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मापक - 007

## Advance Design of Concrete Structures (1030)

P. Pages : 2

Time : Four Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.

1. Design an Interior Panel of flat slab for L. L. of  $4 \text{ kN/m}^2$  and F.F. of  $1 \text{ kN/m}^2$ . The Pannels are  $6\text{m} \times 6\text{m}$ , The Diameter of the supporting column is 400mm. Drop shall be provided. The exposure conditions are mild. Floor to floor height of column is 3.5m. Use Direct design method and Material M20 and Fe500. Take all the necessary checks as per I.S. Provisions. Show details of reinforcement. **25**
2. Design a Grid floor porch  $12\text{m} \times 20\text{m}$  with centre to centre spacing of ribs as 2m both way Assuming slab thickness as  $1/20^{\text{th}}$  of span. Take L. L =  $4 \text{ kN/m}^2$  & F.F =  $1.5 \text{ kN/m}^2$  use M20 & Fe500. Draw details of reinforcement. **25**
3. Design a beam of composite construction for following requirement. **25**
  - a) Flange width provided by slab = 1500 mm.
  - b) Thickness of the slab = 100 mm.
  - c) Span of the beam = 12m.
  - d) Total load on beam = 24 kN/m.
  - e) Prefabricated unit shall be a steel beam section.
4. A circular girder is  $450 \text{ mm} \times 650 \text{ mm}$  in section and is supported on 8 columns equally spaced on a circle of diameter 7.5m. The girder is subjected to service load of  $80 \text{ kN/m}$ . The supporting columns are 300mm diameter. Design the girder using material M20 and Fe 415. **25**
5. The foundation for a structure comprising six piles of square cross section have to support a service load of 3600 kN. The piks are driven through a hard stratum and bear on hard rock. Design the reinforcement in the pile assuming the pile to be 6m. long and use M20 & Fe 415 steel. Sketch the details of reinforcement in pile. **25**

6. Design a slab pannel fixed on all edges. Having  $\mu$  same in both Directions at top and bottom, Pannel size is  $8\text{m} \times 10\text{m}$  use M25 and Fe 500. **25**
7. a) A one way continuous slab of 4m span, carrying Uniformly Distributed load, the thickness of the slab and reinforcement are such that the Ultimate M.R. of slab at support A and B and in the span region are  $80 \text{ kN-m/m}$ ,  $60 \text{ kN-m/m}$  and  $50 \text{ kN-m/m}$  respectively. Using the yield line theory calculate the collapse load. **15**
- b) Design a reinforced concrete spherical dome on a base radius of 15m and rise of 5m for supporting total uniformly Distributed load including self weight of  $3\text{kN/m}^2$  use M20 & Fe 415. **10**
8. a) Design a pile cap for group of two piles spaced 1.5m apart. The piles are 400 mm diameter and the column transmits a factored load of 1000 kN and is of size  $500\text{mm} \times 500\text{mm}$  use M20 and Fe 415. Draw the details of reinforcement. **10**
- b) Explain the following in detail. **15**
- i) Design of High Performance concrete.
- ii) Effect of creep & shrinkage on concrete.
- iii) Any two methods of NDT. Testing.

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