

31071 ADVANCED CONSTRUCTION TECHNOLOGY

DETAILED SYLLABUS

Unit 1

1.1 PILE FOUNDATIONS

Definition – uses of piles – types of piles – Bearing piles and Friction piles - classification based on material – stone piles- Encased piles - Reinforced cement concrete piles cast-in situ pile and pre cast piles description, advantages and disadvantages - load bearing piles and friction piles - purpose - sheet piles-types-description - choice of type of pile - factors to be considered – pile cap and pile shoe – description - load test on piles – description - Pile driving – equipment's - types of hammer - choice of hammer - causes of failure of piles – Reinforcement requirements for R C piles.

1.2 MODIFIED CONCRETE

Admixtures – definition – function – classification - uses of different types - quantity to be used - lightweight concrete - lightweight aggregate - production of light weight aggregate - shot Crete or grunting – definition - typical arrangement for gunite system - special concrete – Ferro cement- production process – curing - advantages and limitations - fibre reinforced concrete - production process – uses - Pre-stressed concrete - General principle of pre stressing - advantages of pre stressed Concrete - materials used - methods of pre-stressing - steel used - pretension method - post tension method - system of pressurising - freyssinet system - Magnel Blaton system - Leemc-call system - Causes for losses in pre-stress – remedial measures – Composite member

Unit II

2.1 PRE FABRICATION SYSTEM

Advantages and Disadvantages of Prefabrication system - Terms defined : prefabricated building, module, composite members, modular co-ordination, system; - Basic module - planning modules grid – modules in horizontal plane for

residential buildings and industrial buildings - other consideration - Module for components:- flooring scheme, Beams, columns, walls; Staircase,- lintel, sunshade - Tolerance on dimensions:- length, cross sectional dimension, straightness, squareness, twist, flatness 2.2 PRE FABRICATION METHODS Characteristics to be considered in devising a system - Types of pre fabricated building - load bearing wall type - frame type; Design considerations - bearing for pre cast units, joints; Requirements of an ideal structural joint - manufacture of precast concrete elements- place - process - main, auxiliary and subsidiary process; Stages of pre-casting –preparation and storage of materials - moulding and curing; Pre fabrication methods: individual method, battery form method, tilting mould method , Flow line production method- extension method - Handling during transport and storage - Handling arrangement - Transport - inside the factory - stacking yard to erection site, Erection works to be carried out - Equipment required

Unit III

3.1 FIRE PROTECTION IN BUILDINGS

General - causes and effects of fire - precautionary measures to minimize dangers of fire – limiting fire spread – factors to be considered - Fire resisting properties of common building material - general rules for fire resisting buildings - alarm system - protection of openings - common wall stair-floor fire extinguishing arrangement – fire protection systems – types - Emergency exit arrangements - Strong room construction

3.2 EARTH QUAKE RESISTING CONSTRUCTION

Indian Seismicity – Earthquake History - Definition of terms used - Behavior of structures in the past Earthquakes – Seismic forces – Effect of seismic forces on Buildings – Planning of Earthquake resistant Buildings - Roofs and Floors- Articulation joints – Expansion Joints – I.S. code provision – Alterations to Buildings – Foundation – Permissible increase in the allowable Bearing capacity of soils - Seismic coefficient for different zones – Construction of framed buildings in Earthquake zones – Walls – Beams etc.

Unit IV

4.1 MAINTENANCE AND REHABILITATION OF BUILDINGS

Rehabilitation of buildings - demolition of buildings - safety aspects – general - precautions during demolitions - sequence of demolition of operation – demolition process of trusses, girders and beams, walls, flooring - catch plat form – lowering removal and disposal of materials - mechanical demolition - Repairs to building – repairing of plastering works - fixing doors in – Making opening in masonry and fixing doors and windows - Renewing glass panes with wooden fillets – fixing fan clamps in existing R.C.C slab - repair to terrazzo (mosaic) flooring

4.2 PRECAUTIONS TO PREVENT CRACKS IN BUILDINGS

Cracks - general – Hair crack – Structural crack – Horizontal crack in masonry – Vertical/ diagonal cracks at walls - R.C.C beams or pillars - transverse cracks in R.C.C slab and sunshade - Repairs – Methods- materials used for filling cracks.

Unit V

5.1 HOUSING MODERNIZATION

Housing modernization and management (building and construction safety, energy efficiency in housing, Property Refurbishment / Upgrade / Modernization / Renovation - Modular kitchens, bathrooms, New windows, doors and timber floors, Roof insulation, dry lining and BER (Building Energy Rating) - Certificates – Plumbing and Electrical to heating efficiency Landscaping and driveways to patios and decking - Drafting a Construction Contract – Transforming from Traditional to Modern Style - Case Studies – Strengthening of Old buildings -Energy-saving houses, Green House, Passive house, Passive house construction, Low-energy house, Zero energy house, Energy consulting, Energy efficiency: Passive house standard, Quality-tested commercial passive house construction, Office building construction, Residential building construction - Consulting, planning, supervising – Green Building Concepts – materials – ratings.

5.2 LIFT MODERNIZATION

Independent Lifting Services - Mechanical Modernization - escalators or pathways - Aesthetic Modernization -Lift Car Interior-Eco-friendly Modernization – lift construction - Installation and modernization and maintenance.

Reference Book: 1. Concrete Technology – M.S. Shetty 2. Fire Resistant Construction – Building Construction by S.P.Arora and S.P.Bindra 3. Earth quake Proof - Building Construction by Dr.Janardhanjha and Prof.Suresh Kumar 4. Sinha IS Code of Practice for Earth quake , IS Code of Practice for Fire resistance, IS Code of Practice for pre stressing (2005) 5. Pile foundation – RD Chellis, MIS 6. Construction and foundation Engg – Sinha & Janatha Shau. 7. Principle Fine safety standards for building Construction – M.Ya Roytman