

B. N. Mandal University, Laloonagar, Madhepura

Details of theory & Sessional Papers code of 4<sup>th</sup> Year B. Tech. Course

Branch: CIVIL ENGINEERING

No.	Subject	Subject Code	Branch Code	L	T	P	Th. Ext.	Th. Int.	Sessional
1	Structural Analysis-II	SA-II	CE-401	2	1	3	70	30	
2	Foundation Engineering	FE	CE-402	3	1	0	70	30	-----
3	Transportation Engg	TE	CE-403	2	1	3	70	30	TE-50
4	Construction Planning & MGT	CPM	CE-404	2	1	3	70	30	
5	Construction Specification & Estimation	CSA	CE-405	3	1	0	70	30	CS&E-100
6	Water resources Engg	WRE-II	CE-406	2	1	3	70	30	WRE-II-50
7	Design Of Concrete Structure	CS-II	CE-407	2	1	3	70	30	CS-II-50
8	Elective -II	EL-II	CE-408	3	1	0	70	30	-----
9	Project	Project	CE-409	0	0	3	---	---	Project-100
10	Design Of Hydraulic Structure	DHS	CE-410	0	0	3	---	---	DHS-50

Elective-II

A) Pre-stressed Concrete Design(PCD) B) Industrial Waste Treatment

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

Expert-II  
(Internal)  
Name: Kumar Anand K. Purohit  
Designation: HOD, CE  
Address: Dept. of CE, MIT, Anand

J. Thaur  
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Faculty of Science & Engineering  
BNMU, Madhepura

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Details of Theory & Sessional papers code of 4rth year B.Tech course for Civil Engineering

**STRUCTURAL ANALYSIS – II (SA-II) CE-401**

L-T-P : 2-1-0

Theory :

First Term-

(1) **Analysis of statically indeterminate structures** : fixed beams and propped cantilevers by conjugate beam method; Theorem of three moments. Influence lines for propped cantilevers, continuous beams and two – hinged arches. Lecture :08

(2) **Introduction to force and displacement methods** : consistent deformation. Analysis of two hinged & Rigid arches ; Suspension Bridges with two hinged stiffening girder ,Redundant Frames Lack of heat & Temperature stresses, Strain Energy method. Lect:04

(3) **Energy method**, slope-deflection and moment distribution; Analysis of 2 hinged arches,Principal of Superposition Theorem,Virtual work,Reciprocal Theorem & Muller – Brealau's Theorem. Lecture:06

Second Term-

(4) **Matrix formulation of force and displacement methods** : Solution of simultaneous equations: Stiffness matrix approach with reference to computer application; generation of frame element stiffness matrix, Torsion effect; Concept of local effects, generation of load vector, Effects of finite joints; application to plane frames, space frames, grid structures. **Lect:12**

(5) **Finite element Method** for 2-D, Plane problems- introduction. Lecture:06

(6) **Introduction** to Structural analysis Software. Lecture:04

**Text Books :**

(1) Matrix analysis of framed structures by W.Weaver and J.M.Gore, Van Nostrand.

(2) Basic Structural Analysis by C.S.Reddy, Tata McGraw Hill, New Delhi.

(3) Theory of Matrix Structural Analysis by J.S. Przemieniecki, Dover, New York.

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(4) Structural Analysis – A Matrix Approach by G.S. Pandit and S.P. Gupta, Tata McGraw Hill, New Delhi

(5) Matrix Methods of Structural Analysis by M.B. Karchi, Wiley Eastern, New Delhi.

(6) Structural Analysis Vol II by Bhavikatti Vikash ,Publishing House Pvt. Ltd

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FOUNDATION ENGINEERING (FE) CE-402

L-T-P : 3-0-0

Theory:

First Term-

Shallow Foundation:-

Lecture:12

Types & functions of foundations, Depth of foundations , ultimate & allowable bearing capacity Shear failure & settlement criteria , Rankine's Analysis ,Terzaghis analysis(Derivation of the Formula not required) Local & general shear failure , effect of water table, eccentric & inclined loads. Skempton's analysis, Meyerhof analysis, Brinch Hansen Theory ,Ballas Theory, Settlement analysis. IS recommendations for permissible uniform & differential settlement, Proportioning of footings, Plate load test, standard penetration test, design of footings based on N value, combined footings, Strip footings, Raft foundations, Piled Raft foundations, Well foundations. Floating foundations.

Deep Foundation:-

Lecture:10

Uses & types of piles, pile driving equipments, Bearing capacity of piles-static & dynamic formulas. Pile load tests, cyclic load tests, Penetration tests. Determination of pile capacities, negative skin friction and group action of piles considering stress-strain characteristics of real soils, Deep open cuts, Cofferdams, Batter piles, Anchor piles and determination of pull out resistance. Legal aspects of problems in Foundation Engineering.

Second Term-

**Critical study of nature and complexities of soil structure interaction;** Application of advanced techniques of analysis such as the finite element method , finite differences, relaxation and interaction for the evaluation of soil-structure interaction for different types of structures under various conditions of loading and subsoil characteristics.

Lecture:12

**Preparation of comprehensive design oriented computer programmes for specific problems.** Interaction problems based on the theory of sub grade reaction such as beams , footing, rafts, bulkheads etc.

Lecture:08

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Text Books:

1. Analytical and computer method in foundation by J.E. Bowels, McGraw Hill Books Co., New York.
2. Numerical Methods in Geotechnical Engineering by C.S. Desai and J.T. Cristian, McGraw-Hill Book Co., New York.

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## TRANSPORTATION ENGINEERING (TE) CE-403


L-T-P: 2-1-3


Theory:

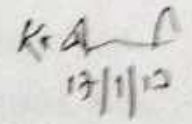
First Term-

### (A) Highway Engineering.

1. Introduction : Importance of transportation, Different modes of transportation, Characteristic of road transport, importance of roads in India, Scope of Highway Engineering, Classification of roads and road patterns, recently launched highway projects in India. Lecture : 2
2. Traffic Engineering : Traffic Characteristic, Traffic Operation, Elements of Design of Intersections. Lecture : 4
3. Highway Geometric Design : Introduction, Highway cross- section elements, sight distance, Design of Horizontal Alignment, Design of Vertical alignment, IRC Specifications. Lecture : 10
4. Highway Materials : Sub-grade soil, Stone aggregate, Binding material (Bitumen emulsion tar and cut back), modification binders, use of Geo- textiles and Geo- grids, MORT specs, SUPERPAVE Lecture:04
5. Design of highway Pavements : Function and desirable characteristics of pavements, pavements course, Pavements types, comparison of rigid and flexible pavement, pavement components, IRC and AASHTO methods Lecture :06
6. Highway construction : WBM, WMM, BM, BMM, PC, AC, Mastic Asphalt , BSG, PM, Seal Coat , BSD, Prime coat, Track coat, Highway maintenance and pavement Evaluation highway drainage. Lecture: 08

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(B)

1. **Railway Engineering** : Role of railway in transportation system, railway and highways, comparisons. Lecture: 02
2. **Permanent ways** : Alignment and grade, cross section and its elements, gauges, grade compensation and widening of gauges on curves, coning of wheels and traction resistance. Lecture: 06
3. **Single and Interlocking, Points and crossing, station and yards.** Lecture: 01

**Second Term-**

(C)

**Introduction to Bridge Engineering:** Lecture: 10

- a.) Introduction, type of bridge and culvert and their suitability, site selection.
- b.) Determination of scour depth, depth of foundation, linear waterway Economic span, Afflux, Freeboard, clearance.
- c.) Load forces and stresses in bridge structures, IRC loading.
- d.) Type of bridge : Super structures flooring and their choice, Details of bearings and joints in Bridge super structure.
- e.) Type of bridge foundation – spread, raft, well and caissons, sinking of well foundations (design excluded), Method of erection of bridges.

(D)

**1. Introduction to Airports.**

**Text\ Reference Books:**

1. An introduction to Transportation, Engineering and Planning by Morlok, E. R., McGraw Hill Kagakusha International Student Edition.
2. Traffic Engineering and Transportation Planning by Kadiyali, L. R., Khanna Publishers, New Delhi.
3. Introduction to Transportation Engineering by Hay, W. W., John Wiley and sons, New York.
4. Fundamentals of Transportation Engineering by Papacostas, C.S. Prentice Hall of India, New Delhi.
5. Principles of Urban transportation Planning by Hutchinson, B. G., McGraw Hill Book company.

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6. A text Book of Railway Engineering by Saxena, S.C.Arora, S. P., Dhanpat Rai & Sons< New Delhi.
7. Railway Track Engineering by Munday, J. S., Tata McGraw Hill, New Delhi.
8. Highway Engineering by Khanna, S.K. and Justo, S.E.G., Nemchand Bros., Roorkee.
9. Principle and design of pavements by Kadiyali, L. R., Khanna Publishers, New Delhi
10. Highway Engineering by Wright, P.H., John Wiley and sons, New York
11. An Introduction to Transportation Engineering and planning by Morlok, E.R., McGraw Hill, Kagakusha international student Education.
12. Introduction to Transportation Engineering by Hay. W.W., John Wiley and sons, New York.

**Practical:**

1. Test on Road Aggregates

- a. Aggregate Crushing value test
- b. Abrasion test
- c. Aggregate Impact test
- d. Specific gravity and water absorption test
- e. Shape test ( Elongation and Flakiness)
- f. Stripping value of road aggregate

2. Tests on Bitumen

- a. Penetration test
- b. Softening point test
- c. Specific gravity test
- d. Viscosity test

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CONSTRUCTION PLANNING AND MANAGEMENT  
(CPM) CE-404

L-T-P : 2-1-0

ture

Theory:

First Term-

1. Construction and fabrication methods : Pre- fabrication techniques: choice of equipment  
Safety features and Regulations. **Lecture: 04**

2. Value Analysis, Feasibility studies; Economics of project evaluation: Finance, material and  
manpower development. **Lecture: 06**

3. Network analysis, PERT : Leveling of Resources. **Lecture: 04**

Second Term-

4. Site organization : layout: work study: Decision making processes: CPM and L. P. Project  
monitoring **Lecture: 06**

5. Maintenance management : Case studies. **Lecture: 02**

6. Introduction to Project Management Software. **Lecture: 06**

Text Book:

1. Construction Planning and Management by U. K. Srivastav.

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## CONTRACTS, SPECIFICATION AND ESTIMATION (CS & E) CE-405

L- T- P : 3-1-0

### Practical/Sessional :

#### First Term-

1. **Contracts** : Types, item rate contract, Percentage rate contract, Contract for supply of materials, Lump-sum contract, Labour rate contract, Negotiated contract and Piece work agreement. Lecture :10

2. **Tenders** : Earnest money, Work order, Informal tender, Security deposit, Liquidated damages, Contract Documents, Awarding and termination of contract, Maintenance period of contract, Refund of security deposit. Lecture: 08

3. **Measurement and Payment** : Intermediate and running payment, Final payment, Measurement completed work, Measurement book, Loss of measurement book. Lecture:06

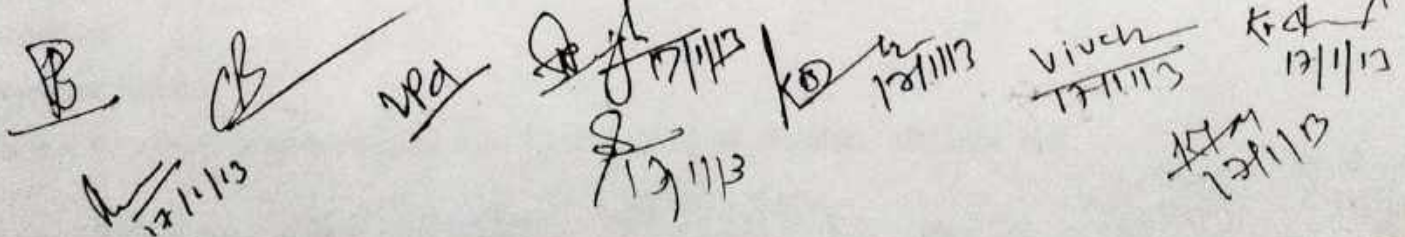
#### Second Term-

4. **Specifications** : Introduction, Object of specification, Types, General specification of buildings. Lecture:05

5. **Specification of Materials** : Bricks, Cement, Sand, Water, Lime and Reinforcement, Quantity surveying and estimating, Analysis of rates. The evaluation will be based upon submission of a partial or complete estimate of a project. Lecture:12

#### Text Books :

1. Estimating and Costing by B. N. Dutta, Tagore Palli, Lucknow.
2. Quantity surveying by, P. L. Basin, S. Chand and Company, Delhi.
3. Building Construction and Estimating by G. H. Cooper. McGraw-Hill.
4. Construction Project Scheduling and Control, 2nd Edition by Saleh Mubarak , Wiley

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L-T-P : 2-1-3

**First Term-**

1. **Irrigation Principles and Practices** : Introduction, Necessity, Advantages and disadvantages of irrigation, classification, method Irrigation. **Lecture:05**
2. **Soil water plant and Their Relationship** : Soil Classification, Soil- water plant relation , soil moisture relationship, Water Requirement of Crops; Optimum Use of water, Factors affecting water requirement of crops. Duty, Delta; and their relationship. Water Requirement by inductive methods, various coefficients & consumptive use or requirement by climatologically approach, FAO methods for Reference evapotranspiration **Lecture: 12**
3. **Irrigation Efficiencies**: Efficiencies of water application, efficiencies of water conveyance, & efficiency of water distribution ,storage & use **Lecture: 03**

**Second Term-**

4. **Irrigation Scheduling** : for both Irrigated dry and irrigated wet crops, irrigation scheduling in command areas. **Lecture: 04**
5. **Canal Irrigation** : Classification of canals, Canals alignments, Components of permanent canal system, Canal capacity, canal losses, Lined channels & their design, Kennedy's slit theory and design of channels on its basis, Lacey's slit theory and regime equations, various types of relations, Design of channels based on Lacey's equation. **Lecture:10**

6. **LIFT IRRIGATION** : Classification, Location, Water lifting arrangement, Yield of wells.

**Text Books :**

1. Fundamental of Irrigation Engineering by Bharat Singh, Nemchand Bros., Roorkee, Uttarakhand.

**Reference Book :**

1. Water Resources Engineering by R.K. Linsley & J.L.H. Paulhus, McGraw Hill.

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DESIGN OF CONCRETE STRUCTURES - II (CS-II) CE-407

L-T-P : 2-1-3

Theory :

First Term-

1. Design of RCC water tanks, solos, bunkers and simple bridges. Lecture:16
2. Design of residential buildings. Lecture:12

Second Term-


3. Design of arches and shells. Lecture:10

Text/ Reference Books:

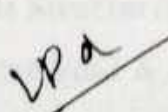
1. Plain and Reinforced Concrete, Vol. I and II. by J. Krishna and O. P. Jain, Nemchand Bros. Roorkee.
2. IS 456, 2000. Code of Practice for Plain and Reinforced concrete.
3. Design Aids for R.C. to IS 456-2000.
4. Design of Reinforced Concrete Structures by P. Dayaratnam, Oxford- IBM Publishing Co., New Delhi.


Practical/Sessional:

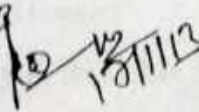
Complete design and drawing of two complete projects such as a residential building, a bridge, a stadium, elevated water tank, bunker, silo and shell roof.

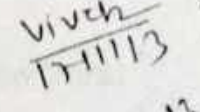
  
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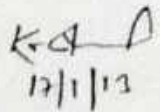


  
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ELECTIVE CE-408 (B)

PRE-STRESSED CONCRETE DESIGN (PCD) CE-408

L-T-P : 3-1-0

Theory :

First Term-

Concept on mechanics; materials; properties of section; stress analysis- three methods: prestressing and post stressing; Beam design – no tension and ultimate; Poles and slab panels; Loss assessment; Composite beams. Lecture: 21

Second Term-

Design for shear. Large span structure; Structural forms and design principles; Special material, open web and builtup structures. Lecture:21

Text book:

- 1) N. Krishna Raju- prestressed concrete structure .(T.M.H)

Reference book:

- 1) T.Y. Lin-Prestressed Concrete Structure(Asia Publishing House.)
- 2) Y.Guyon –Prestressed Concrete Vol-I & II(John & Willey & Sons.Inc New York)

PROJECT CE-409

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## DESIGNS OF HYDRAULIC STRUCTURES (DHS) CE-410

L-T-P : 0-0-3

Theory:

First Term-

1. DESIGN & MAINTENANCE OF CANALS: Design of canal based on tractive force approach, Maintenance of unlined channels (Based on IS 4839 - 1979 part - I), Maintenance of lined channels (Based on IS 4339 - 1979 part - II).

Lecture: 10

2. DESIGN OF CANAL OUTLETS.

Lecture: 06

3. CANAL HEADWORKS

- Selection of site for storage & diversion head works
- Weir or Barrages
- Divide wall, Scouring sluice or under sluices, fish ladder.

Lecture: 12

Second Term-

4. DAMS

- Gravity dams, earth & rock fill dams, buttress dams & arch dams.
- Spillways & outlet works

Lecture: 12

5. CANAL REGULATION WORKS

- Head Regulator, Distributary head regulator, Cross regulators
- Necessity of channel falls, types of falls & design of vertical drop fall/Sharda type falls

Lecture: 10

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## 6. CROSS - DRAINAGE WORKS

- Types of C - D works: Aqueducts, siphon Aqueducts, Super passages, Siphon Super passages, Level crossings, Inlet & Outlet.
- Fluming of channels & design of channel transitions. Lecture:06
- 7. An introduction to river basis development. Lecture :02

### Text Books :


1. Fundamental of Irrigation Engineering by Bharat Singh, Nemchand Bros., Roorkee, Uttarakhand.
2. Irrigation & Water Power Engineering by Punima B.C., Pande Lal B.B., Laxmi Publication Pvt. Ltd. New Delhi.
3. Water Resource Engineering by Garg S.K., Khanna Publishers, New Delhi.
4. Water Power Engineering by Dandekar MM/ Sharma KN, Vikash Publishing Pvt. Ltd


### Reference Books :

1. Water Resources Engineering by R.K. Linsley & J.L.H. Paulhus, McGraw Hill.
2. Hydroelectric Handbooks by W.P. Creager & J.D. Justin, John Wiley & Sons.

### PRACTICAL/SESSIONAL:

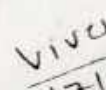
Design problem

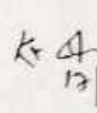
  
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