

Registration No. :

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Total number of printed pages – 2

B. Tech
PECI 5403

Seventh Semester Back Examination – 2014
DESIGN OF ADVANCED CONCRETE STRUCTURES

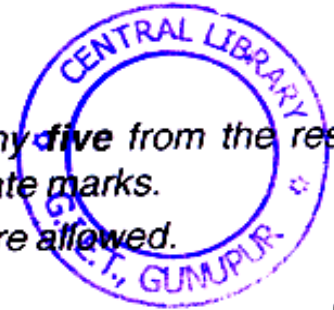
BRANCH : CIVIL

QUESTION CODE : L 190

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory and any **five** from the rest.
The figures in the right-hand margin indicate marks.
Use of relevant IS Codes and IRC Codes are allowed.*



1. Answer the following questions : 2×10
- Distinguish between active earth pressure and passive earth pressure as applicable for retaining walls. Draw suitable figure to explain it.
 - Draw the elevation of a counterfort retaining wall and show different components.
 - What do you mean by Importance Factor in earthquake resistant design of structures ?
 - Distinguish between minor, major and moderate earthquakes.
 - Explain why high strength steel is used in prestressed concrete.
 - State the salient features of IRC AA loading.
 - What are the various factors which influence the ductility of a structure ?
 - State the various types of forces and loads which act on a simply supported slab culvert bridge ?
 - Name the various IS codes which are used for earthquake resistant design of structures.
 - State the various types of loads and forces which act on a bridge structure.
2. Design the stem of a cantilever retaining wall of 5 m height above ground level with angle of repose of 30 degree. The density of soil at site is 18 kN/cubic metre and the safe bearing capacity of soil is 140 kN/cubic metre. The coefficient of friction between soil and concrete as 0.55. Use M20 concrete and Fe 415 steel. Assume suitable additional data, if required. 10

P.T.O.

3. A simply supported rectangular concrete beam, 150 mm wide and 300 mm deep is having a span length of 6 m carrying a live load of 3 kN/m in addition to its dead load. It carries an effective prestressing force of 250 kN through a horizontal tendon located at an eccentricity of 30 mm below the neutral axis. The beam also carries a concentrated load of 5 kN at a distance of 2 m from left end. Calculate the resultant stresses at extreme top and extreme bottom at a section, 4 m from left end. 10
4. Find the design shear force for the RCC slab culvert as per the following data. Carriage way two lane = 7.5 m wide, Clear span = 6.0 m, Wearing coat = 80 mm Width of bearing = 350 mm, Diameter of reinforcement bars = 28 mm Loading on bridge = IRC Class AA wheeled. Draw suitable figures to calculate the required values. 10
5. A three storied office building 24 m × 24 m is to be constructed in Sambalpur on rocky soil. Calculate the lateral force and storey shears in an external corner frame due to earthquake loading adopting the following data. Bay width = 4m centre to centre, frame spacing = 6 m centre to centre Floor thickness including finish = 30 cms, Outer columns = 35 cms × 35 cms Inner columns = 45cms × 45 cms, Girders below floor slab = 30 cms × 40 cms Live load = 3 kN/m². Assume any other data if required. 10
6. A prestressed concrete beam of section 200 mm wide by 300 mm deep having an effective span of 8m carries a live load of 5.0 kN/m. Calculate the maximum and minimum resultant stresses at a distance 3 m from left end. The beam is subjected to a concentric prestressing force of 100 kN over a horizontal cable. 10
7. (a) Explain the types of losses which occur for pretensioned prestressed concrete members. Derive the loss due to elastic deformation of concrete. 5
(b) A pre tensioned beam of 150 mm wide and 300 mm deep is prestressed by 8 wires of 6 mm diameter initially stressed to 1000 N/sq mm with their centroid at a distance of 40 mm below the neutral axis. Calculate the maximum stress in concrete immediately after transfer allowing the loss due to elastic deformation of concrete. 5
8. Write short notes on the following : 3.33×3
(a) Concept of ductility in RCC members
(b) Stability requirements for a retaining wall
(c) Pretensioning and post tensioning.