GANPAT UNIVERSITY

B.TECH SEMESTER VIII (CIVIL ENGINEERING)

REGULAR EXAMINATION MAY – JUNE 2014

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 Design Stem, Heel slab and Toe slab of retaining wall to retain the earth 3.5m high. The top surface is horizontal behind the wall but subjected to a surcharge of 17kN/m^2. The soil behind the wall is a well drained medium dense sand with following properties: **12**

Unit wt. γ =17kN/m^3

Angle of internal friction Φ=30°

The material under the wall base is the same as above with S.B.C. of 150kN/m^2. The coefficient of friction between base and soil is 0.55. Design the wall using M20 grade concrete and HYSD reinforcement of grade Fe415.

OR

Q-1 A counterfort retaining wall has a height of retaining earth of 6m. The top surface is horizontal behind the wall. The soil behind the wall is a well drained medium dense sand with following properties: **12**

Unit wt. γ =16.2kN/m^3

Angle of internal friction Φ=30°

The material under the wall base is the same as above with S.B.C. of 150kN/m^2. The coefficient of friction between base and soil is 0.6. Design the stem and counterfort using M20 grade concrete and HYSD reinforcement of grade Fe415.

Q-2 Design side walls and hopper bottom of a rectangular bunker of capacity 500 kN to store coal using M20 concrete and Fe415 steel. Unit weight of coal is 8 kN/m^3. Angle of repose of coal, φ=25°. **11**

OR

Q-2 Design side walls and hopper bottom of a circular bunker of capacity 500 kN to store coal using M20 concrete and Fe415 steel. Unit weight of coal is 8 kN/m^3. Angle of repose of coal, φ=25°. Give the check for direct stress and shear stress. **11**

Q-3 A silo with internal diameter 5m, height of cylindrical portion 20m 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 = 8.5 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.

SECTION-II

Q-4 Design of Angle Purlin for fink type truss span of 16m pitch ¼ and, using AC sheet for Covering a roof bay width 4m, height of building 12m and location Ahmadabad, length of industrial building is 40m, F_y=250N/mm^2 & E = 2 X 10^5 N/mm^2. **12**

OR

Q-4 Design a column section for industrial building having axial force 1000kN having moment of 200kNm. **12**

F_y=250N/mm^2 & E = 2 X 10^5 N/mm^2.

Q-5(A) Design of top cord member for Gable type of truss span of 16m pitch ¼ having tension force of 230kN and compressive force of 90kN. **5**

F_y=250N/mm^2 & E = 2 X 10^5 N/mm^2.

Q-5(B) Design of Vertical main tie member N type of truss span of 20m pitch ¼ having tension force of 170kN and compressive force of 69kN. **6**

F_y=250N/mm^2 & E = 2 X 10^5 N/mm^2.

Q-6 **Attempt any two.** **12**

(i) Janssen's theory

(ii) Design procedure for Purlin using Channel Section. Define the IS code provision with its Details.

(iii) Discuss briefly various types of retaining walls and situations where a particular type is used.

END OF PAPER