CN5002 SHORING, SCAFFOLDING AND FORMWORK

DETAILED SYLLABUS

OBJECTIVES

1. To study and understand the overall and detailed planning of formwork, plant and site equipment.
2. To understand the Design and erection of forms for various elements such as slabs, beams, columns, walls, shells and tunnels.
3. To know the latest methods of form construction.

UNIT I PLANNING, SITE EQUIPMENT & PLANT FOR FORM WORK

Introduction - Forms for foundations, columns, beams walls etc., General objectives of formwork building - Planning for safety - Development of a Basic System - Key Areas of cost reduction - Planning examples. Overall Planning - Detailed planning - Standard units - Corner units – Pass units - Calculation of labour constants - Formwork hours - Labour Requirement– Overall programme - Detailed programme - Costing - Planning crane arrangements - Site layout plan- Transporting plant - Formwork beams - Scaffold frames - Framed panel formwork- Formwork accessories.

UNIT II MATERIALS ACCESSORIES PROPRIETARY PRODUCTS & PRESSURES

Lumber - Types - Finish - Sheathing boards working stresses - Repetitive member stress - Plywood - Types and grades - Jointing Boarding - Textured surfaces and strength – Reconstituted wood - Steel - Aluminum - Hardware and fasteners - Nails in Plywood - Allowable withdrawal load and lateral load. Pressures on formwork - Examples - Vertical loads for design of slab forms - Uplift on shores - Laterals loads on slabs and walls.

UNIT III DESIGN OF FORMS AND SHORES

Basic simplification - Beam formulae - Allowable stresses - Deflection, Bending - Lateral stability - Shear, Bearing - Design of Wall forms - Slab forms - Beam forms - Column forms - Examples in each. Simple wood stresses - Slenderness ratio - Allowable load vs length behaviour of wood shores - Form lining Design Tables for Wall formwork - Slab Formwork - Column Formwork – Slab props - Stacking Towers - Free standing and restrained - Rosett Shoring - Shoring Tower – Heavy Duty props.

UNIT IV BUILDING AND ERECTING THE FORM WORK

Carpentry Shop and job mill - Forms for Footings - Wall footings - Column footings - Sloped footing forms - Strap footing - Stepped footing - Slab form systems - Sky deck and Multiflex – Customized slab table - Standard Table module forms - Swivel head and uniportal head - Assembly sequence- Cycling with lifting fork - Moving with table trolley and table prop. Various causes of failures - ACI - Design deficiencies - Permitted and gradual irregularities.

UNIT V FORMS FOR DOMES AND TUNNELS, SLIP FORMS AND SCAFFOLDS

Hemispherical, Parabolic, Translational shells - Typical barrel vaults Folded plate roof details- Forms for Thin Shell roof slabs design considerations - Building the forms - Placing concrete- Form removed -Strength requirements -Tunnel forming components - Curb forms invert forms- Arch forms - Concrete placement methods - Cut and cover construction - Bulk head method- Pressures on tunnels - Continuous Advancing Slope method - Form construction - Shafts. Slip Forms - Principles -Types - advantages - Functions of various components - Planning - Desirable characteristics of concrete - Common problems faced - Safety in slip forms special structures built with slip form Technique- Types of scaffolds - Putlog and independent scaffold- Single pole scaffolds - Truss suspended - Gantry and system scaffolds.

REFERENCES

1. Austin, C.K., Formwork for Concrete, Cleaver -Hume Press Ltd., London, 1996.
2. Hurd, M.K., Formwork for Concrete, Special Publication No.4, American Concrete Institute, Detroit, 1996
3. Michael P. Hurst, Construction Press, London and New York, 2003.
4. Robert L. Peurifoy and Garold D. Oberlender, Formwork For Concrete Structures, McGraw-Hill, 1996.