



ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

Guwahati

Course Structure and Syllabus

CIVIL ENGINEERING (CE)

Semester V/ CE / B.TECH

| Sl. No. | Subject Code | Subject | Hrs/week | | | Credits |
|-------------------------|--------------|------------------------------------|----------|----|---|---------|
| | | | L | T | P | |
| Theory | | | | | | |
| 1 | CE131501 | Hydrology | 3 | 2 | 0 | 4 |
| 2 | CE131502 | Structural Analysis-II | 3 | 2 | 0 | 4 |
| 3 | CE131503 | Design of Structures – I | 3 | 2 | 0 | 4 |
| 4 | CE131504 | Transportation Engineering – I | 3 | 2 | 0 | 4 |
| 5 | CE131505 | Concrete Technology | 3 | 2 | 0 | 4 |
| 6 | HS131506 | Principles of Management | 2 | 0 | 0 | 2 |
| Practical | | | | | | |
| 7 | CE131513 | Design of Structures – I Lab | 0 | 0 | 2 | 1 |
| 8 | CE131514 | Transportation Engineering – I Lab | 0 | 0 | 2 | 1 |
| 9 | CE131515 | Concrete Technology Lab | 0 | 0 | 2 | 1 |
| Total | | | 17 | 10 | 6 | 25 |
| Total Contact Hours: 33 | | | | | | |
| Total Credits : 25 | | | | | | |

Course Title : HYDROLOGY
Course Code: CE131501
L-T-P-C: 3-2-0-4

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|-----------------------|---------------|
| Class Hours/week | 4 |
| Expected weeks | 12 |
| Total hrs. of classes | 36+12 = 48 |

| MODULE | TOPIC | COURSE CONTENT | HOURS |
|--------------|------------------------------------|---|-----------|
| 1 | INTRODUCTION | Hydrology- definition & scope, hydrologic cycle and its components, practical applications of hydrology. | 5 |
| 2 | PRECIPITATION | Forms, type & formation of precipitation, measurement of precipitation, interpretation of rainfall data, Rainfall mass curve and hyetograph, estimating missing data, double mass curve, average rainfall over area, DAD analysis, abstraction from precipitation. | 8 |
| 3 | RUNOFF AND HYDROGRAPH | Runoff components, factor affecting runoff, Rainfall runoff relationship, hydrograph and its components, base flow separation, unit hydrograph–concept, derivation, limitations and use, S –hydrograph and its uses, derivation of unit hydrograph from S-hydrograph. | 8 |
| 4 | GROUND WATER HYDROLOGY | Occurrence of ground water, Aquifers, Aquifuge, Aquiclude, Aquifer parameters, Darcy's law, yield from wells for confined and unconfined aquifers, yield of an open well. | 7 |
| 5 | FLOOD ROUTING | Definition, storage equation, storage discharge relationship, reservoir routing and channel routing. | 6 |
| 6 | WATER RESOURCES PLANNING | Role of water in national development, single and multipurpose projects, reservoirs– types, Physical characteristics, determination of reservoir capacity, mass curve, demand curve, yield from a reservoir. | 8 |
| 7 | EVAPORATION AND EVAPOTRANSPIRATION | Introduction, Evaporation process, factors affecting evaporation, estimation of evaporation, measurement of evaporation. | 6 |
| TOTAL | | | 48 |

RECOMMENDED BOOKS:

1. A Textbook of Hydrology, Dr. P. Jaya Rami Reddy, University Science Press.
2. Engineering Hydrology, K Subramanya, Tata McGraw-Hill Education.
3. Introduction to Hydrology, Warren Viessman; Gary L Lewis.
4. Applied Hydrology, VenTe Chow, David R. Maidment, Larry W, Publisher: Assaye Melaku.

Course Title : STRUCTURAL ANALYSIS-II
Course Code: CE131502
L-T-P-C: 3-2-0-4

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|-----------------------|---------------|
| Class Hours/week | 4 |
| Expected weeks | 12 |
| Total hrs. of classes | 36+12 = 48 |

| MODULE | TOPIC | COURSE CONTENT | HOURS |
|--------------|---|---|-----------|
| 1 | SLOPE DEFLECTION METHOD | Introduction, Development of slope-deflection equations and analysis of fixed beam, continuous beam and simple frame with and without translation of joints. | 6 |
| 2 | MOMENT DISTRIBUTION METHOD | Introduction, Definition of terms- Distribution factor, Carry over factor, Development of method of analysis of fixed beam, continuous beam and simple frame with and without translation of joints. | 8 |
| 3 | KANI'S METHOD | Introduction, Basic Concept, Analysis of Continuous beams and analysis of rigid jointed no sway plane frames. | 8 |
| 4 | COLUMN ANALOGY METHOD | Introduction, Development of method, Analysis of fixed beam and frame. | 6 |
| 5 | UNSYMMETRICAL BENDING | Principal moment of inertia, Stress in beams due to unsymmetric bending, location of neutral axis. | 8 |
| 6 | MOVING LOADS AND INFLUENCE LINES | Application to determinate structures-Beam, Truss, 3-hinged arch, Suspension Bridges. Muller-Breslau's Principles: Influence lines for support reactions, bending moment, shear force in propped cantilever, two span continuous beams and for two hinged arch. | 12 |
| TOTAL | | | 48 |

RECOMMENDED BOOKS:

1. Basic Structural Analysis Reddy, C. S. Tata McGraw Hill.
2. Theory & Analysis of Structures Jain, O. P. Nem Chand & Vol. I&II and Jain B. K Bros.Roorkee.
3. Indeterminate Structural Analysis Kinney, J.S. McGraw Hill Book Company.
4. Plastic Method of Structural Neal, B. G Chapman and Hall.
5. Structural Analysis Ghali, A & Neville, M. Chapman & Hall Publications.

Course Title : DESIGN OF STRUCTURES – I
Course Code: CE131503
L-T-P-C: 3-2-0-4

| | |
|-----------------------|---------------|
| Class Hours/week | 4 |
| Expected weeks | 12 |
| Total hrs. of classes | 36+12 = 48 |

| MODULE | TOPIC | COURSE CONTENT | HOURS |
|--------------|---|--|-----------|
| 1 | MATERIAL PROPERTIES | Properties of concrete and reinforcing steel, characteristic strengths, stress-strain curves, I.S. specifications. | 4 |
| 2 | DESIGN PHILOSOPHIES | Working stress, ultimate strength and limit state method of design. | 5 |
| 3 | ANALYSIS AND DESIGN OF SECTIONS IN BENDING | Flexure of beams by working stress and limit state methods, singly and doubly reinforced rectangular, T sections. | 5 |
| 4 | SHEAR AND BOND | Behavior of beams in shear and bond, design for shear, anchorage and splicing of reinforcement, detailing of reinforcements. | 6 |
| 5 | RETAINING WALL | Cantilever and counter fort type with and without surcharge. | 7 |
| 6 | DESIGN OF FOOTING | Isolated and combined footing; strip footing. | 7 |
| 7 | DESIGN OF COLUMNS | Short and Long columns, eccentrically loaded columns. | 7 |
| 8 | DESIGN OF SLABS AND STAIRCASES | Design of one way and two way slabs; circular slabs, flat slab; yield line theory for slabs, design of stair cases. | 7 |
| TOTAL | | | 48 |

RECOMMENDED BOOKS:

1. Design of R.C.C structures; DrN.Subramanian, Oxford University Press.
2. Limit State Design of R.C.C Structures, A.K. Jain, Nemchand Brothers.
3. Design of RCC ,N.Krishnaraju , CBS Publishers.
4. Reinforced concrete design, S.U. Pillai and Devdas Menon Tata Mcgraw Hill.
5. Design of R.C.C structures; Ramamurtham; Dhanpat Rai Publishing Co.

Course Title : TRANSPORTATION ENGINEERING – I
Course Code: CE131504
L-T-P-C: 3-2-0-4

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|-----------------------|---------------|
| Class Hours/week | 4 |
| Expected weeks | 12 |
| Total hrs. of classes | 36+12 = 48 |

| MODULE | TOPIC | COURSE CONTENT | HOURS |
|--------|----------------------------------|--|-------|
| 1 | INTRODUCTION | Importance of transportation, modes of transportation, scope of highway engineering. | 1 |
| 2 | HIGHWAY DEVELOPMENT AND PLANNING | Historical development of road construction and highway development plan in India. Classification of road, road patterns, saturation system, highway planning in India. | 5 |
| 3 | HIGHWAY ALIGNMENT | Basic requirements for an ideal alignment, factors governing highway alignment, highway location surveys. | 2 |
| 4 | GEOMETRIC DESIGN OF HIGHWAY | Highway cross-sectional elements, sight distance, design of horizontal alignment, design of vertical alignment and intersection elements. | 12 |
| 5 | TRAFFIC ENGINEERING | Definition, scope, Traffic characteristics, Traffic studies- Traffic volume, capacity and speed. Design capacity and level of service, PCU. | 3 |
| 6 | PAVEMENT MATERIALS | Stone aggregates: Desirable properties, tests, requirements of aggregate for different types of pavement. Bituminous materials: types, tests on bitumen, desirable properties, selection of grade of bitumen. Bituminous mix design: Principle, methods, modified binders. | 3 |
| 7 | PAVEMENT DESIGN | Types of pavements, comparison of different types of pavements, functions of pavement components, pavement design factors, Design wheel load, equivalent single wheel load, repetition of loads, strength characteristics of pavement materials, climatic variation; design of flexible pavement as per IRC approach (use IRC: 37); Rigid pavement- Westergaards assumption, critical load positions, stresses in rigid pavements- | 10 |

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|--------------|---|--|-----------|
| | | stresses due to loads, stresses due to temperature change, combined loading and temperature stresses, Joints in rigid pavements: Transverse joints, longitudinal joints, fillers and sealers. | |
| 8 | HIGHWAY CONSTRUCTION | Equipments used for construction, Embankment design and construction, construction of different types of roads: water bound macadam, different types of bituminous construction, cement concrete pavements, Construction of soil stabilized roads: different soil stabilization methods, use of geo-textiles and geo-grids. | 4 |
| 9 | HIGHWAY DRAINAGE | Necessity, surface draining, highway sub drainage, draining in hill roads and City streets. | 2 |
| 10 | HIGHWAY MAINTENANCE AND REHABILITATION | Pavement failures – flexible pavement failures, rigid pavement failures; Maintenance of different types of pavements- assessment and need for maintenance, pavement management system; Evaluation of pavements- structural evaluation of pavements, functional evaluation of pavements, strengthening of existing pavements: objects of strengthening, types of overlays, design of different types of overlays. | 6 |
| TOTAL | | | 48 |

RECOMMENDED BOOKS:

1. **Highway Engineering** – Khanna & Justo.
2. **Principles of Transportation Engineering** – Chakraborty & Das.
3. **Transportation Engineering** – Khisty&Lall.
4. **Traffic Engineering**- L.R. Kadiyali.
5. **Highway Engineering** – Rangawala.

Course Title : CONCRETE TECHNOLOGY
Course Code: CE131505
L-T-P-C: 3-2-0-4

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|-----------------------|---------------|
| Class Hours/week | 4 |
| Expected weeks | 12 |
| Total hrs. of classes | 36+12 = 48 |

| MODULE | TOPIC | COURSE CONTENT | HOURS |
|--------------|---|---|-----------|
| 1 | OVERVIEW OF CONCRETE | Definition of concrete; Types of concrete- based on density and strength; Properties of concrete; Grades of concrete; Advantages and Disadvantages of concrete. | 3 |
| 2 | INGREDIENTS OF CONCRETE | <p>Cement: Portland cement; Manufacture of Portland cement; Chemical composition of Cement; Hydration of Cement; Basic Properties of Cement Compounds- C_3S, C_2S, C_3A, C_4AF, $Ca(OH)_2$; Testing of Cement- Field test and Laboratory test; Types of Cement- Ordinary Portland Cement (OPC), Rapid Hardening Cement (RHC), Extra Rapid Hardening Cement, Sulphate Resisting Cement, Portland Slag Cement (PSC), Portland Pozzolana Cement (PPC); Water/Cement ratio; Gel Space ratio.</p> <p>Aggregate: Classification of Aggregate- based on Geologic Origin, Size and Shape; Testing of Aggregates- Sieve Analysis, Aggregate Impact test, Aggregate Crushing Test, Aggregate Abrasion Test, Numericals on fineness Modulus, Zoning of Sand and Specific Gravity; Bulking of sand.</p> <p>Water: Suitability of drinking water as mixing water; Dangers of sea water as mixing water; Curing of concrete; Methods of Curing, Water for curing of concrete.</p> | 16 |
| 3 | PROPERTIES OF FRESH AND HARDENED CONCRETE | Workability; Factors affecting workability; Workability test- Slump test, Compacting Factor Test, Flow Table Test; Segregation and Bleeding; Strength of concrete; Factors affecting Strength and Durability of Concrete. | 7 |
| 4 | CONCRETE MIX DESIGN | Concrete Mix-design according to IS 10262: 2009. | 10 |
| 5 | ADMIXTURES IN CONCRETE | Definition; Functions of admixtures; Chemical admixtures- Accelerators, Retarders, Air Entraining agent, Plasticizers and Super-plasticizers; Mineral admixtures- Fly ash and Rice Husk Ash. | 7 |
| 6 | SPECIAL TYPES OF CONCRETE | Light weight concrete; High density concrete; Fibre reinforced concrete; No fines concrete; Ready mix concrete. | 5 |
| TOTAL | | | 48 |

RECOMMENDED BOOKS:

1. Concrete technology Theory and Practice by M.S. Shetty.
2. Concrete technology by B.L. Gupta and Amit Gupta.
3. Concrete technology by M.L. Gambhir.
4. Concrete technology by Neville and Brooks.
5. Concrete technology by Santhakumar.

Course Title : PRINCIPLES OF MANAGEMENT
Course Code: HS131506
L-T-P-C: 2-0-0-2

| | |
|-----------------------|----|
| Class Hours/week | 2 |
| Expected weeks | 12 |
| Total hrs. of classes | 24 |

| MODULE | TOPIC | COURSE CONTENT | HOURS |
|--------|------------------------------|---|-------|
| 1 | MANAGEMENT | Definition, nature, importance, evolution of management thoughts – pre & post scientific era, contributions made by Taylor, Fayol, Gilbreth, Elton Mayo, McGregor, Maslow – covering Time & Motion Study, Hawthorne Experiments; Is management a science or art? Functions of manager, ethics in managing and social responsibility of managers. | 4 |
| 2 | PLANNING & CONTROL | Why Management process starts with planning, steps in planning, planning premises, types of planning, barriers to effective planning, operational plan, strategic planning, McKinsey's 7's Approach, SWOT analysis, Controlling- concept, Planning- control relationship, process of control, human response to control, dimension of control, MBO. | 4 |
| 3 | DECISION MAKING & ORGANIZING | Nature, process of decision making, decision making under Certainty and Uncertainty, decision-tree, group-aided decision, brainstorming. Organizing – concept, nature and process of organizing, authority and responsibility, delegation and empowerment, centralization and decentralization, concept of departmentation. | 4 |
| 4 | STAFFING & MOTIVATION | Concept, Manpower planning, Job design, recruitment & selection, training and development, performance appraisal, motivation, motivators and satisfaction, motivating towards organizing objectives, morale building. | 3 |
| 5 | LEADERSHIP & COMMUNICATION | Defining leadership and its role, should managers lead, leadership style, leadership development, Leadership behaviour. Communication- Process, Bridging gap-using tools of communication, electronic media in Communication. | 3 |

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|--------------|---------------------------------|---|-----------|
| 6 | FINANCIAL MANAGEMENT | Financial functions of management, Financial Planning, Management of Working Capital, Sources of Finance. | 3 |
| 7 | MARKETING MANAGEMENT | Functions of Marketing, Product Planning & Development, Marketing Organization, Sales Organization, Sales Promotion, Consumer Behaviour, Marketing Research and Information | 3 |
| TOTAL | | | 24 |

TEXTBOOKS / REFERENCE BOOKS:

1. Robbins & Caulter, Management, Prentice Hall of India.
2. John R.Schermerhorn, Introduction to Management, Wiley-India Edition.
3. Koontz, Principles of Management, Tata-McGraw Hill.
4. Richard L. Daft, New Era of Management, Cengage Learning.
5. Stoner, Freeman and Gilbert. Jr., Management, Prentice Hall of India.
6. Koontz, Weihrich, Essentials of Management, Tata-McGraw Hill.
7. D.C. Bose, Principles of Management and Administration, Prentice Hall of India.

PRACTICALS

Course Title : DESIGN OF STRUCTURES – I LAB

Course Code: CE131513

L-T-P-C: 0-0-2-1

Expected No. of weeks : 12 (approx)

| EXPERIMENT NO. | AIM OF THE EXPERIMENT | HOURS |
|-----------------------|---|--------------|
| 1 | Clark Maxwell's Reciprocal theorem using a beam. | 3 |
| 2 | Analysis of redundant joint. | 3 |
| 3 | Deflections of a truss. | 3 |
| 4 | Maxwell's Reciprocal theorem. | 3 |
| 5 | Elastic displacements of curved members. | 3 |
| 6 | Elastic properties of concrete and steel. | 3 |
| 7 | Three hinged arch. | 3 |
| 8 | Two hinged arch. | 3 |
| 9 | Experimental or Analytical study of 3 bar pin jointed truss. | 3 |
| 10 | Experimental or Analytical study of deformations in bar-beam combination. | 3 |
| 11 | Experimental or Analytical study of deflections in unsymmetrical bending. | 3 |
| 12 | Application of the analysis software (STAAD). | 3 |
| TOTAL | | 36 |

NOTE: The students have to perform any 5(five) of the above experiments.

Course Title : TRANSPORTATION ENGINEERING – I LAB

Course Code: CE131514

L-T-P-C: 0-0-2-1

Expected No. of weeks : 12 (approx)

| EXPERIMENT NO. | AIM OF THE EXPERIMENT | HOURS |
|-----------------------|------------------------------|--------------|
| 1 | Sieve analysis | 3 |
| 2 | Impact test | 3 |
| 3 | Crushing Strength test | 3 |
| 4 | Abrasion test | 3 |
| 5 | Water Absorption test | 3 |
| 6 | Specific gravity test | 3 |
| 7 | Flakiness Index test | 3 |
| 8 | Elongation Index test | 3 |
| 9 | CBR Test | 3 |
| TOTAL | | 27 |

Course Title : CONCRETE TECHNOLOGY LAB

Course Code: CE131515

L-T-P-C: 0-0-2-1

Expected No. of weeks : 12 (approx)

| EXPERIMENT NO. | AIM OF THE EXPERIMENT | HOURS |
|----------------|--|-----------|
| 1 | To determine the fineness of cement. | 3 |
| 2 | To determine the standard consistency of cement paste. | 3 |
| 3 | To determine the initial and final setting time of cement. | 3 |
| 4 | To determine the soundness of cement. | 3 |
| 5 | To determine the strength of cement (mortar cubes) for 7 days and 28 days. | 3 |
| 6 | To determine the workability of concrete <ul style="list-style-type: none">• Slump test• Compacting factor test | 3 |
| 7 | To determine the compressive strength of concrete cubes for 7 days and 28 days. | 3 |
| TOTAL | | 21 |
