Note: Attempt all questions. Each question is of 20 marks.

Q.1 Attempt any 4 parts, each part is of 5 marks
   a) What do you mean by Toughness and Hardness of Aggregate?
   b) What are the Mineral Admixtures? Explain
   c) What is the Characteristic strength of Concrete?
   d) What do you understand by Creep of concrete?
   e) Write a short note on Durability of concrete.

Q.2 Attempt any 4 parts, each part is of 5 marks
   a) Write the basic fundamentals of limit state design.
   b) Write the basic fundamentals of working stress design.
   c) Write a short note on grades of concrete.
   d) What do you mean by over reinforcement and under reinforcement?
   e) A plane concrete beam (M20 grade concrete) has a rectangular section, 300 mm wide and 500 mm deep (overall) estimate the cracking torque.

Q.3 Attempt any 2 parts, each part is of 10 marks
   a) Draw Stress-Strain Curve of mild steel in tension and locate important point and explain about them.
   b) Design a rectangular beam for an effective span of 6 m. the superimposed load is 80KN/m and size of the beam is limited to 30cm x 70cm overall. Use M20 and Fe 415.
   c) Design a rectangular beam for 4 m effective span which is subjected to a dead load of 15 KN/m. Use M15 and Fe 415.

Q.4 Attempt any 2 parts, each part is of 10 marks
   a) A circular column 4.6 m high is effectively held in position at both ends of resistant against rotation. Design the column to carry as axial load of 1200 KN, if its diameter is restricted to 450 mm use M20 and Fe 415.
   b) Design a one way slab, with a clear span of 4 m. simply supported on 230 mm thick masonry walls, and subjected to a live load of 4 KN/m² and a surface finish of 1 KN/m². Assume Fe 415 and assume that the slab is subjected to moderate exposure conditions.
   c) Discuss stability analysis of the retaining walls.

Q.5 Attempt any 2 parts, each part is of 10 marks
   a) Design an isolated footing for a square column, 450mm X 450mm, reinforced with 8-25 dia bars, and carrying a service load of 2300 KN. Assume soil with a safe bearing capacity of 300 KN/m² at a depth of 1.5 m below ground, assume M 20 and Fe 415 for footing, and M25, Fe 415 for column.
   b) Determine suitable dimensions of a cantilever retaining wall, which is required to support a 4.0 m high bank of earth above the ground level on the toe side of the wall. Consider the backfill surface to be inclined at angle of 15° with the horizontal. Assume good soil for foundation at a depth of 1.25 m below the ground level with a safe bearing capacity of 160 KN/m² and an angle of shearing resistance of 30°. Assume coefficient of friction between soil and concrete to be 0.5.
   c) i) Define the types of retaining walls and their behavior.
      ii) Write a note on combined footing. And draw its diagram.