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8. Punmia, B.C., "A text" book of Building Construction", Laxmi Publications, Delhi, Mad 1987.

9. Singh Surendra, "Engineering ~aterials", Konark Publishers Pvt. Ltd .,1994.

V SEMESTER

HS 1501 MANAGEMENT SCIENCE (2-1-0)

- I. **Basic Concepts and Functions of Management:** Planning: Nature, Purpose and Objectives, Planning. Organizing: nature and Purpose. Authority and Responsibility, Staffbug, Supply of Human Resources Performance Appraisal, Controlling: System and Process of Controlling, Controlling Techniques.
- II. **Human Resources Management:** Nature and Scope of Human Resource planning, training and Development, recruitment and selection, career growth, grievances, motivation and its types, need for motivation, reward and punishment, models for motivation, leaders: kind of leaders, leadership styles. Roles and function of leaders, conflict management, kinds and cause of conflict, settlement of conflict. group and team working, organization design and Development.
- III. **Marketing Management: Marketing Environment:** Consumer Markets and Buyer Behavior Marketing Mix, Advertising and Sales Promotion. Channels of Distribution.
- IV. **Financial Management and Accounting Concepts:** Book Keeping, Financial Statement Analysis, Financial Ratios, Capital Budgeting, Break-Even Analysis.
- V. **Production/Operation Management:** Planning and Design of Production and Operation Systems, Facilities Planning, Location, Layout and Movement of Materials, Materials Management and Inventory Control, Maintenance management. PERT & CPM.
- VI. **Management Information system:** Role of information in decision making, Information system planning, Design and Implementation. Evaluation and Effectiveness of Information System.
- VII. **Statistical Quality Control, TQM and ISO Certification**
- VIII. **Social and Ethical Issues in Management:** Ethics in management, Social Factors, Unfair and Restrictive Trade Practices.
- IX. **Strategic and Technology Management:** Need, Nature, Scope and Strategy, SWOT analysis, value and concepts.

References

1. Philip Kotler, "Marketing Management", Prentice Hall of India 1997.
2. Fred Luthans, "Human Resource Management", McGraw Hill, Inc. 1997.
3. Stephen P. Robbins, "Organizational Behaviour Concepts, Controversies and Applications", Prentice Hall, Englewood, Cliffs, New Jersey, 1989 ..
4. M.Y. Khan and P.K. Jain, "financial Management", Tata McGraw Hill, 1997.
5. Michael Porter, "Competitive Advantage", The Free Press, 1985
6. Michael Porter, "Competitive Strategy", The Free Press, 1985
7. Y.K. Bhusan, "Fundamentals of Business Organisation and Management", S. Chand and sons, 1998.
8. K.K. Ahuja, "Industrial Management", Khanna Publishers, 1998.

CE 1501 TRANSPORTATION ENGINEERING I (2-1-0)

I. Introduction

Modes of Transportation, their importance and limitations. the importance of highway transportation

I. Highway Planning

Principles of Highway Planning, Road development and Financing, Privatisation of Highways Highway Alignment-Requirements, Engineering surveys for Highway location.

II. Geometric Design

Cross section *elements*, width, camber, Design speed, Sight distances, Requirements and design horizontal and vertical alignments.

III. Highway Materials

Properties of subgrade and pavement component materials, Material characterisation, Tests on subgrade soil, aggregates and bituminous materials, Bituminous mix design.

IV. Pavement Design and Construction

Factors in the design of flexible and rigid pavement, Group index and C.B.R. Methods, Westergaards analysis of wheel load stresses in rigid pavement, I.R.C. design method for Concrete pavements Pavement Construction Techniques and Quality control, Types of Bituminous pavements.

V. Highway Drainage

Surface drainage and subsoil drainage, Pavement failures, Maintenance and Strengthening.

VI. Traffic Engineering

Fundamentals of Traffic Flow; Traffic field studies and their uses, Traffic control devices, Traffic Management, Prevention of Road accidents.

VII. Functional design aspects of bridges and IRC loading.

CE 1507-P TRANSPORTATION ENGINEERING I LAB (0-0-3)

List of Experiments

1. CBR test on soil
2. Impact test on aggregates

3. Crushing test on aggregates
4. Hardness test on aggregates
5. Soundness test on aggregates
6. Shape test on aggregates
7. Specific gravity on aggregates
8. Penetration test on bitumen
9. Ductility test on bitumen
10. Softening point test on bitumen
11. Viscosity test on Tar
12. Flash and fire point on bitumen
13. Specific gravity test on bitumen
14. Traffic speed study (Endoscope method)
15. Traffic volume study (manual as well as mechanical method)

References

1. Khanna, S.K. and Justo, CEG, "Highway Engineering". Nem Chand & Bros., 1997.
2. Kadiyali, L.R., "Highway Engineering", Khanna Publishers, Delhi, 1996.

CE 1502 STRUCTURAL ANALYSIS II (3-1-0)

- I. Analysis of Fixed beams, Continuous beam and Simple frames with and without translation of joints, Method of Consistent Deformation, Slope-Deflection method, Moment Distribution Method, Strain Energy method.
- II. Muller-Breslau's principle and its application for drawing influence lines for indeterminate beams.
- III. Analysis of two-hinged arches, influence line diagrams for maximum bending moment, shear force and thrust.
- IV. Suspension bridges, Analysis of cables with concentrated and continuous loadings, Basics of two and three hinged stiffening girders, Influence line diagram for B.M., S.F. in the stiffening girders.
- IV. Basics of force and displacement matrix methods for beams, plane frames(rigid and pin jointed).
- V. Basics of Plastic Analysis, Application of Static and Kinematic theorem for plastic analysis of beams and plane frames.

CE 1506-P STRUCTURAL ANALYSIS LAB. (0-0-3)

List of Experiments

1. Clark Maxwell's Reciprocal theorem using a beam.
2. Analysis of a redundant joint.
3. (a) Deflections of a truss.
(b) Maxwell's reciprocal theorem.
4. Elastic displacements of curved members.
5. Elastic properties of beams.

6. Three hinged arch.
7. Two hinged arch.
8. Behaviour of struts.
9. Experimental and Analytical study of 3 bar pin-jointed truss.
10. Experimental and Analytical study of deformations in bar-beam combination.
11. Experimental and Analytical study of deflections in unsymmetrical bending.
12. Verification of Muller-Breslau principle - Arch/continuous beam/frame models.
13. Verification of Muller-Breslau principle-Begg's deformeter.
14. To find carryover factor for the beam with far end fixed.

References

1. Coates, R.C., Coutic, M.G. & Kong, F.K., "Structural Analysis", English Language Bo Society & Nelson, 1980.
2. Ghalil, A. & Neville, M., "Structural Analysis", Chapman &-Hall Publications, 1974.
3. Jain, A.K., "Advanced Structural Analysis", Nem Chand & Bros., Roorkee, India, 1996.
4. Jain, *a.p.* & Arya A.S., "Theory of Structures", Vol. II, Nem Chand Bros., Roorkee, 1976.
5. Kinney, J.S., "Indeterminate Structural Analysis", McGraw Hill Book Company, 1957.
6. Prakash Rao, D.S., "Structural Analysis", Universal Press (India) Limited, Hyderabad, 1997.
7. Wang, C.K., "Intermediate Structural Analysis", McGraw Hill Book Company? 1983.
8. Weaver, W. & Gere, J.M., "Matrix Analysis of Framed Structures", CBS Publishers and Distributors, Delhi, 1990.

CE 1503 CONCRETE STRUCTURES I (3-1-0)

I. Material Properties

Properties of concrete and reinforcing steel. characteristic strengths, stress-strain curves, I.S. specifications.

II. Design Philosophies

Working stress, ultimate strength and limit states of design.

III. Analysis and Design of Sections in Bending

Flexure of beams by working stress and limit state methods, singly and doubly sections, T and L sections.

IV. Shear and Bond

Behaviour of beams in shear and bond. Design for shear, anchorage and splicing of reinforcement, detailing of reinforcement.

V. Serviceability Conditions

Limit states of deflection and cracking, calculation of deflections.

VI. Design of Columns

Short and long columns, eccentrically loaded columns.

VII. Slabs, Lintels & Staircases.

Design of one way and two way slabs; circular slabs, yield line theory for slabs, beam and slab

construction, lintels and staircases.

VIII. Flat Slabs.

Introduction to flat slabs.

IX. Torsion

Design of beams for torsion.

X. Column Footings.

Isolated and combined column footings.

XI. Cantilever Retaining Walls

Design of cantilever type retaining walls.

Reference:

1. Dayaratnam P., "Reinforced Concrete Structures", Oxford and IBH Publishing Co., 1986.
2. Sinha, S.N., "Reinforced Concrete Design", Tata McGraw Hill Pub. Co., New Delhi, 1990.
3. Krishna, J., and Jain O.P., "Plain and Reinforced Concrete", Vol. 1, Nem Chand & Bros., Roorkee, 1990.
4. Jain, A.K., "Reinforced Concrete - Limit State Design", Nem Chand & Bros., Roorkee, 1993.
5. Syai, I.C. and Ummat, R.K., "Analysis and Design of Reinforced Concrete Elements", A.H. Wheeler and Co. Ltd., Allahabad, 1992.
6. Ram Chandra, "Design of Concrete Structures", Vol. I, Standard Book House, New Delhi 1995.
7. Nilson, A.H and George winter, "Design of Concrete Structures", McGraw Hill Hook Co 1 Gth Ed. 1986.
8. Wang, C.K. and Salmon, C.G., "Reinforced Concrete, Design", International Text Boo. Co., 1985.
9. Park, R. and Pauley, T., "Reinforced Concrete Structures", JoIm Wiley and Sons, 1975
10. "Design Aids for Reinforced Concrete to LS. - 456 - 1978", SP - 16, 1980, Bureau of Indi Standards, New Delhi.

CE 1504 GEOTECHNICAL ENGINEERING I (3-1-0)

I. Introduction

Introduction to Geotechnical Engineering; Unique nature of soil; Soil formation and soil types.

II. Simple Soil Properties Basic definitions; phase relations; Index properties of soil - Soil grain and soil aggregate properties of coarse grained and fine grained soils.

III. Soil Classification

Indian standard soil classification system.

IV. Compaction Behaviour

Clay minerals (basic concepts) and soil structure; Compaction - Theory of compaction; Laboratory compaction tests; Different methods of compaction control.

V. Principle of Effective Stress and Related Phenomena

Principle of effective stress; Capillarity; Seepage force and quicksand condition; Total, Pressure and Elevation heads.

VI. Permeability

One dimensional flow ; Permeability of soils - Darcy's Law; Laboratory methods of determination; Permeability as a function of soil type, permeant, void ratio, soil fabric, and effective stress; Pumping out test for field determination of permeability

11.

VII. Seepage through Soils

Two dimensional flow problems - Steady flow, confined now and unconfined flow; Flow nets and their characteristics; Uplift pressure, exit gradient. failure due to piping; Criteria for design of filters.

Shear Strength Behaviour

Stress at a point and Mohr's stress circle; Mohr - Coulomb failure criterion; Laboratory tests shear strength determination; Effective stress and total stress shear strength parameters; UU, CU and tests and their relevance to field problems; Shear strength characteristics of normally consolidated and clays; Shear strength characteristics of sands.

List of Experiments

1. Visual soil classification.

VIII. Compressibility and Consolidation Behaviour

Compressibility - Effects of soil type, stress history and effective stress on compressibility:

Consolidation - Factors affecting consolidation and compressibility parameters; Normally consolidated and over consolidated soils; Different forms of primary consolidation equation; Transient flow condition; Terzaghi theory of one - dimensional consolidation and time-rate of consolidation; Evaluation of compressibility and consolidation parameters from consolidation test data.

IX. Shear Strength Behaviour

Introduction; Stress at a *point* and Mohr's stress circle; Mohr - Coulomb failure criterion; Laboratory tests shear strength determination; Effective stress and total stress shear strength parameters; UU, CU and tests and their relevance to field problems; Shear strength characteristics of normally consolidated and clays; Shear strength characteristics of sands.

CE 1508-P GEOTECHNICAL ENGINEERING I LAB (0-0-3)

List of Experiments

1. Visual soil classification.
2. Different methods of determining water content. Specific gravity test.
3. Core cutter and 2nd bottle method of determining the in situ density.
4. Void ratio and degree of saturation.
5. Sieve analysis.
6. Hydrometer analysis.
7. Atterberg limits.

8. Permeability tests.
9. Compaction test.
10. Direct shear test.
11. Unconfined compression test.
12. Unconfined compression test.

References

1. Gopal Ranjan and Rao, A.S. R "Basic and Applied Soil Mechanics." (Revised Edition). New Age International, New Delhi, 1998.
2. Holtz R. and Kovacs. W.D. "Introduction to Geotechnical Engineering", John Wiley, New York, 1981.
3. Lambe, T.W. and Whitman, R.Y. "Soil Mechanics", John Wiley, New York. 1969.
4. Terzaghi, K., and Peck, R. 8., "Soil Mechanics in Engineering Practice", John Wiley, N York, 1968.
5. Taylor, D.W., " Fundamentals of Soil Mechanics ", John Wiley, New York, 1948.
6. Lambe, T. W., "Soil Testing for Engineers", John Wiley, New York, 1951.

CE 1505 ENVIRONMENTAL ENGINEERING I(3-1-0)

I. General

Environment and its components, Importance of water. Role of an Environmental Engineer. Historical overview.

II. **Water Demand** Design flows, design periods, design population, Factors affecting water consumption, variations of water demand, design capacities for various water supply components.

III. **Sources of Water and Collection Works** Alternative sources i.e. rain, surface and ground water. Assessment of yield and development of the source.

IV. Quality of Water

The hydrological cycle and water quality, physical, chemical and biological water quality parameters

water quality requirements. Indian standards

V. Transmission of Water

Hydraulics of conduits. Selection of pipe materials. pipe materials and joints, pumps, pump stations.

VI. Treatment of Water

Historical overview of water treatment, Water treatment processes, water treatment processes (theory and application) : Aeration, solids separation, settling operations, coagulation, softening, filtration, disinfection, other treatment processes: dissolved solids removal, treatment plant design, preparation of hydraulic profiles.

VII. Distribution of Water

Methods of distributing water, distribution reservoirs, distribution systems, distribution system components, capacity and pressure requirements, design of distribution systems, hydraulic Analysis of distribution systems, pumping required for Water supply systems.

VIII. Plumbing of Building for Water Supply

Service connections, fixture units, simultaneous flow, and design of plumbing system.

CE 1509-P ENVIRONMENTAL ENGINEERING I LAB (0-0-3)

1. Determination of turbidity, color and conductivity
2. Determination of pH, alkalinity and acidity
3. Determination of hardness and chlorides
4. Determination of residual chlorine and chlorine demand.
5. Determination of dissolved oxygen.
6. Determination of most probable number of coliforms.

References

1. Peavy, H.S., Rowe, D.R. and Tchobanoglous, G., "Environmental Engineering", McGraw Hill Book Company, 1985.
2. Fair, G.M., Geyer, J.C. and Okun, D.A., "Water and Wastewater Engineering", John Wiley and Sons Inc., 1966.
3. Viessman, Jr. and Hammer, M.J., "Water Supply and Pollution Control", Harper College Publishers, 1985.