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Total No. of Questions : 09

B. Architecture (2012 & Onwards) (Sem.-3)

STRUCTURE DESIGN-I

Subject Code : BACH-307

M.Code : 70419

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. Attempt SIX questions. Q. No. 1 is **COMPULSORY**. Attempt any FIVE from the rest.
2. Missing data, If any may be assumed suitably.
3. Relevant codes are allowed.

1.
 - a) Define retaining wall. 2
 - b) Differentiate between gross and net bearing capacity of soil. 2
 - c) What do understand by effective length/height of a wall? 2
 - d) Explain the difference between span and spacing of a truss. 2
 - e) Define the middle third rule of stability of a dam/retaining wall. 2
2.
 - a) Discuss various terms :
 - i) Slenderness ratio 2
 - ii) Shape factor of units 2
 - b) A wall 342 mm thick transmits a total load of 200 kN/m to the soil. Calculate the width and depth of foundation if soil weighs 17 kN/m^3 , its angle of repose is 32° and the net safe bearing capacity is 200 kN/m^2 . Design the footing. 6
3. A wall carries a load of 120 kN/m including its own weight. Find suitable width and depth of its foundation. Take $p = 120 \text{ kN/m}^2$, $w = 17 \text{ kN/m}^3$ and $\Phi = 30^\circ$. Design suitable section of footing if wall is 300mm thick above plinth and is constructed with $200 \times 100 \times 100 \text{ mm}$ bricks. Make a neat sketch of section of footing. 10

4. Discuss all the conditions of stability of masonry retaining walls. Derive the middle third rule of stability of retaining wall. 10
5. Find the stability of a retaining wall with top width as 1m, bottom width 3m and height 6m retaining earth fill on vertical face. Also find the extreme stresses at the base of the wall taking the densities of soil retained and masonry as 16kN/m^3 and 22kN/m^3 respectively. Assume angle of internal friction as 30° . 10
6. Design a brick pier section to carry an axial load of 200 kN. The width of the pier is restricted to $1\frac{1}{2}$ normal brick. The brickwork is in 1:3 cement mortar using 1st class bricks (nominal) with crushing strength 10 MPa. The pier is 3.53 meter high with both ends fixed. Also, calculate the load carrying capacity of the same pier if load is 10mm eccentric. 10
7.
 - a. Discuss Timber beams in detail. 5
 - b. Explain various checks applied in case of design of timber beams. 5
8. Design a simply supported beam of deodar wood carrying a u.d.l. of 15 kN/m inclusive of its self wt. The clear span of beam is 4.0 m (supported on walls of 230mm thickness). Apply all checks. Given data: Allowable permissible bending stress = 10.2 N/mm^2 . Allowable shear stress = 0.8 N/mm^2 . $E = 10000\text{ N/mm}^2$. 10
9.
 - a. Draw a labeled sketch of a truss showing all the members clearly. 5
 - b. What are the different loads applied on roof truss? How these loads are calculated? 5

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.