

## National Institute of Technology, Raipur (C.G.)

Course of Study & Scheme of Examination							B. Tech. VII Semester					Branch : Civil Engineering	
S.No.	Board of Studies	Sub.Code	Subject Name	Periods/week			Examination Scheme					Total Marks	Credits L+(T+P)/2
				L	T	P	TA	FE	SE	T.C.A.	ESE		
1	Civil	CE-711	Structural Engineering Design - III	4	1	-	20	15	15	50	70	120	5
2	Civil	CE-712	Water Resources Engineering - I	3	1	-	20	15	15	50	70	120	4
3	Civil	CE-713	Structural Analysis III	3	1	-	20	15	15	50	70	120	4
4	Refer Table -2		Professional Elective- II	3	1	-	20	15	15	50	70	120	4
5	Civil	CE-721	Structural Engg Drawing I Lab -	-	-	3	30	-	-	30	20	50	2
6	Civil	CE-723	Computer Application in Civil Lab	-	-	3	30	-	-	30	20	50	2
7	Civil	CE-724	Pract. Training	-	-	-	50	-	-	50	0	50	2
8	Civil	CE-725	Minor Project	-	-	12	100	-	-	100	50	150	6
9	Civil	CE-726	Seminar and Report Writing	-	-	2	50	-	-	50	0	50	1
Total				13	4	20	340	60	60	460	370	830	30

Note : For attendance of a student in every theory and practical class, the teachers are supposed to keep records ultimately in the following format which will be included in the semester mark-sheets.

**T.C.A. = Total of Continuous Assessment.**

Format for attendance					
Attendance					Category
> 85				----- >	High "H"
> 70 & < 85				----- >	Medium "M"
> 60 & < 70				----- >	Low "L"
< 60				----- >	Poor "P"

**Table - 2**  
**Professional Elective II (CE714)**  
**Construction Engineering Group**

<b>S.No.</b>	<b>Board of Study</b>	<b>Subject Code</b>	<b>Subject</b>
1	Civil Engg.	CE-7141	Quality Control and Assurance in Construction
2	Civil Engg.	CE-7141	Safety in Construction
3	Civil Engg.	CE-7141	Construction Management
4	Civil Engg.	CE-7141	Construction Equipments and Techniques
<b>Transportation Engineering Group</b>			
5	Civil Engg.	CE-7142	Transportation Planning and Management
6	Civil Engg.	CE-7142	Advanced Transportation Engineering
7	Civil Engg.	CE-7142	Traffic Engineering
<b>Geotechnical Engineering Group</b>			
8	Civil Engg.	CE-7143	Advanced Soil Mechanics
9	Civil Engg.	CE-7143	Geoenvironmental and Geohazard Engineering

**National Institute of Technology Raipur (CG)**  
**Civil Engineering Department**  
**Seventh Semester**

Structural Engineering Design – III

Code: CE- 711

Total Theory Periods per Week: 4    Total Tutorial Periods per Weeks: 1    Total Marks: 120

Teacher's Assessment: 20    First Examination: 15    Second Examination: 15    End Semester Examination: 70

Unit 1

Plate Girders

Riveted and Welded Plate Girders - Design of cross-section, curtailment of flange plates, stiffeners, splices.

Unit 2

Connections

Simple, Semi-rigid and Rigid Connections, Connection Configurations, Framed and seated connections, Moment resistant connections.

Industrial Buildings

Various components of an industrial building, Loads and load combinations, Design of purlins, roof trusses, Industrial building frames, gantry girder and bracings.

Unit 3

Steel Tanks and Chimneys:

Pressed steel tank including tiers, stays, foundation and staging, self-supporting steel chimneys.

Unit 4

Steel Bridges

Plate girder and Truss Bridges, General arrangement, Design loads for Highway / Railway steel bridges, Design of Truss bridge for Railway loading.

Name of Text Books:

Design of Steel Structures – B.C. Punmia, Jain & Jain (Laxmi Publication, New Delhi)

Design of Steel Structures – A.S. Arya and J.L. Ajamani (Nemchand and Bros., Roorkee)

Name of Reference Books:

Design of Steel Structures (Vol. - I & II) – Ram Chandra (Standard Book House, New Delhi)

Design of Steel Structures – Dayaratnam (Wheeler Publishing, New Delhi)

Design of Steel Structures – E.H.Gaylord and C.N. Gaylord (Mc Graw Hill, New York)

Steel Structures: Design and Behaviour – C.G.Salmon and J.E.Johnson (Harper and Row, New York)

**National Institute of Technology Raipur (CG)**  
**Civil Engineering Department**  
**Seventh Semester**

Water Resources Engineering - I

Code: CE- 712

Total Theory Periods per Week: 3      Total Tutorial Periods per Weeks: 1      Total Marks: 120

Teacher's Assessment: 20    First Examination: 15    Second Examination: 15    End Semester Examination: 70

Unit1 Introduction : Need for Irrigation, Advantages and Disadvantages of irrigation, development of irrigation in India. Types of Irrigation systems - Flow Irrigation, Tank Irrigation, Lift Irrigation, Tube Well Irrigation. Soil-Water-Crop relationship, Soil groups in India.

Methods of Irrigation: Introduction, requirement of irrigation methods, surface and sub surface irrigation, sprinkler and drip irrigation.

Water Requirement of crops : Introduction, Water requirement of crop, quantity of water for irrigation, consumptive use of water or evapo-transpiration, crop season and crops of India, crop period and base period, delta, duty of water, relationship between delta duty and base period, factors affecting duty, methods of improving duty, Intensity of irrigation, irrigation requirement of crops.

Unit 2 Canal Irrigation : Classification of canal, parts of canal irrigation system, canal alignment, lay-out of canal system, typical canal cross section, command areas, losses in irrigation systems, water requirement of irrigation channels.

Design of Stable Channels in Alluvium : Introduction, Kennedy's silt theory, Garret's diagram, Lacey's Theory, Lacey's regime equations, Lacey's shock theory, Design of channels by Kennedy's and Lacey's theories, Use of Lacey's diagrams, maintenance of Irrigation channels, sediment transport, silting of canals and its control.

Design of Lined channels : Introduction, benefits of lining, types of lining, economics of lining, procedure and design of lined canals.

Unit 3 Water Logging and its Control : Causes and ill effects of water logging, prevention and control, reclamation of water logged and saline lands, surfacedrainage

Distribution of canal waters : System of regulation and control, requirement of a good outlet, types of outlet.

Water Distribution System : Rotational delivery (Warabandi), Continuous delivery and delivery on demand, Role of command area development authority, Functions and organisational structures.

Unit 4 River behaviour and Training : Objects, river characteristics, river patterns, classification of river training works, methods of river training embankments, bank protection, spurs, cutoffs, pitched island, river diversion, meandering causes and parameters.

Flood Control : Introduction, Flood estimation by empirical and flood frequency studies, levees and embankments, channel improvement, flood ways evacuation and flood plain zoning, economics of flood control, National Policy of floods, floodforecasting.

Unit 5 Reservoir Planning : Introduction, Type of reservoirs, storage zones of a reservoir, mass curve and demand curve, determination of reservoir capacity, safe field.

Flood Routing : Graphical method, Modified Puls method, I.S.I method, trial and error method, reservoir losses, reservoir sedimentation, life of reservoir, environmental effects of reservoirs.

Name of Text Books:

Irrigation Engineering and Hydraulic Structures - S.K. Garg (Khanna Publications) Irrigation Engineering - B.C. Punmia (Laxmi Publications)

Name of Reference Books:

Irrigation, Water Resources and Water Power Engineering - Dr. P.N. Modi (Standard Book House) Theory and Design of Irrigation Structures (Volume - I & II) - Varshney (Nem Chand & Bros.) Irrigation Engineering - Asawa G.L. (New Age International Publications) Fundamentals of Irrigation Engineering - Bharat Singh (Nem Chand & Bros.)

**National Institute of Technology Raipur (CG)**  
**Civil Engineering Department**  
**Seventh Semester**

Structural Analysis III

Code: CE- 713

Total Theory Periods per Week: 3      Total Tutorial Periods per Weeks: 1      Total Marks: 120

Teacher's Assessment: 20    First Examination: 15    Second Examination: 15    End Semester Examination: 70

**Unit 1**

Matrices Related to Structural Analysis:

Introduction, definitions of various types of matrices, Matrix algebra.

Introduction to matrix method of analysis:

Basic concept of analysis, Static and Kinematic Indeterminacy, Formulation of stiffness and flexibility matrices, application to simple problems.

**Unit 2**

Matrix stiffness method of truss analysis:

Degree of freedom (Kinematic indeterminacy), deformation matrix, Element stiffness matrix, force-displacement matrix, static matrix, global stiffness matrix, joint-force matrix, numerical examples.

**Unit 3**

Matrix stiffness method of beam and rigid frame analysis:

Joints and elements in beam vs degree of freedom, sending load on the elements to the joints, static matrix, deformation matrix, element stiffness matrix, force displacement matrix, global stiffness matrix, joint-force matrix, numerical examples, concepts of computer programming for matrix method of structural analysis.

**Unit 4**

Introduction to plastic analysis of structures

Plastic Hinge concept, fully plastic moment, shape factor, collapse mechanism, static and kinematic methods of collapse load, upper and lower bound principle theorems, design for fully plastic moment .

Name of Reference Books:

1. Indeterminate structural analysis by C.K. Wang, McGraw-Hill International Book Company.
2. Matrix analysis of framed structures by W. Weaver and J.M. Gere, CBS Publishers and distributors, Delhi
3. Matrix analysis of structures by Aslam Kassimali, Brooks/ Cole Publishing Co. New York.

**National Institute of Technology Raipur (CG)**  
**Civil Engineering Department**  
**Seventh Semester**

Quality Control and Assurance in Construction

Code: CE- 7141

Total Theory Periods per Week: 3      Total Tutorial Periods per Weeks: 1      Total Marks: 120

Teacher's Assessment: 20    First Examination: 15    Second Examination: 15    End Semester Examination: 70

Unit 1

Construction Projects

Agencies involved in Construction Projects, mutual relationship, quality control at site; and whose job is it.

Unit 2

ISO / IS Requirements

IS 9000 (Parts 1 to 4) (Pt 1; 1994, Pt 2; 1993, Pt 3; 1991, Pt 4; 1993) for Total Quality Management.

ISO 14000 – 1988 for environment – Impact of large construction projects.

Unit 3

Quality Control on Construction Projects

Inspection of reinforced concrete, masonry and steel works, testing techniques and quality at reports.

Unit 4

Statistical Analysis

Sampling frequencies, statistical and reliability analysis, optimum sample size.

Unit 5

Quality Assurance

Quality Assurance in constructions

Name of Text Books:

ISO 9000 in Construction – Nee, Paul A. (Wiley Interscience Publication, 1994)

IS: 14000, – Quality System – Guidelines for Selection and Use of Standards on Quality System 1988.

Name of Reference Books:

ISO 9000 in Construction – Wah, L.S., Min., L.C. & Ann, T.W. (McGraw Hill Book Company, 1996)

Construction Engineering and Management – S. Seetaraman (Umesh Publication)

**National Institute of Technology Raipur (CG)**  
**Civil Engineering Department**  
**Seventh Semester**

**Safety in Construction**

Code: CE- 7141

Total Theory Periods per Week: 3      Total Tutorial Periods per Weeks: 1      Total Marks: 120

Teacher's Assessment: 20    First Examination: 15    Second Examination: 15    End Semester Examination: 70

**Unit 1**

**Construction Project**

A brief outline project definition, elements, relation to safety, types of projects and safety hazards.

**Unit 2**

**Construction sites and safety**

Tools – Electrical, Pneumatic, Grinding, Hand tools.

Machinery – Earth moving, Concrete Breaker, Carpenters, Transporting, Batching Plant and Concrete Mixer, Dumpers.

Material Handling – Various materials and their effects, storing materials.

Common Risks and Hazards.

**Unit 3**

**Planning Safety for Construction Projects**

Safety Construction Safety, Legal Requirements, First-Aid, Safety Clauses in contract, Safety Policy, Safety deposit, Safety Officer, Safety Committees, Safety of Contractors Worker.

**Unit 4**

**Safety Practices**

Roads and bridges, tunneling, buildings, and structures, (excavation, blasting, consent, machinery, transportation, concrete structures, piling, deep foundations, compressed air, tunneling, dewatering, structural steel erection, floors, and walk opening, demolition, use of ladders, electrical works, welding and cutting, grinding and chipping, hoisting apparatus, A.C. Roofs.

**Unit 5**

**Modern project**

Special Safety practices for Modernisation Project

Planning for sequential operations and emergencies first aid, fire hazards and preventive methods.

**Name of Text Books:**

Construction Safety, Security and Loss Prevention – B. Fulman.

**Name of Reference Books:**

Fundamental of Construction Safety – P.T. Armstrong.

Construction Engineering and Management – S. Seetaram (Umesh Publication)



**National Institute of Technology Raipur (CG)**  
**Civil Engineering Department**  
**Seventh Semester**

**Construction Management**

Code: CE- 7141

Total Theory Periods per Week: 3      Total Tutorial Periods per Weeks: 1      Total Marks: 120

Teacher's Assessment: 20    First Examination: 15    Second Examination: 15    End Semester Examination: 70

Unit 1

The Owner's Perspective

Introduction-The project life cycle-Major Types of Construction-Selection of Professional Services-Construction contractors-Financing of constructed facilities-Legal and regulatory Requirements-The changing Environment of the construction Industry-The Role Project Managers

Unit 2

Organizing for Project Management

What is project management? – Trends in Modern Management-Strategic planning and project programming- Effects of project risks on organization-Organization of Project Participants-Traditional designer-Constructor sequence-Professional construction management-Owner-Builder-Operation-Turnkey operation-Leadership and Motivation for the Project team-Interpersonal behaviour in project organization-perceptions of Owners and Contractors

Unit 3

The Design and Construction Process

Design and construction as an integrated system-Innovation and technological Feasibility-Innovation and technological feasibility-Design Methodology-Functional Design-Physical Structures-Geo-Technical Engineering Investigation-Construction Site Environment-Value engineering-Construction Planning-Industrialized Construction and Prefabrication-Computer -Aided Engineering

Unit 4

Labour, Material and Equipment Utilization

Historical Perspective – Labour Productivity-Factors Affecting Job-Site Productivity-Labor Relations in construction-Problems in collective bargaining-Materials Management-Materials Procurement and Delivery- Inventory control-Tradeoffs of cost in Material Management-Construction Equipment-Choice of Equipment and Standard production Rates-Construction Processes Queues and Resource Bottlenecks

Unit 5

Cost Estimation

Costs Associated with Construction Facilities-Approaches to cost estimation-Type of construction cost estimates- Effects of scale on construction cost-Unit cost-Method of estimation-Methods for allocation of joint costs- Historical cost data-Cost indices-Applications of cost Indices to Estimating-Estimate based on Engineers List of Quantities-Allocation of Construction costs over time-Computer Aided cost Estimation-Estimation of operating costs

Name of Text Books:

Construction Project Management Planning, Scheduling and Control – Chitkara, K.K. (Tata McGraw Hill Publishing Co., New Delhi, 1998)

Project Mangement: A systems Approach to Planning, Scheduling and Controlling – Harold Kerzner (CBS Publishers & Distributors, Delhi, 1988)

Name of Reference Books:

Project management for Construction: Fundamental Concepts for owners, Engineers, Architects and Builders – Chris Hendrickson and Tung Au, (Prentice Hall, Pittsburgh, 2000)

Construction Project Management – Frederick E.Gould (Wentworth Institute of Technology, Vary E.Joyce, Massachussetts Institute of Technology, 2000)

Project Management – Choudhury, S. (Tata McGraw Hill Publishing Co., New Delhi, 1988)

Applied project Engineering and Management – Ernest E. Ludwig (Gulf Publishing Co., Houston, Texas, 1988)

**National Institute of Technology Raipur (CG)**  
**Civil Engineering Department**  
**Seventh Semester**

**Construction Equipments and Techniques**

Code: CE- 7141

Total Theory Periods per Week: 3      Total Tutorial Periods per Weeks: 1      Total Marks: 120

Teacher's Assessment: 20    First Examination: 15    Second Examination: 15    End Semester Examination: 70

Unit 1

Construction Equipments

Fundamentals of earthwork operations - Earth moving operations -Types of Earthwork

Equipment Tractors, Motor Graders, Scrapers, Front end waders, Earth Movers.

Equipment for Dredging, Trenching, Tunnelling, Drilling, Blasting-Equipment for compaction-Erection Equipment.

Types of pumps used in construction - Equipment for Dewatering and Grouting -Foundation and Pile Driving Equipment.

Forklifts and Related Equipment - Portable Material Bins – Conveyors - Hauling Equipment.

Unit 2

Equipment for Production of Aggregate and Concreting

Crushers-Feeders-Screening Equipment-Handling Equipment-Batching and Mixing Equipment-Hauling, Pouring and Pumping Equipment-Transporters.

Unit 3

Sub-structure Construction Techniques

Box jacking -Pipe Jacking-Under Water Construction of diaphragm walls and basement -Tunnelling techniques piling techniques-driving well and caisson-sinking cofferdam-cable anchoring and grouting-driving diaphragm walls, sheet piles-laying operations for built up offshore system-shoring for deep cutting-Large reservoir, construction with membranes and Earth system-well points-Dewatering and stand by Plant equipment for underground open excavation

Unit 4

Super Structure Construction

Vacuum Dewatering of concrete flooring-Concrete paving technology-Techniques of construction for continuous concreting operation in Tall buildings of various shapes and Varying sections-Launching Techniques-Suspended from work-erection techniques of tall structures, Large span structures-Launching techniques for heavy decks in situ prestressing in high rise structures, aerial transporting handling erecting light weight components on tall structures-erection of lattice tower as and rigging of transmission line structures.

Unit 5

Repair Construction

Mud jacking grout through slab foundation-micropiling for strengthening floor and shallow profile-pipeline laying protecting sheet piles, screw anchors-sub grade water proofing under pining advanced techniques and sequence in demolition and dismantling.

Name of Text Books:

Construction Planning, Equipment and Methods (5th Edition) – Peurifoy, R.L., Ledbetter, W.B. and

Schexnayder, C. (McGraw Hill, Singapore, 1995)

Construction Equipment and Management – Sharma S.C. (Khanna Publishers New Delhi, 1988).

Name of Reference Books:

Construction Equipment and Job Planning – Deodhar, S.V. (Khanna Publishers, New Delhi, 1988)

Construction Equipment and its Planning and Application – Dr. Mahesh Varma (Metro-politan Book Company, New Delhi-, 1983)

Practical foundation engineering hand book – Robertwade Brown (McGraw Hill Publications, 1995)

Construction Dewatering: New Methods and Applications – Patrick Powers. J. (John Wiley and Sons, 1992)

Advanced Construction Techniques – Jerry Irvine (CA Rocketr, 1984)

**National Institute of Technology Raipur (CG)**  
**Civil Engineering Department**  
**Seventh Semester**

**Transportation Planning and Management**

Code: CE- 7142

Total Theory Periods per Week: 3      Total Tutorial Periods per Weeks: 1      Total Marks: 120

Teacher's Assessment: 20    First Examination: 15    Second Examination: 15    End Semester Examination: 70

**Unit 1**

**Introduction**

Urbanization and transportation problems, transportation sector in five year plans, regional transportation plans, comprehensive transportation planning, goals and objectives, principles of transport planning, process of urban transport planning.

**Unit 2**

**Trip Generation Analysis**

Trip classification, multiple regression analysis, trip rate analysis, category analysis.

**Unit 3**

**Trip Distribution Analysis**

Methods of trip distribution, uniform factor method, average factor method, frator method, furness method, limitations of growth factor methods, elementary gravity model.

**Unit 4**

**Model Choice Analysis**

Determinants of mode choice, theoretical framework for discrete choice model, binomial and multinomial logit model, choice-set determination, model specification, functional form, statistical estimation, validation.

**Assignment**

Basic concepts, traffic assignment methods, all-or-nothing assignment, multiple route assignment, capacity restraint assignment, diversion curves.

**Unit 5**

**Economic Evaluation of Transport Plans**

Need, costs and benefits of transport projects, methods of economic evaluation, benefit-cost ratio method, first year rate of return, net present value methods, internal rate of return method.

**Major Issues**

Public transport policy, intermediate public transport, non motorized transport, transport facility for elderly population, women and children.

Name of Text Books:

Traffic Engineering and Transport Planning – Kadiyali, L.R. (Khanna Publishers, Delhi, 1996)  
Transport Planning and Traffic Engineering – Flaherty, CAO (John Wiley & Sons, Inc., New York, 1997)

Name of Reference Books:

Principles of Urban Transport Systems Planning – Hutchinson, B.G. (Scripta Book Company, Washington, D.C., 1974)  
Modelling Transport – Ortuzar, title D. and Willumson, L.G. (John Wiley & Sons, New York, 1995)

**National Institute of Technology Raipur (CG)**  
**Civil Engineering Department**  
**Seventh Semester**

**Advanced Transportation Engineering**

Code: CE- 7142

Total Theory Periods per Week: 3      Total Tutorial Periods per Weeks: 1      Total Marks: 120

Teacher's Assessment: 20    First Examination: 15    Second Examination: 15    End Semester Examination: 70

**Unit 1**

**Highway Economics and Financing**

Benefits from highway improvement, cost of highway transportation, highway method, benefit cost ratio method, methods of raising highway finances.

**Unit 2**

**Highway Materials**

Evaluation of subgrade soil, group index, plate bearing test, C.B.R. test Bituminous paving mixes – Requirements, Design of mixes, Marshall Method, Modified Hubbard-Field Method.

**Highway Construction**

Material, Equipment, Construction procedure and quality control in construction of water bound macadam roads, Bituminous roads and cement Concrete roads, Construction of joints in cement concrete pavements, Joint fillers and scalers.

**Unit 3**

**Design of flexible pavements**

Design wheel loads, climatic variations, Empirical and semi-empirical methods of design, Group Index, C.B.R. Triaxial, Mc Load Lumister's layered system, North Dakota cone method, design of airport pavements, various design factors, design of flexible airport pavements.

**Unit 4**

**Design of rigid Pavements**

Design considerations, wheel load stresses, temperature stresses, design of joints in cement concrete pavements, design of rigid airport pavements.

**Unit 5**

**Soil Stabilized road**

Basic Principles of soil stabilization, various methods of soil stabilization, proportioning of materials, Mehra's method of soil stabilization, design of soil cement, soil lime and soil bitumen mixes, stabilization of black cotton soil and desert sand pavement failure, evaluation and strengthening failure of flexible and rigid types of pavements, aRoad nic and periodic maintenance, design of overlay with bankelmn beam, different types of overlays, airport pavement overlays.

**Name of Text Books:**

Traffic Engineering and Transport Planning – Kadiyali, L.R. (Khanna Publishers, Delhi, 1996)

Transport Planning and Traffic Engineering – Flaherty, CAO (John Wiley & Sons, Inc., New York, 1997)

**Name of Reference Books:**

Principles of Urban Transport Systems Planning – Hutchinson, B.G. (Scripta Book Company, Washington, D.C., 1974)

Modelling Transport – Ortuzar, title D. and Willumson, L.G. (John Wiley & Sons, New York, 1995)

**National Institute of Technology Raipur (CG)**  
**Civil Engineering Department**  
**Seventh Semester**

**Traffic Engineering**

Code: CE- 7142

Total Theory Periods per Week: 3      Total Tutorial Periods per Weeks: 1      Total Marks: 120

Teacher's Assessment: 20    First Examination: 15    Second Examination: 15    End Semester Examination: 70

Unit 1

Introduction

3E's of traffic Engineering, Special problems due to mixed traffic and other conditions in developing countries, Concept of PCU.

Unit 2

Traffic Characteristics

Road user characteristics, Vehicular characteristics, Traffic flow characteristics, Capacity, Traffic studies, Volume, Spot speed, Speed and delay, Origin and destination, Parking and accident.

Unit 3

Traffic Operations

Traffic regulations, Controls on vehicles, Drivers and flow, One way street tidal flow operation, priority for high occupancy vehicles, Traffic control devices, Signs, Signals, Islands and markings, Design of isolated traffic signals by IRC method.

Unit 4

Traffic Safety

Analysis of traffic accidents, Highway lighting, Effect of road conditions and road geometrics on traffic safety, Traffic safety awareness.

Unit 5

Traffic and Environment

Pollution problems of cities, Noise pollution, Air pollution, Vibration, Environmental Impact Assessment, Mitigative Measures.

Name of Text Books:

Traffic Engineering – McShane, W.R. and Roes, R.P. (Prentice Hall, New Jersey, 1990)

Traffic Engineering and Transport Planning – Kadiyali, L.R. (Khanna Publishers, Delhi, 1996)

Name of Reference Books:

Transport Planning and Traffic Engineering – Flaherty, CAO'(Ed.) (John Wiley & Sons, Inc., New York, 1997)

Traffic Flow Fundamentals – May, A.D. (Prentice Hall, Englewood Cliffs, New Jersey, 1990)

**National Institute of Technology Raipur (CG)**  
**Civil Engineering Department**  
**Seventh Semester**

**Advanced Soil Mechanics**

Code: CE- 7143

Total Theory Periods per Week: 3      Total Tutorial Periods per Weeks: 1      Total Marks: 120

Teacher's Assessment: 20    First Examination: 15    Second Examination: 15    End Semester Examination: 70

Unit 1

Introduction, Soil classification, Special Characteristics of soil

Unit 2

Advanced field and lab testing; Field CBR and Cyclic Plate Load Test, SPT, Field Vane shear test etc.

Unit 3

Specification and methods of soil improvement, Geotextile reinforcements, Classical method, Computer based method, Reliability based design

Unit 4

Embankment construction, Settlement calculation, Stage construction; Earth Retaining Structures: Gravity walls,; Stability of Slopes,;

UNIT 5

Design of slopes in Hilly areas

Text book (TB):

1. Gulhati S. K. and Datta M., "Geotechnical Engineering", Tata McGraw-Hill Publishing Company Limited, 2005.

Reference books (RB):

1. Terzaghi, K. and Peck B., "Soil Mechanics in Engineering Practice", John Wiley & Sons, New York, 2<sup>nd</sup> Edition, 1967.
2. Das B. M., "Advanced Soil Mechanics", Taylor & Francis Publishers, 2<sup>nd</sup> Edition, 1997.
3. Gopal, Ranjan and A.S.R. Rao, "Basic and Applied Soil Mechanics", New Age International Publishers, 2<sup>nd</sup> Edition, 2000.
4. Lambe and Whitman, "Soil Mechanics", John Wiley & Sons Inc., 1969.
5. Arora, K.R., "Soil Mechanics and Foundation Engineering" Standard Publishers Distributors, 5<sup>th</sup> ed., 2005.
6. IS 2720 (Part 31): 1969 Field Determination of California Bearing Ratio.
7. IS 1888: 1982 Method of Load Test on Soils.
8. Other Relevant BIS Codes.



**National Institute of Technology Raipur (CG)**  
**Civil Engineering Department**  
**Seventh Semester**

**Geoenvironmental and Geohazard Engineering**

Code: CE- 7143

Total Theory Periods per Week: 3      Total Tutorial Periods per Weeks: 1      Total Marks: 120

Teacher's Assessment: 20    First Examination: 15    Second Examination: 15    End Semester Examination: 70

**Unit 1 Geoenvironmental Engineering**

Waste generation; Sources and effects of subsurface contamination; Physical, Chemical and biological characteristics of solid waste; Soil waste interaction; Contaminant transport.

**Unit 2 Landfills**

Types of landfills; siting criteria; Waste containment principles; Types of barrier materials; Planning and design aspects relating to waste disposal in landfills, in ash ponds and tailing ponds, and in rocks; Regulations.

**Unit 3 Geotechnical Earthquake engineering**

Engineering seismology, strong ground motion, seismic hazard analysis, Local site effects and design ground motions, liquefaction hazard evaluations and remedial measures.

**Unit 4 Landslides**

Causes and phenomenon associated with landslides, effect of rainfall on slope stability, earthquake triggered landslides, landslides prevention, control and remedial measures

**Unit 5 Other hazards**

Ground subsidence, ground heave, erosion.

**Text Book:**

1. Gulhati S.K., Datta, M.: Geotechnical Engineering, Tata McGraw-Hill Publishing Company Limited, New Delhi.

**Reference Books:**

1. Terzaghi, K. and Peck B., "Soil Mechanics in Engineering Practice", John Wiley & Sons, New York, 2<sup>nd</sup> Edition, 1967.
2. Das B. M., "Advanced Soil Mechanics", Taylor & Francis Publishers, 2<sup>nd</sup> Edition, 1997.
3. Gopal, Ranjan and A.S.R. Rao, "Basic and Applied Soil Mechanics", New Age International Publishers, 2<sup>nd</sup> Edition, 2000.
4. Lambe and Whitman, "Soil Mechanics", John Wiley & Sons Inc., 1969.
5. Arora, K.R., "Soil Mechanics and Foundation Engineering" Standard Publishers Distributors, 5<sup>th</sup> ed., 2005.

**National Institute of Technology Raipur (CG)**  
**Civil Engineering Department**  
**Seventh Semester**

Structural Engineering Drawing I Lab

Code: CE- 721

Total Periods per Week: 3

Total Marks: 50

Teacher's Assessment: 30

End Semester Examination: 20

Study of complete standard drawing

a. Multistoried building

b. Bridge

c. Water tank

Experiments to be performed (Min 10 experiments)

Structural Drawings of Structural Engineering Design I and Structural Engineering Design II

List of Equipments / Machine Required:

List of Equipments – Computers and Software like AutoCAD, STRUDD, STADD etc

Recommended Books:

Detailing Books/ Codes

1 SP 16

2 R.C. C. Detailing Hand Book - Boughton

**National Institute of Technology Raipur (CG)**  
**Civil Engineering Department**  
**Seventh Semester**

Computer Application in Civil Lab

Code: CE- 723

Total Periods per Week: 3

Total Marks: 50

Teacher's Assessment: 30

End Semester Examination: 20

Experiments to be performed (Min 10 experiments)

1. A C++ program for determination standard deviation of any number of observations.
2. A C++ program for determination of correlation index.
3. A C++ program to perform regression analysis.
4. A C++ program to add any desired number of matrices.
5. A C++ program to multiply any desired number of matrices.
6. A C++ program to determine the inverse of a matrix.
7. A C++ program for solution of simultaneous linear algebraic equations by Gauss elimination method.
8. A C++ program for solution of simultaneous linear algebraic equations by Gauss Jordan method.
9. A C++ program for solution of simultaneous linear algebraic equations by Matrix Inversion method.
10. A C++ program for numerical solution of ordinary differential equations by Runge-Kutta method.
11. A C++ program for numerical solution of ordinary differential equations by Predictor-Corrector method.
12. A C++ program for the computation of area of any section by trapezoidal rule.
13. A C++ program for the computation of area of any section by Simpson's rule.
14. Graphics programming for the generation of line of different styles.
15. Graphics programming for the generation of a rectangle, circle, ellipse of given dimensions.

List of Equipments / Machine Required:

PC system.

Turbo C++ compiler.

Recommended Books:

Let us C++ – Yeshwant Kanitkar (BPB Publications)

Problem Solving with C++ – Savitch (Addison Wesley Publication)