beer and
schmertman’s methods of settlement prediction in non cohesive soil.
Unit – 3
Classification of piles, load carrying capacity of single piles in clay, silt
and sand by dynamic and static methods, Pile load test, Pile group,
Negative skin friction, Settlement of pile group.

Unit – 4
Foundation on expansive soil, Construction on expansive soil, Alteration of soil
condition, under-reamed piles. Elements of well foundation, Shape, Depth of scour,
Well sinking, Tilt, shift and their prevention.
Unit – 5
Stability of slopes, Limit equilibrium method, Method of slices, Simplified Bishop
method, Stability Charts. Soil behavior under dynamic loads ,Machine foundation:
classification, definitions, design principle in brief, Barken’s method.

Note: The students should be given a comprehensive problem at the
end which requires inputs/ knowledge/ application from all the units of
the syllabus. It may be evaluated as a part of TAQ.

Text & Reference Books:

6. B. M. Das – Foundation Engineering, CENGAGE Learning
UNIT – 1

Introduction of Flexibility and stiffness method. Hand computation of problems on beam,

UNIT – 2

Hand computation of problems on trusses, frames and grids.

UNIT – 3

Generalized computer oriented treatment of stiffness method, Method of assembling the stiffness matrix, substructure technique for solving very large structures.

UNIT – 4

Analysis for imposed deformation, temperature, support settlement, etc.

UNIT – 5

Transfer matrix method of analyzing framed structure.

Note: The students should be given a comprehensive problem at the end which requires inputs/ knowledge/ application from all the units of the syllabus. It may be evaluated as a part of TAQ.

Reference:
1. Weaver & Gere, Matrix Analysis of Framed structures.

UNIT – 1

Environmental legislations for setting up and for operation of an industrial activity, Compliance procedure of these legislations, Need of Environmental Impact Assessment (EIA) study, Other Pollution control legislations.

Unit-2

Defining the industrial activity: Location, approach, manufacturing processes, raw
materials and other inputs of natural resources; Defining the local environment format: Physical environment, biological, environment and socio-economic environment.

Unit-3

Detailing of the local environment: Physical environment- water, air, land resources & solid wastes, noise emissions, radiation emissions etc.; biological environment- all flora & fauna including microbial activities in the local vicinity; Socio-economic environment- history of the area, customs & rituals, demography, infrastructural activities, education, health, and developmental profile of the area, specific local environmental issues.

Unit-4

Environmental Pollution in Industries: various industrial processes, sources and types of pollutions - solid, liquid, gaseous, noise & radiation emissions. Case studies of various industries, e.g., dairy, fertilizer, distillery, sugar, pulp and paper, iron and steel, metal plating, thermal power plants, etc.

Unit-5


Note: The students should be given a comprehensive problem at the end which requires inputs/ knowledge/ application from all the units of the syllabus. It may be evaluated as a part of TAQ*

References:

2. Environment (protection) Act 1986. Any authorized & recent publication on Government Acts. Also available on CPCB/MoEF Website
4. Wastewater Reuse and Recycling Technology- Pollution Technology Review 72, Culp, Gordan,
5. George Wasner, Robert Williams and Mark , V.Hughes Jr., Noyes Data Corporation, New Jersey.
6.5 (D) NCE – 014 PRINCIPLES OF TOWN PLANNING AND ARCHITECTURE

L – 3, T – 1, P-0
CT – 30, TA – 20, ESE – 100

Unit - 1

Unit - 2
An overview of ancient human settlements, Evolution of towns: Garden city movement, Linear city and concentric city concepts, Neighbourhood and Radburn, La-cite industrielle, Radiant city to present day planning, Satellite town concepts. Concept of habitat, Neighborhood planning, problems of metropolis.

Unit -3

Unit - 4

Unit - 5
Functional planning of buildings: Occupancy classification of buildings, General requirements of site and building. Building codes, Acts and Bye-laws, Licensing of building works. Functional planning of building such as residential, institutional, public, commercial, industrial buildings - identifying activity areas and linkages, checking for circulation, ventilation, structural requirements and other constraints. Different symbols used in building industry as per NBC and preparing sketch plan, working drawing etc.

Note: The students should be given a comprehensive problem at the end which requires inputs/ knowledge/ application from all the units of the syllabus. It may be evaluated as a part of TAQ.
References:

1. Sir Banister Fletcher’s, A History of Architecture, CBS Publisher.
8. George S. Salvan, Architectural Theories of Design, JMC Press, Quezon city
13. B.B. Dutt, Town Planning in Ancient India, Gyan Publishing House, New Delhi

DEPARTMENTAL ELECTIVE –2 SUBJECT (NCE-021 to NCE-024) (Half Unit Course)

6.6 (A) NCE-021: ADVANCED CONCRETE DESIGN

L – 2, T –1, P-0
CT – 15, TA – 10, ESE – 50

Unit - 1

Design of over-head tanks: Design of RC domes and beams curved in plan, design of Cylindrical and rectangular tanks with different end conditions using IS: 3370 tables, Intze tank design with membrane analysis with mention of continuity effects.
Design of staging: Braces, Columns and Raft Foundation.

Unit - 2

Building Frames: Dead, Live, Wind and Earthquake loads, Analysis of framed building by approximate methods for vertical and horizontal loads, concept of Exact Analysis, joint detailing.

Unit - 3


Unit - 4

High performance concrete, Production and no -conventional concrete. Design of composite Sections: Composite beam and slabs in simple conditions.
Note: The students should be given a comprehensive problem at the end which requires inputs/ knowledge/ application from all the units of the syllabus. It may be evaluated as a part of TAQ.

References:
1. Reinforced Concrete Design by M L Gambhir
2. Reinforced Concrete Design by B C Punamia
3. Essentials of Bridge Engineering by D.J. Victor

6.6 (B) NCE- 022: EARTH AND EARTH RETAINING STRUCTURE

Unit -1
Earth and Rock Fill Dam, Choice of types, material, foundation, requirement of safety of earth dams, seepage analysis. Mechanically Stabilized Earth retaining walls: General considerations, backfill and reinforced materials, construction details, design method, stability

Unit -2
Soil nailing: applications, advantages, limitations, methods of soil nailing, case histories, analysis and design.

Unit -3
Reinforced Soil: Introduction, basic components, strength characteristics, soil-reinforcement interface-friction, Reinforced Earth wall: Stability analysis, construction procedure, drainage, design Procedure

Unit -4

Note: The students should be given a comprehensive problem at the end which requires inputs/ knowledge/ application from all the units of the syllabus. It may be evaluated as a part of TAQ.

References:
1. V N S Murthy - Soil Mechanics and Foundation Engg
2. Swami Saran - Reinforced Soil and its Engineering Application
4. B. M. Das - Foundation Engineering , CENGAGE Learning
5. P.C Varghese- Foundation Engineering, PHI Learning Pvt. Ltd., Delhi
UNIT-1

Introduction: Overview of transportation system, nature of traffic problems in cities. Present Scenario of road transport and rail transport assets. Role of transportation: Social, Political, Environmental. Goals and objective of Transportation planning.

UNIT-2

Type of transportation system: Different modes of surface transport, Public Transport Intermediate Public Transport (IPT), Rapid and mass transport system like MRTS & bus rapid transit. Traffic Flow and traffic stream theory & variables, Queing theory.

UNIT-3

Travel demand: Estimation and fore casting, trip classification, trip generation: factor and methods, multiple regression analysis. Trip distribution methods, modal split, trip assignment.

UNIT-4


Note: The students should be given a comprehensive problem at the end which requires inputs/ knowledge/ application from all the units of the syllabus. It may be evaluated as a part of TAQ.

References:

1. Introduction to Transportation Engineering: William W. Hay.
2. Introduction to Transportation Engineering planning- E.K.Mortak.
4. Traffic Engineering, L.R. Kadiyali
6.6 (D) NCE-024: RURAL WATER SUPPLY AND SANITATION

Unit-1

Rural Water Supply: Issues of rural water supply – Various techniques for rural water supply- merits- National rural drinking water program- rural water quality monitoring and surveillance- operation and maintenance of rural water supplies.
Low Cost water Treatment: Introduction – Epidemiological aspects of water quality methods for low cost water treatment - Specific contaminant removal systems

Unit-2

Rural Sanitation: Introduction to rural sanitation- Community and sanitary latrines - Planning of wastewater collection system in rural areas- Treatment and Disposal of wastewater - Compact and simple wastewater treatment units and systems in rural areas stabilization ponds - septic tanks - Imhoff tank- soak pits- low cost excreta disposal systems Effluent disposal. Identify problems pertaining to rural water supply and sanitation. Design water supply and sanitation system for rural community.

Unit-3

Industrial Hygiene and Sanitation: Occupational Hazards- Schools- Public Buildings-Hospitals- Eating establishments- Swimming pools – Cleanliness and maintenance and comfort- Industrial plant sanitation.

Unit-4

Solid Waste Management: Disposal of Solid Wastes- Composting- land filling incineration- Biogas plants - Rural health - Other specific issues and problems encountered in rural sanitation.

Note: The students should be given a comprehensive problem at the end which requires inputs/ knowledge/ application from all the units of the syllabus. It may be evaluated as a part of TAQ.

References:

1. ‘Water Treatment and Sanitation – Simple Method for Rural Area’ by Mann H.T. and Williamson D.
2. Operation and maintenance of rural water supply and sanitation systems by Brikké F
3. ‘Water Supply for Rural Areas & Small Communities’ by Wanger E.G. and Lanoix J.N.,
5. ‘Manual on Water Supply and Treatment’, CPHEEO, Ministry of Urban Development, Govt. of India.
6. ‘Manual on Sewerage and Sewage Treatment’, CPHEEO, Ministry of Urban Development, Govt. of India

1. Preparation of working drawings for the following using any drafting software
2. RC Beams- Simply supported, Continuous, Cantilever
3. T – beam / L-beam floor
4. Slabs – Simply supported, Continuous, One way and two way slabs.
7. Combined rectangular and trapezoidal footings.
8. Detailing of Buildings with respect to Earthquake Resistant Design

References:


6.8 NCE-652: ENVIRONMENTAL ENGINEERING LAB

1. Determination of turbidity and conductivity.
2. Determination of pH, alkalinity and acidity.
3. Determination of hardness and chlorides.
4. Determination of residual chlorine.
5. Determination of MPN (most probable number) of coliforms.
6. Measurement of SPM and PM$_{10}$ with high volume sampler.
7. Measurement of sound level with sound level meter.
8. Determination of total, suspended and dissolved solids.
9. Determination of BOD.
10. Determination of COD.
14. Field Visit of Water/ Sewage Treatment Plant of A Nearby area.

Note: Any 8 Experiments out of the list of experiments are to be performed.

References:

6.9 NCE-653: CAD LAB II
L -0, T -0, P -3
CT – 10, TA – 10, ESE – 30

2. Working on Latest Version of Transportation Engineering software like MAX ROAD/ Surveying Software.
3. Working on Latest Version of GIS software (ARC GIS / ENVI / GEPSY)
4. Working on Latest Version of Project Management software (PRIMAVEERA / MS PROJECT)

6.10 NCE-654: SURVEY CAMP
TOTAL MARKS: 50

The purpose of the camp is to train students in using modern surveying techniques and equipment such as GPS, total stations, automatic and digital levels, electronic theodolites, etc. to prepare a detailed digital map.

The course will be run in the form of a camp for 7 working days and will involve the following components:

1. Reconnaissance of the area to be mapped.
2. Control establishment: Observations and Adjustment using GPS and/or Total station traverse to yield adjusted coordinates of control points.
3. Detail digital mapping using Total station/GPS.
4. Preparing a digital map using open source mapping software and report writing.

Note: Teaching load will be equivalent to 0-0-3.