Code No: RR420108 **Set No.1**

IV B.Tech. II Semester Regular Examinations, April/May -2006
ADVANCED STRUCTURAL ENGINEERING
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FOUR Questions
All Questions carry equal marks
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NOTE: Use relevant I.S. Codes & Tables permitted
Assume suitable data whenever necessary

1. Design the side wall (using Airy's theory for pressures) of a 20m high cylindrical silo of internal dia. 6m used to store wheat. Use M-20 grade concrete and Fe-415 grade steel. Sketch the reinforcement details. Take unit weight of wheat=8KN/m^3. [20]

2. Fix up the dimensions of a square R.C. bunker to store coal (unit weight=8KN/m^3) of volume 25m^3. Design the side walls using M-15 grade concrete and Fe-415 grade steel. Sketch the reinforcement details. Take ϕ=30^0. [20]

3. Design the cylindrical portion of an R.C. chimney of 60m height, external dia. 4m for a uniform wind pressure of 1500N/m^2. Use M-25 grade concrete and Fe-415 grade steel. Sketch the details of reinforcement. [20]

4. (a) With the help of a neat sketch illustrate the parts of a cylindrical shell. [10]
   (b) Name some of the methods of analysis of shells without going through the analysis. [4]
   (c) Explain the behaviour of shell as a structural form. [6]

5. Write notes on any TWO: [2×10=20]
   (a) Bunkers & silos
   (b) Janssen's theory
   (c) Grid floors

6. Design an R.C. grid floor to carry a live load of 1.8KN/m^2 over an area of 12m×18m. The spacing of ribs in the two directions=1.5m c/c. Use M-20 grade concrete and Fe-415 grade HYSD bars. Sketch the reinforcement details. Use IS:456 or any other suitable method. Assume all the 4 sides to be simply-supported. [20]

7. Design the RC slab, steel girders and shear connectors of a composite bridge deck two-lane road bridge of span 14m. There are 4 steel girders at 2.5m c/c spacing. Use M-20 grade concrete and Fe-415 grade steel. Take design live load as IRC-class AA (tracked). Give neat sketches. [20]

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Code No: RR420108 **Set No.2**

IV B.Tech. II Semester Regular Examinations, April/May -2006
ADVANCED STRUCTURAL ENGINEERING
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FOUR Questions
All Questions carry equal marks
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NOTE: Use of relevant I.S. Codes & Tables permitted
Assume suitable data whenever necessary

1. Design the sloping bottom of an R.C. silo 6m in internal dia. and 20m height used to store wheat. The slope provided is 45^0 and the bottom hole 440mm in dia. Use M-20 grade concrete and Fe-415 grade steel. Sketch the reinforcement details. Assume unit weight of wheat=8KN/m^3. [20]

2. Design the side walls of an R.C. square bunker of side 2.5m and height 3.5m to store coal. Use M-15 grade concrete and Fe-415 grade steel. Take the unit weight of coal=8KN/m^3 and angle of repose=30^0. Sketch the reinforcement details. [20]

3. Check the stresses in concrete an steel for an R.C. chimney for the following data:-
Outside dia=4m
Height=60m
Sections considered at depth of 24m, 48m and 60m below top.
Thickness of 3 portions=200, 250 and 300mm
Wind pressures for the 3 portions=1650, 1500 and 1000 N/m^2.
Assume 1% steel in all the portions
Thickness of brick lining provided=10cm
Air gap between shell & lining=150mm
Mix used M-25 grade and steel Fe-415 grade steel. Sketch the reinforcement details. [20]

4. Without going through the analysis of folded plates,
   (a) List out the assumptions usually made. [8]
   (b) Explain the difference between "plate" action and "slab action". [4]
   (c) Name the methods of analysis. [4]

5. Write notes on any TWO: [2×10=20]
   (a) Janssen's theory
   (b) Classification of plates
   (c) Temperature effects in chimneys

6. Design an R.C. grid floor (12m×18m) to carry a live load of 2KN/m^2 using M-20 grade concrete and Fe-415 grade steel. The spacing of ribs in both directions=1.5m c/c. Sketch the reinforcement details by taking a C.S. of grid. [20]

7. Design a composite bridge deck consisting of an R.C. slab on steel girders. The span of the two lane highway bridge is 15m. There are 4 steel girders at 2.5m c/c spacing. Use M-25 grade concrete and Fe-415 grade steel. Consider IRC-class AA tracked vehicle only for live load. No need to design connection between flange and web, intermediate and end stiffences. Give neat sketches. [20]

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Code No: RR420108 **Set No.3**

IV B.Tech. II Semester Regular Examinations, April/May -2006
ADVANCED STRUCTURAL ENGINEERING
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FOUR Questions
All Questions carry equal marks
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NOTE: Use of relevant I.S. Codes & Tables permitted
Assume suitable data whenever necessary

1. Using Janssen's theory for pressures design the vertical wall of an R.C. silo used to store wheat and also the ring beam at the junction with the conical bottom having 45^0 slope and 500mm dia hole. The internal dia. of silo is 6m and height 20m. Sketch the reinforcement details. Take M-20 grade concrete and Fe-415 grade steel. Unit weight of wheat=8KN/m^3. [20]

2. Design the side walls of a square R.C. bunker to store 200KN of coal (unit weight= 8KN/m^3 and angle of repose 30^0). Use M-15 grade concrete and Fe-415 grade steel. Sketch the reinforcement details. [20]

3. Design the base of an R.C. chimney of outside dia 4m; height above G.L.=60m. Use M-15 grade and concrete and Fe-415 grade steel.
Assume other details as per standard practice. Show the reinforcement details with a neat sketch. [20]

4. With the help of neat sketches illustrate the different types of Folded plates. [20]

5. Write short notes on any TWO: [2×10=20]
   (a) Shell structures
   (b) Airy's theory
   (c) Composite Bridge Deck systems

6. An R.C. grid roof is to be designed to cover an area of 12m×16m, the spacing of ribs in mutually perpendicular directions being 2m c/c. Take live-load as 1.5KN/m^2. Adopt M-20 grade concrete and Fe-415 grade steel. Sketch the reinforcement details, taking a C.S. of grid. [20]

7. Design the super structure of a composite bridge deck consisting of an R.C. slab on steel girders. It is a two-lane highway bridge of 12m span. There are 4 steel girders at 2.5m c/c. Use M-20 grade concrete, Fe-415 grade steel and IRC-class AA tracked vehicle as live load. Give sketches [20]

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Code No: RR420108 **Set No.4**

IV B.Tech. II Semester Regular Examinations, April/May -2006
ADVANCED STRUCTURAL ENGINEERING
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FOUR Questions
All Questions carry equal marks
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NOTE: Use of relevant I.S. Codes & Tables permitted
Assume suitable data whenever necessary

1. Design the side wall of an R.C. silo of internal dia. 6m and height 20m used to store wheat. Use M-20 grade concrete and Fe-415 grade steel. Sketch the reinforcement details. Assume unit weight of wheat=8KN/m^3. [20]
2. Design the hopper bottom of an R.C. square bunker of side 2.5m and height 3.5m to store coal (unit weight=8KN/m^3 and angle of repose=30^0). The hopper is 45^0 inclined and has an opening of 500mm×500mm. Use M-15 grade concrete and Fe-415 grade steel. Sketch the reinforcement details. [20]
3. Design the cylindrical portion of an R.C. chimney of outside dia. 4m height above G.L. = 70m. Take intensity of uniform wind pressure as 1000N/m^2. Consider sections at 18m, 42m and 70m below top. Assume 1% steel and check the sections 10cm thick lining is provided supported at every 6m. An air-gap of 150mm is provided between the lining and inside of shell. Use M-25 grade concrete and tor steel. Sketch the details of reinforcement. [20]
4. With the help of neat sketches illustrate some of the important types of shell roofs. [20]
5. Write notes on any TWO: [2×8=16]
   (a) Folded plate structures
   (b) Airy's theory
   (c) Shear connectors.
6. Design the R.C. slab, steel girders and shear connectors of a composite bridge deck of a two-lane road bridge of 14m span. There are 4 steel girders at a spacing of 2.5m c/c. Use M-25 grade concrete and Fe-415 grade steel. The live load is taken as IRC-class AA tracked. Give neat sketches. [20]
7. Design for temperature effects an R.C. chimney 66m height having 4m external dia. 100mm thick brick lining is provided upto 42m height above G.L. with an air gap of 100mm. The temperature of gases above surrounding air is 200^0C. Use M-25 grade concrete and Fe-415 grade steel. Take $\alpha_S=\alpha_C=11\times10^{-6}/^0$C and $E_S=2\times10^5$N/mm^2. Assume other data. [20]

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