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**MVSE-104****M.E./M.Tech., I Semester Examination, June 2016****Design of Concrete Structures****Time : Three Hours****Maximum Marks : 70****Note:** i) Use of relevant IS codes, IRC publications and tables are permitted.

ii) Sketch the design details.

iii) Missing data, if any may be suitably assumed.

1. Design an interior panel of a flat slab with panel size  $6\text{m} \times 6\text{m}$  supported by columns of size  $500\text{mm} \times 500\text{mm}$ . Provide suitable drop. Take live load as  $5\text{kN/m}^2$ . Use M25 concrete and Fe415 steel HYSD bars. 14
2. A R.C.C. grid floor is to be designed to cover a floor area of  $12\text{m} \times 18\text{m}$ . The spacing of the ribs in mutually perpendicular directions is  $1.5\text{m}$  c/c. Live load on floor is  $3\text{kN/m}^2$ . Adopt M25 grade concrete and Fe415 grade HYSD bars. Assume ends are simply supported. Analyse the grid floor by IS 456:2000 method and design suitable reinforcements in the grid floor. 14
3. Compute the maximum bending moment for a solid slab bridge for IRC class AA tracked vehicle loading for the following data: 14
  - i) Clear span =  $8.0\text{m}$
  - ii) Clear width of roadway =  $8.0\text{m}$
  - iii) Average thickness of wearing coat =  $80\text{mm}$
  - iv) Width of bearing =  $800\text{mm}$
4. Design a rectangular water tank of size  $5\text{m(L)} \times 4\text{m(W)} \times 3\text{m(D)}$  resting on firm ground. Use M25 grade concrete and Fe415 grade HYSD bars. 14
5. Distinguish between Bunkers and Silo. Design side walls of a rectangular bunker of capacity  $300\text{kN}$  to store coal using M25 concrete and Fe415 steel. Given: 14
  - i) Unit weight of coal =  $8\text{kN/m}^3$
  - ii) Angle of repose of coal ( $\phi$ ) =  $25^\circ$
  - iii) Coefficient of friction between coal and concrete ( $\mu$ ) =  $0.444$ .
6. a) Sketch the layout of tendons of a PSC continuous beam 8
  - i) Straight
  - ii) Curved in elevation
- b) Explain circular prestressing and construction details of a circular container. 6
7. a) Explain in detail: 3
  - i) Methods of post tensioning. 3
  - ii) Stress in Anchorage zone 3
- b) Design an Intze tank for capacity of  $400\text{kL}$ . Use M25 concrete and Fe415 steel. 8
8. Write short notes on any four of the following:  $3\frac{1}{2} \times 4 = 14$ 
  - a) Indeterminate pre-stressed concrete structures
  - b) Composite construction
  - c) Airy's theory for design of silos
  - d) Battery of bunkers
  - e) Deep beams
  - f) Prestress end block design

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