K. K. Wagh Institute of Engineering Education and Research, Nashik
(An Autonomous Institute from A. Y. 2022-23)

Marking Scheme (Set 1)
End-Sem Examination-I, Winter 2025

Academic Year: 2025-2026	Semester: II
Class: M.Tech	Program: Structural Engineering
Branch Code: CIV	Pattern: 2024
Name of Course: Advanced Design of Concrete Structures	Course Code: 2404513

Q.1 (a) Assumptions of Yield Line Theory – 6 Marks

- Any **six correct assumptions** – **1 mark each**
  - Rigid–plastic behavior
  - Formation of collapse mechanism
  - Straight yield lines
  - Full plastic moment developed
  - Deformation along yield lines only
  - Virtual work principle
  - No premature shear/bond failure
  - Minimum collapse load concept
    (Max 6 marks)

Q.2 (a) Flat Slab and Its Types – 6 Marks

- Definition of flat slab – **2 marks**
- Explanation of types (any four @ 1 mark each) – **4 marks**
  - Flat plate
  - With drop panels
  - With column heads
  - With drop panels + column heads

Q.3 (a) RC Deep Beams – Behavior & Design Principles – 8 Marks

- Definition & span/depth ratio – **2 marks**
- Behavior characteristics (any three) – **3 marks**
- Design principles (STM, load path, detailing) – **3 marks**

Q.3 (b) Beams Curved in Plan – Behavior – 8 Marks

- Types of forces (bending, torsion, shear) – **3 marks**
- Stress behavior (inner compression, outer tension) – **3 marks**
- Design considerations – **2 marks**

Q.3 (c) Shear Failure & Design of Deep Beams – 8 Marks

- Shear failure modes (any three) – **3 marks**
- Design steps (any five @1 mark) – **5 marks**

Q.3 (d) Design Methodology of Curved Beams – 8 Marks

- Load resolution – **2 marks**
- BM & torsion calculation – **2 marks**
- Reinforcement design – **2 marks**
- Serviceability & detailing – **2 marks**

Q.4 (a) Rectangular Water Tank (IS Code Method) – 8 Marks

- Analysis of forces & moments – **2 marks**
- Vertical moment calculation – **2 marks**
- Steel area calculation – **2 marks**
- Vertical reinforcement details – **2 marks**

Q.4 (b) Circular ESR – 8 Marks

- Identification of stresses – **2 marks**
- Hoop tension design – **3 marks**
- Vertical bending & ring beams – **3 marks**

Q.4 (c) Rectangular Tank (Approximate Method) – 8 Marks

- Continuous frame action – **2 marks**
- Moment calculation – **2 marks**
- Design of long wall – **2 marks**
- Design of short wall / cantilever action – **2 marks**

Q.4 (d) Design Principles of Rectangular ESR – 8 Marks

- Forces acting – **3 marks**
- Structural behavior of components – **3 marks**
- Water-tightness & detailing – **2 marks**

Q.5 (a) Pile Group Efficiency – 8 Marks

- Definition & formula – **3 marks**
- Factors affecting efficiency (any five @1 mark) – **5 marks**

Q.5 (b) Combined Footing – Suitability & Design – 8 Marks

- Suitability of types with sketches – **4 marks**
- Design steps of slab-type rectangular footing – **4 marks**

Q.5 (c) Raft vs Pile Foundation – 8 Marks

- Correct comparison table (any four points @2 marks) – **8 marks**

Q.5 (d) Design of Pile Cap (4 Piles) – 8 Marks

- Methods of pile cap design – **2 marks**
- Load transfer & design steps – **4 marks**
- Sectional sketch with reinforcement detailing – **2 marks**