Design of Box Culverts, RCC Voided Slab, RCC Slab, T-beam Girder Bridge on Open Foundation

Day 1	
Time Period	**Description of Topic**
09.45-13:00	**Types of Bridges and Hydraulic calculations for bridges** ❖ Minor Bridge ❖ Major Bridge ❖ High level Bridge ❖ Submersible Bridge ❖ Causeway ❖ Culvert ❖ Components of Bridges ❖ Selection of type of Bridge ❖ Factors to be considered for Siting of Bridges ❖ Hydrology and Hydraulic Calculations • Determination of design discharge through various methods • Determination of Afflux and Linear Waterway (for alluvial plain as well as for hilly terrain) • Moles Worth Formula • Fixing of FRL and factors considered therefore • Scour depth calculations for bridges • Constriction of Waterway • Various IRC codal provisions of IRC:SP-13
14:00-17:15	**Types of Foundation, Geotechnical investigations,** ❖ Geotechnical investigation for selecting type of foundation and founding level • Equipment for boring • In-situ tests • Collection of Soil Sample • Types of test performed on each type of sample • Bore log data and corrections required thereon • Net safe bearing capacity for clayey soil and c-ø soil • Rock coring and evaluation of properties of rock • Recommendation for type of foundation and founding level

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	Accuracy ✓ Calculation of bearing capacity for different type of foundation o Criteria for selecting founding level for open foundation and deep foundation considering scour depth ❖ Various IRC codal provisions of IRC:78-2014
Day 2	
09.45-13:00	**Design of Box culvert** ❖ Design of Box culverts ❖ Worked out example for box culverts
14.00-17.15	**Design of Shallow Foundation** ❖ Pavement composition ❖ General features of Shallow Foundation ❖ Design Principles for Shallow foundation ❖ Various IRC Codal provisions for design of foundations including IRC:78-2014 ❖ Worked out example of design of open foundation taking all loading cases and all checks including base pressure checks and strength check in ULS ❖ Floor protection works for open foundation
Day 3	
09.45-13:00	**Design of Substructure for Bridges** ❖ Design Standards ❖ Types of Substructures (Single Piers, Twin Piers, Circular and rectangular piers, Y shape piers etc.) ❖ Criteria for selection for different types of substructures ❖ Different types of loads coming on Sub structure ❖ Worked out design example for circular pier and rectangular pier **Design of Pile Foundation** ❖ General features and types of pile foundations ❖ Various loads on pile foundation ❖ Design Principles for pile foundation ❖ Worked out example of design of bored cats in situ Pile foundation
14:00-17:15	**Design of Slabs** ❖ Different types of loads coming from superstructure including Live loads for

	different deck width as per IRC:6-2017 ❖ Design Principles for design of Voided slabs ❖ Design Principles for design of RCC slabs Worked out design example for voided slab and RCC slab
Day 4	
09.45-13:00	**Bearings for bridges** ❖ Types of Bridges and Bridge Components ❖ Different types of bearing (Elastomeric, POT-PTFE bearings) ❖ Bearing behaviour and load transfer mechanism ❖ Criteria for selection of different types of bearing ❖ Worked out example of elastomeric bearing
14:00-17:15	**Expansion Joints** ❖ Function of Expansion Joints ❖ Types of Joints ❖ Selection Criteria for different types of Joint ❖ Performance Requirement ❖ Procurement of Expansion Joint ❖ Construction Practices ❖ Testing and Acceptance Criteria
Day 5	
09.45-13:00 + 14.00-15.30	Design of Super-structure for Bridges ❖ Types of Super structures ❖ Selection criteria for selection of different types of superstructure ❖ Span length vis-à-vis options for different types of superstructures ❖ Distribution of super imposed loads on different girders ❖ Various codal provision in IRC:112-2011 ❖ Worked out example of 20 m span RCC girder,
15.45-17.15	**Test, Feedback, Concluding and Distribution of Certificates**

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