

## QUANTITY SURVEYING AND CONTRACTS MANAGEMENT

SUBJECT CODE-15CV81

CIE MARKS-20; SEE MARKS-80

HOURS/WEEK-04; EXAM HOURS-03

TOTAL HOURS-50;

CREDITS - 04

### MODULE - 1

Quantity Estimation for Building; study of various drawing attached with estimates, important terms, units of measurements, abstract, Types of estimates - Approximate, detailed, supplementary and revised, Estimation of building -Short wall and long wall method - centre line method. Estimate of R.C.C structures including Slab, beam, column , footings, with bar bending schedule

### MODULE - 2

Estimate of Steel truss, manhole and septic tanks. Quantity Estimation for Roads: Road estimation, earthwork fully in banking, cutting, partly cutting and partly Filling, Detailed estimate and cost analysis for roads

### MODULE - 3

Specification for Civil Engineering Works: Objective of writing specifications essentials in specifications, general and detail specifications of different items of works in buildings, Analysis of Rates : Factors Affecting Cost of Civil Works , Concept of Direct Cost , Indirect Cost and Project Cost Rate analysis and preparation of bills, Data analysis of rates for various items of Works, Sub-structure components, Rate analysis for R.C.C. slabs, columns and beams.

### MODULE - 4

Contract Management-Tender and its Process: Invitation to tender, Prequalification, administrative approval & Technical sanction. Bid submission and Evaluation process. Contract Formulation: covering Award of contract, letter of intent, letter of acceptance and notice to proceed. Features / elements of standard Tender document (source: PWD / CPWD / International Competitive Bidding – NHAI / NHEPC / NPC). Law of Contract as per Indian Contract act 1872 , Types of Contract, Entire contract, Lump sum contract, Item rate,

% rate, Cost plus with Target, Labour, EPC and BOT, Sub Contracting. Contract Forms : FIDIC contract Forms , CPWD , NHAI , NTPC , NHEPC

## MODULE - 5

Contract Management-Post award :Basic understanding on definitions, Performance security, Mobilization and equipment advances, Secured Advance, Suspension of work, Time limit for completion, Liquidated damages and bonus, measurement and payment, additions and alterations or variations and deviations, breach of contract, Escalation, settlement of account or final payment, claims, Delay' s and Compensation, Disputes & its resolution mechanism, Contract management and administration Valuation: Definitions of terms used in valuation process, Cost, Estimate, Value and its relationship, Capitalized value. Concept of supply and demand in respect to properties ( land , building , facilities' ), freehold and lease hold , Sinking fund, depreciation – methods of estimating depreciation, Outgoings, Processand methods of valuation : Rent fixation, valuation for mortgage, valuation of land

### TEXT BOOKS:

1. Datta B.N., “ Estimating and costing ” , UBSPD Publishing House, New Delhi
2. B.S. Patil, “ Civil Engineering Contracts and Estimates ” , Universities Press
3. M. Chakraborti; “ Estimation, Costing and Specifications ” , Laxmi Publications
4. MORTH Specification for Roads and Bridge Works – IRC New Delhi

### REFERENCE BOOKS:

1. Kohli D.D and Kohli R.C, " Estimating and Costing",12 th Edition, S.Chand Publishers, 2014.
2. Vazirani V.N and Chandola S.P, " Estimating and costing", Khanna Publishers, 2015.
3. Rangwala, C. "Estimating, Costing and Valuation", Charotar Publishing House Pvt. Ltd., 2015.
4. Duncan Cartlidge , "Quantity Surveyor' s Pocket Book", Routledge Publishers, 2012.
5. Martin Brook, "Estimating and Tendering for Construction Work", A Butterworth-Heinemann publishers, 2008.
6. Robert L Peurifoy , Garold D. Oberlender , “ Estimating Construction Costs ” – 5ed , Tata McGraw-Hill ,

New Delhi

7. David Pratt , “ Fundamentals of Construction Estimating ” – 3ed ,
8. PWD Data Book ,CPWD Schedule of Rates (SoR). and NH SoR – Karnataka
9. FIDIC Contract forms
10. B.S. Ramaswamy “ Contracts and their Management ” 3ed , Lexis Nexis ( a division of Reed Elsevier India Pvt Ltd)

## DESIGN OF PRE STRESSED CONCRETE ELEMENTS

SUBJECT CODE-15CV82

CIE MARKS-20; SEE MARKS-80

HOURS/WEEK-04; EXAM HOURS-03

TOTAL HOURS-50;

CREDITS - 04

### MODULE - 1

Introduction and Analysis of Members: Concept of Prestressing - Types of Prestressing - Advantages - Limitations - Prestressing systems - Anchoring devices - Materials - Mechanical Properties of high strength concrete - high strength steel - Stress-Strain curve for High strength concrete. Analysis of members at transfer - Stress concept - Comparison of behavior of reinforced concrete and prestressed concrete - Force concept - Load balancing concept - Kern point - Pressure line

### MODULE - 2

Losses in Prestress, Loss of Prestress due to Elastic shortening, Friction, Anchorage slip, Creep of concrete, Shrinkage of concrete and Relaxation of steel - Total Loss. Deflection and Crack Width Calculations of Deflection due to gravity loads - Deflection due to prestressing force - Total deflection - Limits of deflection - Limits of span-to-effective depth ratio - Calculation of Crack Width - Limits of crack width.

### MODULE - 3

Design of Sections for Flexure: Analysis of members at ultimate strength - Preliminary Design - Final Design for Type 1 members

### MODULE - 4

Design for Shear: Analysis for shear - Components of shear resistance - Modes of Failure - Limit State of collapse for shear - Design of transverse reinforcement

### MODULE - 5

Anchorage zone stresses and design of anchorages. Composite Sections: Types of

composite construction – Analysis of composite sections – Deflection – Flexural and shear strength of composite sections.

TEXT BOOKS:

1. Krishna Raju, N. “Prestressed Concrete” , Tata McGraw Hill Publishing Company, New Delhi 2006
2. Krishna Raju. N., “Pre-stressed Concrete – Problems and Solutions” , CBS Publishers and Distributors, Pvt.Ltd., New Delhi.
3. Rajagopalan N, “Pre – stressed Concrete” , Narosa Publishing House, New Delhi

REFERENCE BOOKS:

1. Praveen Nagarajan, “Advanced Concrete Design” , Person
2. P. Dayaratnam, “Prestressed Concrete Structures” , Oxford & IBH-Pubs Company, Delhi, 5th Edition
3. Lin T Y and Burns N H, ‘Design of Pre – stressed Concrete Structures’ , John Wiley and Sons, New York
4. Pundit G S and Gupta S P, “Pre – stressed Concrete” , C B S Publishers, New Delhi
5. IS: 1343: Indian Standard code of practice for Prestressed concrete, BIS, New Delhi.
6. IS: 3370-Indian Standard code of practice for concrete structures for storage of liquids, BIS, New Delhi

# EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

SUBJECT CODE-15CV831

CIE MARKS-20; SEE MARKS-80

HOURS/WEEK-04; EXAM HOURS-03

TOTAL HOURS-50;

CREDITS - 03

## MODULE - 1

Engineering Seismology: Terminologies (Focus, Focal depth, Epicenter, etc.); Causes of Earthquakes; Theory of plate tectonics; Types and characteristics faults; Classification of Earthquakes; Major past earthquakes and their consequences; Types and characteristics of seismic waves; Magnitude and intensity of earthquakes; local site effects; Earthquake ground motion characteristics: Amplitude, frequency and duration; Seismic zoning map of India; (Problems on computation of wave velocities. Location of epicenter, Magnitude of earthquake)

## MODULE - 2

Response Spectrum: Basics of structural dynamics; Free and forced vibration of SDOF system; Effect of frequency of input motion and Resonance; Numerical evaluation of response of SDOF system (Linear acceleration method), Earthquake Response spectrum: Definition, construction, Characteristics and application; Elastic design spectrum.

## MODULE - 3

Seismic Performance of Buildings and Over View of IS-1893 (Part-1): Types of damages to building observed during past earthquakes; Plan irregularities; mass irregularity; stiffness irregularity; Concept of soft and weak storey; Torsional irregularity and its consequences; configuration problems; continuous load path; Architectural aspects of earthquake resistant buildings; Lateral load resistant systems. Seismic design philosophy; Structural modeling; Code based seismic design methods

## MODULE - 4

Determination of Design Lateral Forces: Equivalent lateral force procedure and dynamic analysis procedure. Step by step procedures for seismic analysis of RC buildings using Equivalent static lateral force method and response spectrum methods (maximum of 4

storeys and without infill walls).

## MODULE – 5

Earthquake Resistant Analysis and Design of RC Buildings: Typical failures of RC frame structures, Ductility in Reinforced Concrete, Design of Ductile Reinforced Concrete Beams, Seismic Design of Ductile Reinforced Concrete column, Concept of weak beam-strong column, Detailing of Beam-Column Joints to enhance ductility, Detailing as per IS-13920. Retrofitting of RC buildings <

Earthquake Resistant Design of Masonry Buildings: Performance of Unreinforced, Reinforced, Infill Masonry Walls, Box Action, Lintel and sill Bands, elastic properties of structural masonry, lateral load analysis, Recommendations for Improving performance of Masonry Buildings during earthquakes; Retrofitting of Masonry buildings

### TEXT BOOKS:

1. Pankaj Agarwal and Manish Shrikande, “Earthquake resistant design of structures” , PHI India.
2. S.K. Duggal, “Earthquake Resistant Design of Structures” , Oxford University Press
3. Anil K. Chopra, “Dynamics of Structures: Theory and Applications to Earthquake Engineering” , Pearson Education, Inc.
4. T. K. Datta, “Seismic Analysis of Structures” , John Wiley & Sons (Asia) Ltd.

### REFERENCE BOOKS:

1. David Dowrick, “Earthquake resistant design and risk reduction” , John Wiley and Sons Ltd.
2. C. V. R. Murty, Rupen Goswami, A. R. Vijayanarayanan & Vipul V. Mehta, “Some Concepts in Earthquake Behaviour of Buildings” , Published by Gujarat State Disaster Management Authority, Government of Gujarat.
3. IS-13920 – 2016, Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces, BIS, New Delhi
4. IS-1893 – 2016, Indian Standard Criteria for Earthquake Resistant Design of Structures, Part-1, BIS, New Delhi
5. IS- 4326 – 2013, Earthquake Resistant Design and Construction of Buildings, BIS, New

Delhi.

6. IS-13828 – 1993, Indian Standard Guidelines for Improving Earthquake Resistance of Low Strength Masonry Buildings, BIS, New Delhi.

7. IS-3935 – 1993, Repair and Seismic Strengthening of Buildings-Guidelines, BIS, New Delhi.



## HYDRAULICS STRUCTURES

SUBJECT CODE-15CV832

CIE MARKS-20; SEE MARKS-80

HOURS/WEEK-04; EXAM HOURS-03

TOTAL HOURS-50;

CREDITS - 03

### MODULE - 1

Gravity Dams: Introduction, forces acting on dam, cause of failure, design principles, principal and shear stresses. Elementary profile and practical profile of a gravity dam. Drainage galleries.

### MODULE - 2

Earth Dams: Introduction, causes of failure of earth dams, preliminary section, Determination of parametric line by Casagrande's method. Estimation of seepage

### MODULE - 3

Spillways: Types, Design of Ogee spillway, Upstream and downstream profiles, Energy dissipation devices.

Diversion Headworks: Design of aprons- Bligh's and Koshla's theory, Simple Problems

### MODULE - 4

Cross Drainage Works: Introduction, Type of C.D works, Design considerations for C.D works. Transition formula design of protection works, Design of only aqueduct

### MODULE - 5

Canal Regulation Works: Introduction, Function of a regulator.

Canal falls: Necessity and types.

Canal outlets: Necessity and types.

TEXT BOOKS:

1. S. K. Garg, “Irrigation Engineering and Hydraulic Structures” , Khanna Publishers, New Delhi.
2. Punmia and PandeyLal, “Irrigation and Water Power Engineering” Lakshmi Publications, New Delhi.
3. K. R. Arora. “Irrigation, Water Power and Water Resources Engineering” Standard Publications, New Delhi.

REFERENCE BOOKS:

1. R. K. Sharma, “Text Book of Irrigation Engineering and Hydraulic Structures” , Oxford and IBH, New Delhi.
2. P. N. Modi, “Irrigation, Water Resources and Water Power” , Standard Book House, New Delhi

## PAVEMENT DESIGN

SUBJECT CODE-15CV833

CIE MARKS-20; SEE MARKS-80

HOURS/WEEK-04; EXAM HOURS-03

TOTAL HOURS-50;

CREDITS - 03

### MODULE - 1

Introduction: Desirable characteristics of pavement, Types and components, Difference between Highway pavement and Air field pavement, Design strategies of variables, Functions of sub grade, sub base, Base course, surface course, comparison between Rigid and flexible pavement Fundamentals of Design of Pavements: Stresses and deflections, Principle, Assumptions and Limitations of Boussinesq' s theory, Burmister theory and problems on above

### MODULE - 2

Design Factors: Design wheel load, contact pressure, Design life, Traffic factors, climatic factors, Road geometry, Subgrade strength and drainage, ESWL concept Determination of ESWL by equivalent deflection criteria, Stress criteria, EWL concept, and problems on above. Flexible pavement Design: Assumptions, Mcleod Method, Kansas method, CBR method, IRC Method (old), CSA method using IRC-37-2001, problems on above

### MODULE - 3

Flexible Pavement Failures, Maintenance and Evaluation, Types of failures, Causes, Remedial/Maintenance measures in flexible pavements, Functional Evaluation by Visual inspection and unevenness measurements, Structural evaluation by Benkleman beam deflection method, Falling weight deflectometer, GPR method. Design factors for runway pavements, Design methods for Airfield pavement and problems on above

### MODULE - 4

Stresses in Rigid Pavement : Types of stress, Analysis of Stresses, Westergaard' s Analysis, Modified Westergaard equations, Critical stresses, Wheel load stresses, Warping stress, Frictional stress, combined stresses (using chart / equations), problems on above

Design of Rigid Pavement: Design of CC pavement by IRC: 58-2002 for dual and Tandem axle load, Reinforcement in slabs, Design of Dowel bars, Design of Tie bars, Design factors for Runway pavements, Design methods for airfield pavements, problems of the above

## MODULE – 5

Rigid Pavement Failures, Maintenance and Evaluation: Types of failures, causes, remedial/maintenance measures in rigid pavements, Functional evaluation by Visual inspection and unevenness measurements, wheel load and its repetition, properties of subgrade, properties of concrete. External conditions, joints, Reinforcement, Requirements of joints, Types of joints, Expansion joint, contraction joint, warping joint, construction joint, longitudinal joint, Design of joints

### TEXT BOOKS:

1. S K Khanna, C E G Justo, and A Veeraragavan, “Highway Engineering” , Nem Chand & Brothers
2. L.R.Kadiyali and Dr.N.B.Lal, “ Principles and Practices of Highway Engineering” , Khanna publishers
3. Yang H. Huang , “Pavement Analysis and Design” , University of Kentucky

### REFERENCE BOOKS:

1. Yoder & Wit Zorac , “Principles of pavement design” , John Wiley & Sons.
2. Subha Rao, “Principles of Pavement Design” .
3. R Srinivasa Kumar, “Pavement Design” , University Press.
4. Relevant recent IRC codes

## ADVANCED FOUNDATION DESIGN

SUBJECT CODE-15CV834

CIE MARKS-20; SEE MARKS-80

HOURS/WEEK-04; EXAM HOURS-03

TOTAL HOURS-50;

CREDITS - 03

### MODULE - 1

General bearing capacity equation – Terzaghi' s, Brinch Hansen' s and Mayerhof' s analyses, bearing capacity of footings according to BIS, eccentrically loaded footing, footing on layered soil, Settlement of shallow Foundations: Immediate, consolidation, & differential settlements. Principles of design of footing, Proportioning of footings for equal settlement

### MODULE - 2

Design of combined footings by Rigid method, Combined footings (rectangular & trapezoidal), strap footings. Types of rafts, bearing capacity & settlements of raft foundation, Design of raft foundation – Conventional rigid method, Elastic methods, Coefficient of sub-grade reaction, IS code (IS-2950) procedure

### MODULE - 3

Introduction Necessity of pile foundations, Classification, Load bearing capacity of single pile by Static formula, Dynamic formula, Pile load test and Penetration tests. Introduction, Pile groups, group action of piles in sand and clay, group efficiency of piles, settlement of piles, negative skin friction, laterally loaded piles and under reamed piles.

### MODULE - 4

Well Foundations: Introduction, Different shapes and characteristics of wells. Components of well foundation. Forces acting on well foundation. Sinking of wells. Causes and remedies of tilts and shifts.

Drilled Piers & Caissons: Introduction, construction, advantages and disadvantages of drilled piers. Design of open, pneumatic and floating caissons. Advantages and disadvantages of

floating caissons

## MODULE – 5

Machine Foundations: Introduction, free and forced vibrations, Types of Machine foundations, degrees of freedom of a block foundation, general criteria for design of machine foundation, vibration analysis of a machine foundation, determination of natural frequency, vibration isolation and control

### TEXT BOOKS:

Punmia B.C., “Soil Mechanics and Foundation Engineering” , Laxmi Publications Co., India

- Donald P. Coduto, “Geotechnical Engineering Principles & Practices” , Prentice-hall of India Ltd, India
- Murthy V.N.S., “Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering” , CRC Press, New York

### REFERENCE BOOKS:

Bowles J.E., “Foundation Analysis and Design” , McGraw Hill Pub. Co. New York.

- Swami Saran, “Analysis and Design of Substructures” , Oxford & IBH Pub. Co. Pvt. Ltd., India
- R.B. Peck, W.E. Hanson & T.H. Thornburn, “Foundation Engineering” , Wiley Eastern Ltd., India
- Braja, M. Das, “Principles of Geotechnical Engineering” , Cengage Learning, India
- Bureau of Indian Standards: IS-1904, IS-6403, IS-8009, IS-2950, IS-2911 and all other relevant codes.

## INTERNSHIP/PROFESSIONAL PRACTICE

SUBJECT CODE-15CV84

CIE MARKS-50; SEE MARKS-50

HOURS/WEEK-04; EXAM HOURS-03

TOTAL HOURS-50;

CREDITS - 02

Note: Internship /Professional Practice:

1. This shall be carried out by students in industry set-up related to the construction/ materials testing laboratories/research organizations/project management consulting firms/QS and QA organizations/ planning and design offices/Professional organisations like ACCE/ICI/INSTRUCT/RMCMA/QCI, PMI, CIDC etc. and other avenues related to the civil engineering domain in consultation and approval of internship guide/HOD /internship committees of the institutions.
2. The professional certification programs like ACCE(I)- SMP, ICI-BMTPC certifications, NSTRUCTcertifications, CIDC certifications, RMC-QCI' s RMCPCS Certification Programs, RMCMA-NRMCA' S Concrete Technologist India(CTI) programs and such similar programs by professional bodies with adequate industry exposures at sites/RMC plants can be considered as Internship /Professional Practice with due approvals from the guide/HOD /internship committees of the institutions
3. The industry/organisation should issue certificates of internship offer and its completion. The offer letter should clearly have the nature of work to be done by the student and the supervisor' s name and duration of internship.
4. The student shall make a midterm and final presentation of the activities undertaken during the first 6 weeks and at the end of 12th week of internship respectively, to a panel comprising internship guide, a senior faculty from the department and head of the department. Each student should submit the internship report at the end of semester with internship certificate.
5. Viva-Voce examination shall be conducted by a panel of examiners consisting of internship supervisor from industry or industry professional approved by university and internship guide from the institute.
6. The College shall facilitate and monitor the student internship program.

7. The internship should be completed during vacation after VI and VII semesters.

TEXT BOOKS:

Punmia B.C., “ Soil Mechanics and Foundation Engineering” , Laxmi Publications Co., India

- Donald P. Coduto, “ Geotechnical Engineering Principles & Practices” , Prentice-hall of India Ltd, India

- Murthy V.N.S., “ Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering” , CRC Press, New York

REFERENCE BOOKS:

Bowles J.E., “ Foundation Analysis and Design” , McGraw Hill Pub. Co. New York.

- Swami Saran, “ Analysis and Design of Substructures” , Oxford & IBH Pub. Co. Pvt. Ltd., India

- R.B. Peck, W.E. Hanson & T.H. Thornburn, “ Foundation Engineering” , Wiley Eastern Ltd., India

- Braja, M. Das, “ Principles of Geotechnical Engineering” , Cengage Learning, India

- Bureau of Indian Standards: IS-1904, IS-6403, IS-8009, IS-2950, IS-2911 and all other relevant codes.



