Problems from Previous Quizzes

Use the units given. Show all computations and sketches clearly.

1.   At a given site a 6ft thick sand layer overlies a clay layer that is also 6ft thick. A 6ft by 12ft footing carrying a load of 216 tons is located 3ft below ground surface. Determine stress increases at *mid depth of the clay layer* at a point:

a.   directly below the middle of the footing (20)

b.   along the edge in the long direction at half way from corner of the footing (15)

2. A flexible rectangular area 4m by 8m is subjected to a stress of 500kN/m^2. Stress increase directly below middle of the long edge of the loaded area, at a depth of 8m is[1]: (15):

(a) 42kPa   (b) 60kPa   (c) 84kPa   (d) 120kPa

3.   A mat foundation 10m by 15m carries a load of 40MN and is resting in clay. Mat thickness is 1m, and γ_{con} = 24kN/m^3. Unconfined compressive strength of the clay is 600kPa, its γ = 17kN/m^3.

a.   Determine depth of foundation D_F for a factor of safety of 3.(25)

3.   Indicate the statements that are true (T), if false (F) please **correct** them in the space provided.(15)

T/F	
	Allowable pressure on footings is based on permissible settlement
	Bearing capacity of footings in dense sand occurs due to punching shear failure
	Bearing capacity of footings in clay must be adjusted if water table is less than a distance 'B' below the footing
	Mat foundations are more economical than isolated footing foundations
	Coefficient of earth pressure at-rest is the ratio of total horizontal stress to total vertical stress

4.   A square footing 1.75m by 1.75m is located 1m below ground. It is subjected to a vertical load of 320kN and a clockwise moment of 40kN-m. Unconfined compressive strength of the underlying soil is 100kPa. Determine

   a.   factor of safety for this footing using Vesic's bearing capacity equations.
   b.   maximum stress below this footing

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[1] no partial credit for this part of the problem