

Proposal for Modified syllabus for B.Tech (Civil Engineering) in Faculty Board of Studies (BOS) Meeting  
15-04-2017

ATTENDANCE SHEET -CUM- MINUTES OF BOARD OF STUDIES

Minutes of the meeting of the Board of Studies of CIVIL ENGINEERING (Subject)  
held on 13-4-2017 (date) at \_\_\_\_\_ (time).

PRESENT

(Name)		(Signature)
1. <u>DR. K. HANS RAJ</u>	(Chairperson)	<u>K. Hans Raj</u>
2. <u>DR. JAMUNA PRASAD</u>	(External Expert 1)	<u>J. Prasad</u>
3. <u>ER. S.P. MATHUR</u>	(External Expert 2)	<u>S.P. Mathur</u>
4. <u>ER. PRATEEK SHARMA</u>	(Internal Member)	<u>Prateek Sharma</u>
5. <u>ER. (MISS) KARISHMA YADAV</u>	(Internal Member)	<u>Karishma</u>
6. _____	(Internal Member)	_____
7. _____	(Internal Member)	_____
8. _____	(Internal Member)	_____
9. _____	(Internal Member)	_____
10. _____	(Internal Member)	_____

Proposed changes in the existing system

ENCLOSED

K. Hans Raj  
(Signature of Chairperson)

Prof. A.K. Jain IITD has sent his consent via e-mail to the Chairperson.

#### Modification of labs

Transportation Engineering theory is covered in 4<sup>th</sup> semester and the Lab for the same subject is in 5<sup>th</sup> semester. It is felt by the department that Transportation Lab should be shifted to 4<sup>th</sup> semester as it will be better supported by the theory course.

Concrete technology lab is relatively very important for Civil Engineers and a need is felt to include it in the curriculum instead of hydrology lab which is covered in 5<sup>th</sup> semester. When more teachers are appointed and equipment for the hydrology labs becomes available it will be introduced as an elective.

Course Number and Title: CEM305 –CONSTRUCTION MATERIALS

Course No & Title : CEM 602 - Irrigation Engineering

<p><b>UNIT-1. INTRODUCTION:</b>          Importance of Irrigation Engineering, purposes of Irrigation, objectives of Irrigation, Benefits of Irrigation, Advantages of various techniques of irrigation- Furrow Irrigation, Boarder strip Irrigation, Basin Irrigation, Sprinkler Irrigation , Drip Irrigation.  <b>METHODS OF IRRIGATION:</b>          Advantages and disadvantages of irrigation, water requirements of crops, factors affecting water requirement, consumptive use of water, water depth or delta , Duty of water, Base Period, relation between delta, duty and base period, Soil crop relation-ship and soil fertility.</p>	<p><b>UNIT 1: INTRODUCTION:</b>          Definition of irrigation, Necessity of irrigation, Types of irrigation, Sources of irrigation water. (i) Rain Fall and Run-off: Definition of rainfall and run-off. Catchment area, Dickens' and Ryve's formulae, Types of rain gauges- Automatic and non-automatic, Stream gauging. (ii)Water Requirement of Crops: Definition of crop season, Duty, Delta and Base Period, their relationship, Gross command area, cultivable command area, Intensity of irrigation, Irrigable area, Water requirement of different crops of different crops- kharif and Rabi. Rain Gauge.</p>	<p>Syllabus re arranged in proper order.</p>
<p><b>UNIT-2.CANAL IRRIGATION:</b>          Classifications of canals, canal alignment, Inundation canals, Bandhara irrigation, advantages and disadvantages, Silt theories- Kennedy's theory, Lacey's theory, Drawbacks in Kennedy's &amp;Lacey's theories, comparison of Lacey's and Kennedy's theories, Design of unlined canals based on Kennedy &amp;Lacey's theories.  <b>LINED CANALS:</b> Types of lining, selection of type of lining, Economics of lining, maintenance of lined canals, silt removal, strengthening of channel banks, measurement of discharge in channels, design of lined canals, methods of providing drainage behind lining.  <b>LOSSES IN CANALS, WATER LOGGING AND DRAINAGE:</b>          Losses in canalsEvaporation and seepage, water logging, causes and ill effects of water logging anti wter logging measures. Drainage of land, classification of drains - surface and subsurface drains, Design considerations for surface drains, Advantages and maintenance of tile drains.</p>	<p><b>UNIT 2: Canal IRRIGATION</b>          (i) Canal Head works: Definition, object, general layout, functions of different parts of head works, Difference between weir barrage.          (ii) Flow Irrigation: Irrigation canals, Perennial irrigation, Different parts of irrigation canals and their functions, Sketches of different canal cross-section. Classification of canals according to their alignment, Design of irrigation canals- Chezy's formulae, Meanings formulae, Kennedy's and Lecey's silt theories and equations, comparison of above two silt theories, critical velocity ratio, Various types of canal lining- Advantages and disadvantages.</p>	

<p>UNIT-3 INVESTIGATION AND PREPARATION OF IRRIGATION PROJECTS: Classification of project, Project preparation-investigations, Design of works and drawings, concept of multi - purpose projects, Major, Medium and minor projects, planning of an irrigation project, Economics &amp; financing of irrigation works. Documentation of project report.</p>	<p>UNIT 3: REGULATORY WORKS Functions and explanation of terms used, Cross and head regulators, Falls, Energy dissipaters, Outlets-different types, Escapes. (i) Cross Drainage Works: Functions and necessity of the following types: aqueduct, siphon, super passage, level crossing, inlet and outlet, Constructional detail of the above.</p>	
<p>UNIT-4 TUBE - WELL IRRIGATION: Types of tube wells - strainer type, cavity type and slotted type. Type of strainers, Aquifer, porosity, uniformity coefficient, specific yield &amp; specific retention, coefficients of permeability, transmissibility and storage. Yield or discharge of a tube well, Assumptions, Theim's &amp; Dupuit's formulae, Limitations of Theim's and Dupuit's formulae. Interference of tube wells with canal or adjoining tube-wells, causes of failure of tubewells, optimum capacity, Duty and delta of a tube well. Rehabilitation of tubewell.</p>	<p>UNIT 4: DAMS, Weir and Barrages Earthen dams-types, causes of failure, Classification into masonry and concrete dams, Labeled cross section of gravity dam, Spillways-types and uses. (ii) Water Logging and Drainage: Definition, causes and effects, detection, prevention and remedies, Surface and sub-surface drains and their layout. Weir &amp; Barrages.</p>	
<p>UNIT-5 RIVER TRAINING WORKS: Objectives, classification of river-training works, Design of Guide Banks. Groynes or spurs - Their design and classification ISI. Recommendations of Approach embankments and afflux embankments, pitched Islands, Natural cut-offs and Artificial cut-offs and design Considerations.</p>	<p>UNIT 5: TUBEWELL &amp; Lift IRRIGATION Types of wells- shallow and deep well, aquifer types, ground water flow, construction of open wells and tube wells, Yield of an open/tube well and problems, Methods of lifting water- Manual and mechanical devices, use of wind mills. Introduction, occurrence of ground water, location and command, advantages of tube wells, Tube wells, explanation of terms water table, radius of influence, depression head, cone of depression, confined and unconfined aquifers, Types of tube wells and their choice-cavity, strainer and slotted type: Method of construction boring, installation of well assemble, development of well, pump selection and installation and maintenance.</p>	

Course No & Title: CEM801-Building Contracts and Estimation for Buildings

<p>Unit 1 Buildings:Occupancy classification of buildings – general requirements of site and building- building codes and rules – licensing of building works. Functional planning of buildings such as residential, institutional, public, commercial and industrial buildings.Introduction to estimating, types of estimates, drawing attached with these estimates, Units of Measurement and units of payment of different items of work, Preparation of detailed estimate, detailed reports, specifications, abstract of cost and material statement for small residential, building with flat, etc.Tendering, Invitation to tender by private invitation, by negotiations, essential characteristics of a tender notice, opening, acceptance of tender. Types of tenders, Earnest money, Security deposit, retention amount and its essential characteristics and purpose of retention amount.</p>	<p>UNIT 1: BUILDINGS UNIT 1: BUILDINGS Introduction to estimating: Types of estimates, drawings to attached with these estimates, preparation of rough cost estimates, Units of measurement and units of payment of different items of work, Different methods of taking out quantities-centre line into in/out methods, Preparation of a detailed estimate, complete with detailed reports, specifications, abstract of cost and and material statement for a small residential; building with a flat roof. Preparation of a detailed estimate, complete with detailed reports, specifications, abstract of cost and material statement for pitches roof with steel truss only. Analysis of Rates: Steps in analysis of rates of material, labor and contractors profit. Calculation of quantities of materials for plain cement concrete of different proportions, brick masonry in cement and lime mortar, plastering and pointing with cement mortar in different proportions, white washing. Analysis of rates for earth work in excavation, cement concrete in foundation, damp proof course, RCC &amp;RB in roof slabs, cement plaster, cement polishing-flush, deep pointing.</p>	<p>Justification Classification of Building as per NBC, Licensing of Building, and Functional Planning of Building has already been taught in Building Construction. Analysis of rates earlier in unit-2 has been taken in Unit-1.</p>
<p>Unit2 Analysis of Rates: Steps in analysis of rates of material, labour and contractors profit. Calculation of quantities of materials for plain cement concrete of different proportions, brick masonry in cement and lime mortar, plastering and pointing with cement mortar in different proportions, white washing. Analysis of rates for earth work in excavation, cement concrete in foundation, damp proof course, RCC &amp;RB in roof slabs, cement plaster, cement polishing-flush, deep pointing.</p>	<p>Unit2 Irrigation: Calculation of earth work for inclined channels with the help of drawings for different cross-sections, Roads: Methods for calculating earth work using average depth, average cross sectional area and graphical method. Calculations of quantities of materials for roads in plains for given drawings, detailed Calculation of different items of work for a masonry retaining wall from given drawings. Measurement Book.</p>	<p>Estimation of Irrigation &amp; Roads have been merged on One Unit</p>

<p>Unit3 Irrigation: Calculation of earth work for inclined channels with the help of drawings for different cross-sections, preparation of detailed estimate for a brick lined distributory, laying a water supply line (CI pipe), detailed estimate for sanitary and water supply fittings in a domestic containing one set of toilets and septic tank and estimates for laying brick sewer.</p>	<p>Unit3 VALUATION Purpose of valuation, principles of valuation, Definition of terms such as depreciation, sinking fund, salvage and scrap value, Valuation of a building property by replacement cost method and rental return method. Method of calculation of standard rent-concept of capitalized value and years purchase.</p>	<p>Valuation which was part of Unit-5 has been considered as a separate unit because of its importance</p>
<p>Unit 4 Roads: Methods for calculating earth work using average depth, average cross sectional area and graphical method. Calculations of quantities of materials for roads in plains for given drawings, detailed estimate of a single span slab culvert with return wing walls. Calculation of different items of work for a masonry retaining wall from given drawings.</p>	<p>Unit 4 Contracts &amp; Legal Definitions: Essential Components of Contract Documents Tendering, Invitation to tender by private invitation, by negotiations, essential characteristics of a tender notice, opening, acceptance of tender. Types of tenders, Earnest money, Security deposit, retention amount and its essential characteristics and purpose of retention amount. Procedure for Award of work</p>	<p>Contract management which was part of Unit -5 has been expanded to include all aspects of Contract management</p>
<p>Unit 5 Contract and its legal definition: Contract by private party and public body. When contract becomes void, Discharge of contract, Types of Contract. Execution of the Contract, Conditions with respect to the power and duties of Architect, Contractors duties and liabilities under the contract, Problems arising out of contract conditions, prime cost, provisional sums. Purpose and principles of valuation. Definition of terms such as depreciation, sinking fund, salvage and scrap value. Valuation of building property by replacement cost method and rental return method.</p>	<p>Unit 5 Execution of contracts : Duties of AIC, Duties of contractor, Security Deposit, Advances to Contractor ,Defect Liability Period ,First law of Natural Justice Force Majeure,Contract Price Adjustments,Termination of Contract Concept of Risk &amp; Cost,Arbitration, Measurement Book, Introduction to Finance in Contract Management.</p>	<p>As part of the expansion of scope of Unit-5, the execution of Contract has been taken as complete unit.</p>

Course No & Course Title : : CEM 604 – STRUCTURAL ANALYSIS - II

<p>Unit 1: Introduction: Stiffness, flexibility, flexibility and stiffness matrices</p>	<p>No Change</p>	
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Influence Lines: Analysis for different types of moving loads, use of influence line diagrams, application to determinate structures.		
Unit 2: Redundant Structures: Muller-Breslau principle with application to determinate and redundant structures. Qualitative ILD for continuous beams, frames and arches.	No Change	
Unit 3: Displacement approach: basic principles. Slope deflection method. Moment distribution method, frame with/without sway, use of symmetry and anti-symmetry, Matrix displacement method, basic principles, application to beams, trusses and frames.	Unit 3: Displacement approach: basic principles. Slope deflection method. Moment distribution method, frame with/without sway, use of symmetry and anti-symmetry.	Syllabus given in this unit is to be put at least in Two Units. So Matrix Displacement Method is changed into Unit-4
Unit 4: Theory of Plates and Shells: Analysis of plates, folded plates and singly curved shells: conventional and approximate methods.	Unit-4 : Matrix Method of Analysis Basic principles, application to beams, trusses and frames.	Theory of Plates & Theory of Shells are two separate subjects each one is taught in one full Semester at M-Tech Level in the specialization of Structural Engineering & hence it is deleted.
Unit 5: Space and Cable Structures: Analysis of Space trusses using method of tension coefficients – Beams curved in plan Suspension cables – suspension bridges with two and three hinged stiffening girders.	Unit 5: Space and Cable Structures: Analysis of Space trusses using method of tension coefficients – Suspension cables – suspension bridges with three hinged stiffening girders.	

Course No & Course Title: CEM-701- Design of Reinforced Concrete Structures – II

Unit 1 :Design of continuous R.C. beams, moment redistribution. Design loads on buildings, wind and earthquake loads.	Unit 1 : Design loads on buildings, Dead Loads, Live Loads, wind and earthquake loads. Design of continuous R.C. beams moment redistribution.	Syllabus re- arranged in Proper order.
Unit 2: Analysis and design of RC framed buildings; Framing systems, member proportioning, loadings, static and dynamic analysis and component design, provisions of ductile detailing.	Design of RC framed buildings. Framing systems, member proportioning, Detailing in general & Ductile Detailing in particular as applicable to Earthquake Resistant Design & RC Detailed Drawing	Syllabus re- arranged in Proper order.



Unit 3: Design of T-beams bridge, standard specifications and general design considerations.	No Change	
Unit 4: Design of overhead water tanks, general design consideration for circular & Intze tanks.	No Change	
Unit 5 :Pre-stressed concrete; Materials, prestressing systems, stress analysis & losses of prestress, design of simple beams.	No Change	

Course No & Course Title : CEM 502- STRUCTURAL ANALYSIS – I

UNIT 1: Analysis of statically determinate beams, frames and trusses, deflection of frames and trusses, conjugate beam and area moment theorems; unit load method, strain energy method for slopes and deflections,	No Change	
UNIT 2: Statically indeterminate structures, static and kinematic indeterminacies, castigliano's theorems, theory of least work, use of symmetry and antisymmetry, approximate methods for the analysis of building frames,	No Change	
UNIT 3: Analysis of indeterminate structures by flexibility method, consistent deformation method, strain energy method, influence coefficient method,	UNIT 3: Analysis of indeterminate structures by flexibility method with application to Trusses, Beams & Frames.	Syllabus re- arranged in Proper order.
UNIT 4: Column analogy method, analysis of three hinged, two hinged and fixed arches.	UNIT 4: Column analogy method, analysis of three hinged, two hinged arches.	Syllabus re- arranged in Proper order.
UNIT 5: Analysis of cables and two hinged suspension bridges, unsymmetrical bending and shear centre.	UNIT 5: Analysis of cables, unsymmetrical bending and shear centre.	Syllabus re- arranged in Proper order.

Course No & Course Title : CEM811 -CONSTRUCTION TECHNOLOGY AND MANAGEMENT

<p>UNIT 1: Importance of Project Management, Role of Project manager, Stakeholders in construction project</p>	<p>Elements of Management and Network Techniques: Project Cycle, Organization, Planning, Scheduling, Monitoring, updating and Management System in Construction.</p>	
<p>UNIT 2: Different types of projects, similarities &amp; dissimilarities in projects., Time, Scope &amp; Money, Knowledge areas &amp; Processes involved in construction projects.</p>	<p>Introduction to Construction Projects: Different types of projects, similarities &amp; dissimilarities in projects. Time, Scope &amp; Money, Knowledge areas &amp; Processes involved in construction projects.</p>	
<p>UNIT 3: WBS of a major work, with examples, Planning, monitoring &amp; executing, Planning, sequencing, scheduling, Bar Charts, Networks, CPM, PERT, Upgrading, Cash flow diagram, resource levelling &amp; resource allocation, Crashing of project, Cost Optimization</p>	<p>Network Techniques: Bar Chart, Mile stone chart, work break down structure, and preparation of networks. Network techniques like PERT and CPM. In construction Management, Project Monitoring and resource allocations through network techniques.</p>	
<p>UNIT 4: Invoicing, Preparation of RA bill, Safety in construction, Estimation, Tenders &amp; Contracts Contract management- Tenders/International Building procedures, Bid Evaluation, Professional Practice in engineering and Urban Legislations.</p>	<p>UNIT 4: Engg economy: principle of engg economy, interest and interest formula, comparison of alternative &amp; minimum cost point analysis, break even analysis, depreciation and depletion.</p>	<p>Also included in Building Contracts and Estimation &amp; Statutory Provisions for Buildings</p>
<p>UNIT 5: Equipment for construction, Construction Finances – decision making, Construction of piles, Construction of Tunnels, Construction of cofferdams</p>	<p>UNIT 5: Construction equipment's: Equipment Management: equipment's introduction, standard and special equipment's, selection of construction equipment, cost of owning and operation, economic life of equipment, Engg fundamentals of equipment. excavating and transporting equipment( Tractor, Bull Dozer, Power Shovel, Drag Line, Clam Shell, Hoe, Scraper) hauling and conveying equipment's, drilling rock and plastic rock, production of crust aggregate, foundation grouting, dewatering and pumping equipment, formwork and concreting hoisting equipment's.</p>	<p>Syllabus re- arranged in Proper order.</p>