

Ganpat University
B. Tech. Semester: VIII Civil Engineering
Regular Examination May – June 2016
2CI801- Advanced Structural Design

Time: 3 Hours

Total Marks:70

- Instructions:**
1. Make suitable assumptions wherever necessary.
 2. Figures to the right indicate full marks.
 3. IS-456:2000, IS-800:2007, IS-875(I, II, III) & Steel table are permitted.

SECTION-I

- Q-1 (A) Design a stem of cantilever retaining wall and check for stability to retain a level earth of 3m above basement level. The angle of repose of soil is 35° . The unit weight of soil is 17kN/m^3 . The coefficient of friction between soil and concrete is 0.6. The S.B.C. of soil is 170kN/m^2 . Use M25 concrete and Fe415 steel. 8
- (B) Distinguish between: 4
- (1) Active and Passive earth pressure
 - (2) Counterfort and Buttress retaining wall
- OR**
- Q-1 Design the heel slab and toe slab of counterfort retaining wall to retain a level earth of 7m above basement level. The angle of repose of soil is 30° . The unit weight of soil is 18kN/m^3 . The coefficient of friction between soil and concrete is 0.6. The S.B.C. of soil is 100kN/m^2 . Use M15 concrete. Draw the sketch. 12
- Q-2 Write down short note on: 12
- (i) Janssen's theory
 - (ii) Airy's theory
- OR**
- Q-2 A silo with internal diameter 4.5m, height of cylindrical portion 22m and central opening with 0.5m is to be built to store wheat. Design the silo using M20 grade concrete and Fe415 steel. Given: 12
- Unit weight of wheat = 9 kN/m^3
 Angle of internal friction = 28°
 Angle of wall friction = 0.75ϕ while filling
 = 0.60ϕ while emptying
 Pressure ratio $p_h/p_v = K = 0.5$ while filling
 Use Janssen's theory for pressure calculations.
- Q-3 (A) Find out Maximum and Minimum Pressure for a base slab width of 4m in cantilever Retaining Wall. Given data: 5
- Net Stabilized moment = 920 kNm
 Net overturning moment = 310 kNm
 Total load = 590 kN
 SBC of Soil = 200 kN/m^2 .

- (B) Find out Pressure at junction of stem & toe for a base slab width of 4m in cantilever Retaining Wall. Given data: 6
- | | |
|------------------------|---------------------------|
| Width of stem | = 0.4m |
| Toe projection | = 1.0m |
| Base pressure at heel | = 26.7kN/m ² . |
| Net Stabilized moment | = 911.8kNm |
| Net overturning moment | = 314.4kNm |
| Total load | = 594.65kN |
| SBC of Soil | = 200kN/m ² . |

SECTION-II

- Q-4 (A) Give the difference between Bunkers and Silos with neat sketches. 4
- (B) Design side walls of a rectangular bunker of capacity 400 kN to store coal using M20 concrete and Fe415 steel. Unit weight of coal is 8.5 kN/m³. Angle of repose of coal, $\phi=25^\circ$. 8
- Q-5 Calculate the load on a roof truss for an industrial building with 25 m span and 50 m long. The roofing is galvanized iron sheeting. The basic wind speed is 50 m/s and terrain is open industrial area. Building is class B building with a clear height of 8m at the eaves. Draw figure of any one load at panel points. 11
- OR**
- Q-5 Design a purlin on a roof truss with the following: 11
- Dead load = 0.21 kN/m²
- Live load = 0.724 kN/m²
- Wind load = 2.586 kN/m²
- The span of purlin is 5m and spacing of purlin is 1.275m. Angle of roof truss is 12^o. Use CHANNEL section as a purlin.
- Q-6 An 8m long column of an industrial building supports a bracket 1.5m x 1m and 1.8m below the column end supporting a truss. The maximum reaction from the truss is 300kN. The bracket supports a girder transmitting an end reaction of 165kN at an eccentricity of 1m from the centroidal axis of the column. The maximum positive and negative bending moment on column is 110kN-m & -40kN-m respectively. The reaction and the loads have been computed from factored loads. 12
- OR**
- Q-6 (A) Design the base plate for an ISHB350 column to carry a factored load of 1200kN. Assume Fe410 grade steel and M20 concrete. 4
- (B) Design strut of a roof truss member for the following: 8
- Length: 1.8m, Compressive force: 125kN, Tensile force: 140kN

END OF PAPER