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Total Number of Pages: 02

B.Tech
PECI5403

7th Semester Regular / Back Examination 2016-17
DESIGN OF ADVANCED CONCRETE STRUCTURES

BRANCH: CIVIL

Time: 3 Hours

Max Marks: 70

Q.CODE: Y353

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions: (2 x 10)

- a) Distinguish among *minor*, *moderate* and *major* earthquakes.
- b) How many *earthquake zones* are prescribed? Odisha comes under which zone?
- c) For ductile detailing of RCC structures, which IS Code is referred?
- d) If the height of the retaining wall is required to be increased under certain situation, which type of retaining wall is preferred?
- e) What is the function of a shear key?
- f) State various types of water tanks commonly used for storage of water.
- g) For stability requirement of a retaining wall, state the two checking parameters.
- h) What are the two different types of pre stressing commonly applied in practice?
- i) What is the minimum grade of concrete used for the two different pre stressing systems.
- j) Considering angle of dispersion of 45 degree, draw a figure to show the dispersed width of a wheel.

Q2 Design the heel slab of a cantilever retaining wall as per the given input data. Show the reinforcement detailing. (10)

Height of embankment above GL = 4.0m. Width of heel slab = 1.5 m from the edge of the stem, thickness of heel slab = 350 mm, Density of soil = 18 kN/cubic m. SBC of soil = 200 kN/sq m, angle of repose = 30 degree. Coeff of friction = 0.38, Assume M20 concrete and Fe 415 steel.

Q3 A three storied office building 30m x 30m is to be constructed in Bhubaneswar on hard soil. Find the base shear in an inner frame (longitudinal direction) due to earthquake loading using the data given below. (10)

Bay width = 6 m centre to centre, total no of columns in the longitudinal direction is 4, total length of the longitudinal direction = 24, frame spacing = 4 m centre to centre, floor thickness including finish = 20 cms, outer columns = 40 cms x 40 cms, inner columns = 30cms x 30 cms, girders below floor slab = 30 cms x 40 cms, live load = 3 kN/m², damping = 5%, zone factor = 0.24, I = 1, R =5, S_a/g= 2.2, Height of each floor = 3 m.

Q4 Design a rigid base circular water tank resting on the ground to store 60000 litres of water. The depth of tank is 5m. Assume M20 concrete and Fe415 steel. **(10)**

Q5 Calculate the maximum design bending moment for the slab culvert assuming the given input data. Effective span of the culvert = 6.5 m, wearing coat thickness = 75 mm, 2 lane carriageway width = 7.5 m, thickness of slab = 500 mm, Loading-IRC class AA tracked vehicle, impact = 20%, Minimum clearance from kerb= 1 m, Assume any additional data if required. **(10)**

Q6 A simply supported beam of 6 m span having cross section 25 cm by 30 cm carries an uniformly distributed load of 5 kN/m excluding its own weight. A prestressing force of 300 kN is applied through a straight tendon placed at an eccentricity of 5 cm below the neutral axis. Calculate the resultant stresses at extreme fibres at a distance of 2 m from left end. **(10)**

Q7 (a) Explain the concept of pre stressing system. Draw a figure to show various types of stresses induced in prestressing. **(5)**

(b) State the different types of losses taking place in a pre stressing member, after application of initial pre stress. **(5)**

Q8 Write short answer on any TWO: **(5 x 2)**

- Cyclic behaviour of concrete
- Types and components of a retaining wall
- Need for high strength steel in pre stressing
- Types of loads acting on bridges